

# B.A. Semester Subjects Combination W.e.f. 2015

Honours Elective	Elective Group-A	Elective Group-B
Chemistry	Physics, Mathematics	Botany, Zoology
Physics	Mathematics, Chemistry	Mathematics, Electronics
Mathematics	Physics, Chemistry	Physics, Statistics
Statistics	Physics, Mathematics	Computer Science, Mathematics
Computer Science	Electronics, Physics	Physics, Mathematics
Electronics	Physics, Mathematics	Mathematics, Computer Science
Geology	Physics, Mathematics	Chemistry, Mathematics
Geography	Botany, Zoology	Economics, History
Biochemistry	Chemistry, Zoology	Chemistry, Botany
Biotechnology	Chemistry, Botany	Chemistry, Zoology
Microbiology	Chemistry, Botany	Chemistry, Clinical Nutrition & Dietetics
Clinical Nutrition & Dietetics	Chemistry, Zoology	Chemistry, Botany
Anthropology	Sociology, Education	Zoology, Botany
Environmental Science	Botany, Zoology	Chemistry, Botany
English	Education, History, DTP	Philosophy, Education, DTP
Linguistics	English, DTP	English, Anthropology, DTP
Hindi	English, Education, DTP	History, Political Sc., DTP
Bengali	English, Education, DTP	History, Political Sc., DTP
Assamese	English, Education, DTP	History, Political Sc., DTP
Nepali	English, Education, DTP	History, Political Sc., DTP
Khasi ✓	English, Education, DTP	History, Political Sc., DTP
Garo	English, Education, DTP	History, Political Sc., DTP
Mizo	English, Education, DTP	History, Political Sc., DTP
Education ✓	History, Political Science	Economics, Sociology
History	Economics, Political Sc.	EI. Language, Political Sc.
Philosophy ✓	EI. Language, Political Sc.	Economics, History
Political Science ✓	EI. Language, Geography	History, Economics
Economics (BA) ✓	Political Sc., History	Political Sc., Sociology
Sociology	Economics, Political Sc	Education, History
Economics (BSc)	Mathematics, Statistics	Geography, Computer Sc.
Botany	Chemistry, Zoology	Chemistry, Microbiology
Zoology	Chemistry, Botany	Chemistry, Anthropology
Fishery Science	Chemistry, Zoology	

NB:- Elective Language refers to Hindi, Bengali, Assamese, Nepali, Khasi, Garo, Mizo and English.

### Illustration :

a) If a Student opts for Chemistry as Honours BSc Course, he/she can either choose Physics & Mathematics as Elective Subject Combination from Elective Group – A or he/she can choose Botany & Zoology from Elective Group – B.

b) If a Student opts for History as Honours B.A Course, he/she can either choose Economics & Political Science as Elective Subject Combination from Elective Group – A or he/she can choose Political Science & EI.Language from Elective Group – B.

**FOUR YEAR UNDER GRADUATE (FYUG)**

**PROGRAMME UNDER**

**NEW EDUCATION POLICY, 2020**

**(1<sup>st</sup> and 2<sup>nd</sup> Semester)**



**Date of approval in Academic Council - 02.06.2023**

## STRUCTURE OF THE SYLLABUS, FYUG PROGRAMME, NEP 2020

(Example- Subject: Economics Major and History Minor)

### 1<sup>ST</sup> SEMESTER

COURSE CATEGORY	COURSE CODE	CREDIT	TOTAL CONTACT HOURS	REMARK
MAJOR	ECO-100*	4	60/75	
MINOR	HIS-100	4	60/75	Student to choose one course from other department
MDC		3	45	Student to choose one course out of the offered courses by the college under each category
AEC		3	45	Student to choose either English or any MIL and continue the same in 2 <sup>nd</sup> Semester.
SEC				Student to choose one course out of the offered courses by the college under each category
VAC	VAC-104	3	45	Compulsory
<b>Total</b>		<b>20</b>		

### 2<sup>ND</sup> SEMESTER

COURSE CATEGORY	COURSE CODE	CREDIT	TOTAL CONTACT HOURS	REMARK
MAJOR	ECO-150	4	60/75	
MINOR	HIS-150	4	60/75	Student to choose one course from other department
MDC		3	45	Student to choose one course out of the offered courses by the college under each category
AEC		3	45	Student to continue the same as chosen in the 1 <sup>st</sup> Semester.
SEC				Student to choose one course out of the offered courses by the college under each category
VAC		3	45	Student to choose one course out of the offered courses by the college under each category
<b>Total</b>		<b>20</b>		

**NOTE: ALL MAJOR AND MINOR COURSES ARE THE CORE COURSES FOR MULTIDISCIPLINARY PROGRAMME**

## **SEMESTER I**

SL NO	CODE	NAME OF THE COURSE (MDC) SEM I
1	MDC 110	COMMERCIAL ARITHMETIC & ELEMENTARY STATISTICS
2	MDC 111	CULTURE AND SOCIETY
3	MDC 112	FUNDAMENTALS OF COMPUTER SYSTEMS
4	MDC 113	FUNDAMENTALS OF EARTH SYSTEM SCIENCE
5	MDC 114	FUNDAMENTALS OF LIFELONG LEARNING
6	MDC 115	INTRODUCTORY LIFE SCIENCES
7	MDC 116	INTRODUCTION TO NATIONAL CADET CORPS
8	MDC 117	INTRODUCTION TO PSYCHOLOGY
9	MDC 118	MATHEMATICS IN DAILY LIFE
10	MDC 119	PHILOSOPHY OF CULTURE

SL NO	CODE	NAME OF THE COURSE (AEC) SEM I
1	AEC 120	ALTERNATIVE ENGLISH
2	AEC 121	MIL-I:ASOMIYA SAHITYAR ITIHAS
3	AEC 122	MIL-I:BANGLA BHASHA-BIGYAN
4	AEC 123	MIL-I: GARO
5	AEC 124	MIL-I: KALITERESHOR KHASI BAD KAKYLLA-KTIEN
6	AEC 125	MIL-I:MIZO LANGUAGE AND TRADITIONAL CULTURE
7	AEC 126	MIL-I:NEPALI
8	AEC 127	MIL-I:हिन्दीभाषाकाव्याविरिकअनुप्रयोग

SL NO	CODE	NAME OF THE COURSE (SEC) SEM I
5	SEC 130	CYBER SECURITY
2	SEC 131	MOTIVATION
1	SEC 132	PERSONALITY DEVELOPMENT
4	SEC 133	PUBLIC SPEAKING
3	SEC 134	TEAM BUILDING

SL NO	CODE	NAME OF THE COURSE (VAC) SEM I
1	VAC 140	ENVIRONMENT STUDIES

**MDC-110: COMMERCIAL ARITHMETIC AND ELEMENTARY STATISTICS**  
**(Contact Hours-45, Credits-3)**

**Course Objective:** To familiarize the students with the knowledge of essential mathematics and statistics that is applicable in business.

**Learning Outcomes:** Students will be able to:

- a. Acquire the knowledge of various arithmetical and statistical concepts
- b. Learn techniques which help in dealing with real-life business situations

**UNIT - I**

Average- simple and weighted average, Ratio and Proportion.

Percentage, Problems on Time and Distance.

Simple interest- Bank interest – Average rate of interest: interest on installment payment

Compound Interest (With the help of logarithms)

Annuities- Annuity certain, Annuity due, Immediate Annuity and Deferred Annuity (With the help of logarithms)

Profit and loss, Market price Discount- trade and cash discount

**UNIT - II**

Bankers discount, true discount, Bill value, Present value, average due date and equation of payment

Stock Exchange investment, transfer of stock and shares, Ex dividend and cum dividend prices

Commission and Brokerage

Probability meaning and definition, Events, Trial, Random experiment, mutually likely events, mutually exclusive events, Favorable cases to an event

**UNIT - III**

Statistics: Meaning, Application and Limitations.

Measures of Central Tendency – Averages (Mean, Median, Mode) and Dispersion (Range, Quartile Deviation and Standard Deviation)

Diagrammatic Presentation of business data (Bar diagram, line diagram, pie and rectangular chart)

**Suggested Readings (Latest Edition)**

- S.C. Chanda & NK. Nag, Commercial Arithmetic, Kalyani Publication
- Dr. S. K. Singh & Samresh Chauhan, Commercial Arithmetic, SBPD Publication
- Dhayagude M. G., Commercial Arithmetic and Statistics, Everest Publishing House

**MDC-111: CULTURE AND SOCIETY**  
**(Contact Hours-45, Credits-3)**

**Course Objectives (COs):**

The course intends to familiarize the students with the conceptual and theoretical aspects of society and culture.

**Learning Outcomes (LOs):** The students will be able to develop insights and examine various concepts related to culture and society. The students are expected to learn components of culture and cultural diversity of India and North-East region of India.

**Unit- I: Conceptual and Theoretical Aspects**

Culture, Cultural Lag, Society  
Components of Culture (Edward B. Tylor)  
Functionalist theory of culture (Broislaw Malinowski)  
Symbolic Interaction (George Herbert Mead)

**Unit- II: Culture and its Attributes**

Language  
Food  
Religion  
Technology

**Unit- III: Socio-Cultural Diversity - India and North-East India**

Linguistic, Religious and Ethnic Diversity in India  
Unity in Diversity: Contemporary Understanding  
Socio-cultural Diversity of North-East India  
Indigenous Knowledge Systems of the Tribes of North-East India

**Suggested readings:**

- Back, les and Andy Bennett et al.2012. *Cultural Sociology- An Introduction*. Wiley Publishers Oxford, UK.
- Beattie, John. 1976. *Other Cultures*. London: OUP.
- Majumdar,D.N. and T.N Madan.2022.*An Introduction to Social Anthropology*.NewDelhi: Mayur Books.
- Marak, Queenbala. 2020. *The cultural Heritage of Meghalaya...* New Delhi: IGRMS and Manohar.
- Marak, Queenbala. 2021. *Food Politics: Studying Food, Identity and Difference among the Garos*. New Castle. CSP.
- Miller, B.2011.CulturalAnthropology. PHI Learning Pvt. Ltd.
- Ogburn, William F.1922. *Social Change with Respect to Nature and Original change*. Chicago: Chicago Press.
- Ranjan, Geetika. 2016. *Approaches to the study of Indian Culture and Society*. New Delhi: Pragun Publications.
- Shangpliang,Rekha M.2010 .*Forest in the Life of the Khasi* .New Delhi: Concept Publications.
- Singer,Milton.1955. *The Cultural Pattern of Indian Civilization*. The Far Eastern Quarterly.15(1).

Subba, T.B. 2016. *North-East India: A Handbook of Anthropology*. NewDelhi: OrientBlackswan.

Tylor, E. B. 2012. *Primitive Culture*. Cambridge University Press. London.

Vidyarthi, L. P and Rai B.K.1985.*Tribal Culture in India*. New Delhi: Concept Publishing Co.

Williams, R .1990.*Cultural Anthropology*. New Jersey: Prentice Hall.

## MDC- 112: FUNDAMENTALS OF COMPUTER SYSTEMS

(Contact Hours-45, Credits-3)

### Course Objectives (COs):

To understand the fundamental organization of a digital computer. To understand data representation along with theoretical basic knowledge of operating systems.

*Learning Outcomes (LOs):* Students will be able to understand the basic information related to hardware and software. To gain basic knowledge of number system, Boolean logic along with types of operating system and network.

### UNIT -I: Computer Fundamentals

15 Hours

Generations of Computer (I-V) , Block Diagram of a Computer Functions of the Different Units ( Input unit, Output unit, CPU (ALU+CU)) , Input & Output Devices , Memories, Memory hierarchy, Registers and Types, Cache Memory , Primary Memory ( Ram, How data is stored in a RAM) DRAM and SRAM, ROM ROM BIOS/ Firmware Types of ROM Secondary Memories , Solid State Drive , CD /DVD. Software, System Software and Application Software , Computer Languages: Machine language, Assembly language, High level language, Program Language Translators, Compiler, Assembler Interpreter.

### UNIT -II: Number Systems and Boolean Algebra

15 Hours

Bit, Byte, Nibble, Word, Binary Number, Binary Arithmetic (Addition, Subtraction, Multiplication, Division), Hexadecimal number system, Octal number system, Conversion between number systems, Binary codes (BCD, ASCII, EBCDIC). Gates AND, OR, NOT, NAND, NOR, XOR and XNOR operations, Boolean variables, postulates and theorems of Boolean Algebra, Boolean functions, Simplification of Boolean expressions by algebraic method, Dual and Complement of a Boolean expression.

### UNIT -III: Basics of Operating System & Network Hours

15

Operating System: Overview, Evolution of Operating System, functions and importance of operating system, types of operating system (GUI and Non GUI), Open source and Non Open Operating System, their advantage and disadvantage , Batch Operating System , Real-Time , Operating System , Distributed Operating System , Embedded Operating System , Network Operating System , Mobile Operating System. Basics of Networking , LAN ,MAN ,Wan , Arpanet.

### Suggested Readings:

### Text Books:



1. Rajaraman, Neeharika Adabala, Fundamentals of Computers 6<sup>th</sup> Edition , Prentice Hall India Learning Private Limited, 2014.
2. Morris. M. Mano, *Digital Logic and Computer design*, 3<sup>rd</sup> Edition, Prentice Hall India 2002.

**Reference Books:**

1. Malvino& Leach, Digital Computer and Applications, 4<sup>th</sup> Edition, Tata Mc-Graw Hill Company, 2015.
2. Reema Thareja, Fundamentals Of Computers 2<sup>nd</sup> Edition, Oxford University Press, 2026.

## MDC-113: FUNDAMENTALS OF EARTH SYSTEM SCIENCE

(Contact Hours-45, Credits-3)

**Course Objectives (COs):** To provide comprehensive knowledge about the planet Earth, geomorphic processes and concepts of rocks and minerals.

**Learning Outcomes (LOs):** Students will gain knowledge about the geological processes, formation of minerals and rocks; and interactions between exogenetic processes along with the identification of geomorphic features.

**UNIT I (15 hours)** Earth System Sciences: concept and scope. Geological Time Scale. Origin and age of the Earth.

**UNIT II (15 hours)** Geomorphology: concept and scope. Concept of uniformitarianism; Geomorphic agents & processes. Weathering & Erosion. Landforms: Depositional and Erosional.

**UNIT III (15 hours)** Minerals: Definitions, physical properties, and classification. Rocks: Igneous, Sedimentary and Metamorphic rocks and their classification. Rock Cycle.

### Suggested Readings:

Allen, P.A., 1997. Earth Surface Processes, Blackwell publishing.

Bridge, J.S. and Demicco, R.V., 2008. Earth Surface Processes, Landforms and Sediment Deposits, Cambridge University Press.

Leeder, M. and Perez-Arlucea M., 2005. Physical processes in earth and environmental sciences, Blackwell publishing.

Perkins, D., 2013. Mineralogy, Prentice Hall.

Raymond, L. A., 2002. Petrology: the study of igneous, sedimentary, and metamorphic rocks. McGraw-Hill Science Engineering.

Shrivastava J. P., 2009. Rocks and Ore Forming Minerals (National Science Digital Library, CSIR, New Delhi) <http://hdl.handle.net/123456789/1086>. CSIR, New Delhi.

Shrivastava J. P., 2009. Igneous Rocks (National Science Digital Library, CSIR, New Delhi) <http://hdl.handle.net/123456789/1034> CSIR, New Delhi.

Tarbuck, E. J. and Lutgens, F. K. 1998. Earth: An Introduction to Physical Geology, Pearson.

Verma, V. K. 2002. Lectures on Geomorphology, Pilgrims Book House.

## **MDC- 114: FUNDAMENTALS OF LIFELONG LEARNING**

**(Contact Hours-45, Credits-3)**

### **Course Objectives (COs):**

1. To enable the students to understand the concept of Lifelong Learning and its importance and relevance in the present day context.
2. To acquaint the students with various terms related to Lifelong Learning
3. To provide the students with knowledge of Government policies and programmes

### **Learning Outcomes (LOs):**

Students are able to -

1. explain the concepts of Lifelong Learning
2. examine the relationship between ‘lifelong learning’ and related terms
3. identify the link between Lifelong Learning and adult education policies and practices in India.

### **Unit I: Introduction:**

- Lifelong Learning –Concept, Basic elements, Characteristics, Nature and scope
- Sustainable Development Goals and Lifelong Learning
- Types of Lifelong Learners and Lifelong Learning needs
- Need and Importance of Lifelong Learning,

### **Unit II: Inter-related Concepts**

- Adult Education and Lifelong Learning
- Continuing Education and Lifelong Learning
- Lifelong Learning and Lifelong Education
- Life-wide Learning – Individual learning, Community Learning, Workplace Learning.

### **Unit III: Programmes of Lifelong Learning**

- Jan Shiksha Sansthan, Training for Rural Youth for Self-Employment (TRYSEM)
- Support to Training and Employment Programme (STEP) for Women, Condense Courses of Education and Vocational Training Programme for Women
- Farmers’ Training Programmes through Krishi Vigyan Kendras
- Skill Training and Upgradation Programmes

**Activity or Assignment:** Choose any one

1. Prepare a write up on any incident/situation you experience and lesson learnt from that experience
2. Write an essay on ‘Home as the first social Institution’
3. Prepare a report on your visit to any Vocational Training Centre or Farmers Training Centre

### **Suggested Readings:**

1. Rajesh & Dixit, V.K. *Lifelong Learning: Issues and Challenges*, New Delhi: Global Book Organization, 2011.
2. Jarvis, P. *Adult Education and Lifelong Learning: Theory and Practice*. 4th Edition, New York: Routledge, 2010.
3. Holford, John et.al. *International Perspective on Lifelong Learning*. New York: Routledge, 2020.
4. Mohanty S. *Lifelong and Adult Education*. APH Publishing corporation, 2007.
5. Shah, S.Y. *Lifelong learning in India: A policy perspective*. ASEM Education and Research Hub for Lifelong Learning. Online. <https://tinyurl.com/y3u4dngw>
6. UGC (University Grants Commission). *Guidelines on Lifelong Learning and Extension*. New Delhi: University Grants Commission, 2007.
7. Singh, Madhu. *Lifelong Learning*. Humberg: UNESCO Institute of Lifelong Learning, 2002
8. Planning Commission. *Eleventh Five Year Plan: Report of the Sub Group on Adult Education*. In [www.planningcommission.nic.in](http://www.planningcommission.nic.in), 2007. Chadha, N.K. (ed.). *Readings in Lifelong Learning*. New Delhi: University of Delhi, 2009.
9. National Literacy Mission. *Guidelines on Jan Shiksha Sanstans*. New Delhi: Ministry of Human Resource Development, 2003.
10. UGC (University Grants Commission). *Guidelines on Lifelong Learning and Extension*. New Delhi: University Grants Commission, 2007.

**MDC-115: INTRODUCTORY LIFE SCIENCES**  
**(Contact Hours-45, Credits-3)**

**Course Objectives (COs)**

- The aim of Introductory Life Sciences course will be to impart knowledge to students related to topics of general aspects of Life Sciences

**Learning Outcomes**

On completion of the course, students will be able to:

- Know about the concept of general diversity and classification of life forms.
- Know about the concept of Origin of Life.
- Understand about the structural and functional features of prokaryotic and eukaryotic cells.
- Understand the basic concept of genes and their role in inheritance.
- Understand the process of evolution and importance of basic ecological principles.
- Understand the concept of Biodiversity, and appreciate the importance of Wildlife and their conservation.

**Unit-I:** General features of life form and their classification (up to kingdom); Origin of life.

**Unit II:** Structure and function of prokaryotic and eukaryotic cells. Introduction to biomolecules (nucleic acids, proteins, carbohydrates and lipids). Basic concept of genes and their role in inheritance.

**Unit III:** Bio-resources and their economic importance (microbes, plants, and animals). Concepts of evolution, ecology, biodiversity, and wildlife management.

**Suggested Readings:**

1. Bruce, A., Dennis, B., Karen, H., Alexander, J., Julian, L., Martin, R., Keith, R. and Peter W. (2009). Essential Cell Biology. (3rd ed.). Garland Publishing. London.
2. De Robertis, E. D. P. and De Robertis, L. M. F. (1987). Cell and Molecular Biology, (8th ed.). Lea and Febiger.
3. Gardener, E. J., Simmons, M. J., and Snustad, D. P. (2005). Principles of Genetics. (8th ed.). John Wiley and Sons.
4. Hall, B.K. and Hallgrimsson, B. (2008), Strickberger's Evolution, (4th ed.). Jones and Bartlett Publishers.
5. Krishnamurthy, K.V. (2003). Textbook of Biodiversity. (1st ed.). Science Publisher, Chennai.
6. Mader, S.S. (2008). Concepts of Biology. (Indian ed.).CBS Publishers. New Delhi.
7. Sharma B.D. (1999). Indian Wildlife Resources, Ecology and Development. (1st ed.).Daya Publishing House, Delhi.
8. Sharma, P. D. (1990). Ecology and Environment, 7th Edition. Rastogi Publications. Meerut.
9. Singh S.K. (2005). Textbook of Wildlife Management (2nd ed.). International Book Distributing Company, Lucknow.

**MDC -116: INTRODUCTION TO NATIONAL CADET CORPS  
(Contact Hours-45, Credits-3)**

**Course Objectives (COs):** The paper intends to impart basic knowledge about the evolution of National Cadet Corps; a brief overview of our defence system and services, to shape the young minds of our country with an aim of developing qualities like courage, Positive mindset, a secular outlook so that they may become responsible citizen and contribute towards the growth of India as a nation. Through Drill and Command, the young leaders will inculcate in them the quality of discipline.

**Learning Outcomes (LOs):** The students will develop a sense of responsibility and display patriotism, secular values, discipline, improve bearing and develop the quality of immediate and implicit obedience to orders.

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<b>UNIT I</b>	NCC Motto, NCC Flag, Aims of NCC, Cardinal points of NCC, Types, organization, capability & role of NCC cadet. Organization of defence forces in general, Organizational structure of Indian Army, Organizational structure of NCC, NCC Song, Incentives of NCC, Ranks in Army, Navy and Air Force – Certificate Examination in NCC– Honors and Awards. Honour code. Modes of entry to Army CAPF Police
<b>UNIT II</b>	Foot Drill Basics, Aims of Drill, Word of Commands, Attention, Stand at Ease, Turning Left, Right and Inclining at the Halt. Sizing, Forming up in three Ranks and Numbering, Open and Close March Order, Dressing the Squad, Saluting at the Halt, Getting on Parade, Falling Out and Dismissing, Marching, Guard of Honour
<b>UNIT III</b>	Basics of Weapon Training, Introduction and organization of Infantry BN, Characteristic of Rifles, Stripping, Assembling, Care and Cleaning, and Sight Setting, Loading, Unloading of Rifle, Light Machine Gun and Stern Machine Carbine, Safety Procedures, Positions in Shooting and its Advantages, Trigger Control and Firing a Shot, Theory of Group and Snap Shooting.
<b>Practical</b>	a. Drill and physical training b. NCC Camps c. Types of Camps

**Suggested Readings:**

Cadet's Handbook- Common Subject, All Wings, by DG NCC, New Delhi

Cadet's Handbook -Specialized Subject, Army, by DG NCC, New Delhi

Challenging Destiny: A biography (2016). M. D. Bhaskaran, 314pp

Field Marshal Sam Manekshaw, (Soldiering with Dignity), 2021, Lt. Gen. Depinder Singh, PVSM, VSM. Published by Natraj publishers, 271pp

Youth in Step, V. Longer (1983), Published by Lancer International, 220pp

**MDC- 117: INTRODUCTION TO PSYCHOLOGY**

**(Contact Hours-45, Credits-3)**

**Programme Objectives:** This programme will develop interest among the learners towards Psychology. It aims to help learners to understand behaviours and mental processes of people. It will also develop awareness of the empirical knowledge to improve the lives of people.

### **Learning Outcomes**

At the end of the Course students are able to:

1. identify basic concepts of psychology and apply psychological principles to everyday life
2. determine the relationship between the physical functioning of an organism and its behaviour
3. make use of a wide range of actions such as helping, sharing, comforting and cooperating with others

#### **UNIT I      Concept of Psychology**

- Meaning, Nature and Scope of Psychology, Psychology as a Science
- Principles of Psychology
- Branches of Psychology
- Approaches in Psychology: Behaviourism, Cognitive, Psychodynamic and Biological

#### **UNIT II      Physiological Basis of Psychology**

- Physiological Characteristics
- Nervous System and Endocrine System
- Hemispheric Division and its features
- Neurons: Definition, Structure and Types

#### **UNIT III      Pro- Social Behaviour**

- Meaning and determinants of Pro-social Behaviour
- Types: Proactive, Reactive and Altruistic
- Influences on Pro-social Behaviour
- Benefits of Pro-social Behaviour

#### **Assignments (Choose any one)**

1. Prepare a sketch on how to promote pro-social behaviour
2. Use a pro-social behaviour scale to measure the Pro-Social Behaviour of a student.
3. Engage yourself in any one prosocial activities: like Clubs(e.g. art, biking, robotics, scouts, chess etc); or day camps; or creative arts/music/theatre or volunteer opportunities through community organizations

## References -

- Ashok Kumar. E and Laurence Kharluni (2021) *Social Behaviour Scale (SBS-EKAKL)*. National Psychological Corporation (NPC), Agra
- Bierhoff, H. (2005). *Prosocial Behaviour*. United Kingdom: Taylor & Francis.
- Bron R.A. Allyn & Bacon (2002). *Essentials of Psychology*, Guwahati, Nivedita DK. Distributors.
- Chand T. (2002). *Educational Psychology*, Agra, Bhargava Book House,
- Crow, R.B. & Crow (1964). *Educational Psychology*, New Delhi, Eurasia Publishing House,
- Development and Maintenance of Prosocial Behavior: International Perspectives on Positive Morality. (2013). Germany: Springer US.
- Glassman, W. E., Hadad, M. (2004). *Approaches to Psychology*. United Kingdom: Open University Press.
- Mangal. S.K. (2011) *Essentials of Educational Psychology*, PHI Pvt. Ltd, New Delhi.
- Sahoo F.M.(2002) *Psychology in Indian Context*, Agra, Bhargava Book House.
- Schroeder, D. A., Piliavin, J. A., Dovidio, J. F., Penner, L. A. (2017). *The Social Psychology of Prosocial Behavior*. United Kingdom: Taylor & Francis.
- Sharmila P. (2004). *Textbook of Educational Psychology*, Kanishka Publication, New Delhi.



**MDC-118: MATHEMATICS IN DAILY LIFE**  
**(Contact Hours-45, Credits-3)**

**Learning Objectives:** To introduce the basic mathematical concepts that are used in different aspects of our daily life.

**Unit I : Arithmetical Ability** (15 hours)

Unit conversion (length, mass, time); Number System; Decimal Fractions; Square Roots and Cube Roots; Problems on Numbers; Problems on Ages; Use of concepts of HCF and LCM; Percentage; Ratio and Proportion; Time and Distance; Allegations or Mixture; Area, Volume, Surface Areas; Trigonometric ratios; Height and Distance in our everyday life.

**Unit II : Banking Ability** (15 hours)

Interest - Concept of Present value and Future value, Simple interest, Compound interest, Nominal and Effective rate of interest; Depreciation and discount; Annuity - Ordinary annuity, sinking fund, annuity due, present value and future value of annuity; Equated Monthly Installments (EMI) by Interest of Reducing Balance and Flat Interest methods - examples and problems.

**Unit III : Data Interpretation** (15 hours)

Probability; Classification of data - Frequency distribution, Tabulation; Graphical representation of data - Bar Graphs, Pie Charts, Line Graphs; Calendar and Clocks.

**Course Outcomes :** After this course students will be able to understand everyday banking transactions, identify patterns and relationships. Students will be able to perform basic calculations and measurement and also understand about ratios and proportions.

**Notes:** A candidate must obtain the minimum pass marks (as per NEHU Rule) to clear the course.

**Suggested Readings:**

1. Quantitative Aptitude, R.S. Aggarwal, S. Chand Publishing (2022).
2. Fundamentals of Business Mathematics, M.K. Bhowal, Asian Books (2009).
3. Fundamentals of Mathematical Statistics, S.C. Gupta, V.K. Kapoor, Sultan Chand and Sons (2020).
4. The Mathematics of Everyday Life, A.S. Posamentier, C. Spreitzer, Prometheus Books, Illustrated Edition (2018).

## **MDC-119: PHILOSOPHY OF CULTURE**

**(Contact Hours-45, Credits-3)**

**Course Objectives (COs):** Imparting basics of Human Culture, developing core concepts of cultural understanding of knowledge and society.

**Learning Outcomes (LOs):** To develop cultural sensibility and to make students responsive towards diversity and difference.

### **Unit-I: Concepts of Culture**

- (a) Meaning of Culture
- (b) Kinds of Culture ( Material, non-material,etc.)
- (c) Understanding roots of Culture

### **Unit- II: World View**

- (a) Belief Systems, Practices and Performances
- (b) Tribal Cultures: Case Studies from NE-India.
- (c) Holistic understanding of Cultural Identity

### **Unit-III: Cultures of Nationalism**

- (a) Indian Culture, Vedic and Buddhist
- (b) Decolonization of Knowledge and Culture
- (c) Cultural Nationalism

### **Suggested Readings:**

1. Aurobindo, Sri, *The Foundations of Indian Culture*, Vol 1., Sri Aurobindo Ashram Publications, Pondicherry, 1972.
2. Radhakrishnan, S. et.al., (Eds.), *The Cultural Heritage of India*, Vol 1 & 2, Ramakrishna Mission, Kolkata, 1970.
3. Panikkar, K.M., *The Essential Features of Indian Culture*, Chapters 1 & 2, Bharatiya Vidya Bhavan, Mumbai, 1974.
4. Pande, G. C., *Foundations of Indian Culture*, vol 1 & 2
5. Radhakrishnan, S, *The Hindu View of Life*, Macmillan, London, 1962.
6. Mohammada, Malika,, *The Foundations of the Composite Culture in India*, Aakar Books, 2007.
7. Smith, Philip, *Cultural Theory*, Blackwell Publishers, Oxford, 2001.
8. Uberoi, Jeet, *Science and Culture*, Oxford University Press, New Delhi, 1978.
9. Biswas, Prasenjit, *Ethnic Life-World(s) in North-East India*, SAGE, New Delhi, 2008.
10. Ndlovu-Gatsheni, Sabelo J (2020). "The Dynamics of Epistemological Decolonisation in the 21st Century: Towards Epistemic Freedom", *Strategic Review for Southern Africa*. 40 (1): 16–45.

## **AEC-120: ALTERNATIVE ENGLISH**

**(Contact Hours: 45, Credit-3)**

### **Course Objectives**

1. To provide opportunities to students to acquire deeper insights into the English language and literature and enhance and reinforce creativity, understanding, and critical appreciation of the subject.
2. To introduce students to various artistic expressions in order to give them exposure to diverse literary and cultural experiences.
3. To inculcate in students the ability to communicate ideas, opinions and values and to expand their knowledge of the subject as it moves from the classroom to life and life-worlds.

### **Learning Outcomes**

The students will gain awareness of the various artistic expressions emerging out of diverse literary and cultural experiences. This will give them deeper insights into the English language and literature, thus enhancing their creativity, understanding, and critical appreciation of the subject. The students will also gain the ability to communicate ideals opinions and values and apply the knowledge of the subject to real-life situations.

### **UNIT I : Poetry**

1. Matthew Arnold: "To Marguerite: Continued"
2. Nicolas Guillen: "Fusil"
3. W. H. Auden: "Who's Who"
4. Nissim Ezekiel: "Goodbye Party for Miss Pushpa TS"
5. Maya Angelou: "Still I Rise"

### **UNIT II: Prose Pieces, Short Fiction, Grammar and Composition**

1. Jawaharlal Nehru: "Animals in Prison"
2. Ruskin Bond: "Life at My Own Pace"
3. O. Henry: "The Last Leaf"
4. Grammar and Composition:
  - a. Preposition
  - b. Articles
  - c. Idioms and Phrases
  - d. Change of Voice
  - e. Usage
  - f. Correction of Errors

- g. Reading and Comprehension
- h. Narration

### **UNIT III: One-act Plays**

1. A. A. Milne: *The Ugly Duckling*
2. J. M. Synge: *Riders to the Sea*

### **Suggested Reading**

- Corns, T. N., ed. *The Cambridge Companion to English Poetry*. Cambridge University Press, 1973.
- Dolley, Colin and Rex Walford. *The One-Act Play Companion: A Guide to Plays, Playwrights and Performance*. Methuen Drama, 2011.
- Eastwood, John. *Oxford Practice Grammar*, Oxford University Press, 2006.
- Gates, Henry Louis, ed. *The Norton Anthology of African American Literature*. W. W. Norton & Company. Inc., 2014.
- Gilbert, Sandra M. and Adrienne Rich. *Essential Essays Culture, Politics, and the Art of Poetry*. W. W. Norton & Company. Inc., 2018.
- Hashemi, Louise & Raymond Murphy. *Essential Grammar in Use*. Cambridge University Press, 2007.
- Kumar, Akshaya. *Poetry, Politics and Culture: Essays on Indian Texts and Contexts*. Routledge, 2009.
- March-Russell, Paul. *The Short Story: An Introduction*. Edinburgh University Press, 2009.
- McClatchy, J. D., ed. *The Vintage Book of Contemporary World Poetry*. Vintage, 1996.
- Peck, John and Martin Coyle. *The Student's Guide to Writing: Grammar, Punctuation and Spelling*. Macmillan Education UK, 1999.
- Sinha, M. P., et al., ed. *Ruskin Bond: A Critical Evaluation*. Atlantic Publishers and Distributors. 2012.
- Scofield, Martin. *The Cambridge Introduction to the American Short Story*. Cambridge University Press, 2006.
- Spiegelman, Willard. *How Poets See the World: The Art of Description in Contemporary Poetry*. Oxford University Press, 2005.
- Swan, Michael. *Basic English Usage*, OUP, 2000.
- Washburn, Katharine, Clifton Fadiman and John S Major. *World Poetry: An Anthology of Verse from Antiquity to Our Time*. Book-of-the-Month Club, W. W. Norton, 1998.

**AEC – 121: MIL I- ASOMIYA SAHITYAR ITIHAS ((History of Assamese Literature)**

**(Contact Hours: 45, Credits-3)**

**Course Objectives:** The course is designed to introduce the students to the distinctive features of Early Assamese Literature, Medieval Assamese Literature, Modern Assamese Literature and the Contemporary Assamese Literature. The chronology of the growth and development of Assamese literature will be the core focus of study of this paper.

**Course Outcomes:** This course will enable the students to acquire knowledge of Assamese literature, the history of its developments and the changes that have over occurred in response to the changes in its socio-cultural contexts. The course will also teach the students to learn the creative processes and values of the past reflected through literature.

**UNIT: I-** Asomiya MoukhikSahitya: Bihugeet, Biyanam, Jikir, Ainam.

**UNIT: II-** Prak-Sankariyug; MadhavKandali, Hem Swaraswati  
Sankariyug (Vaishnav): Sankardev, Madhabdev aru Ananta Kandali  
PanchaliSahitya: Durgabar, Manakar aru SukabiNarayandev

**UNIT: III-** Arunodoi Yug: AnandaramDhekialPhukan,  
Nathan Brown  
NidhiramFarwel

JonakiYug: Lakshminath Bezbaroa,  
Chandrakumar, Agarwala  
Hemchandra Goswami

**Suggested Readings:**

1. Bhuyan,S.K: *Studies in the Literature of Assam*, Lawyers Book Stall, 1956
2. Neog, Maheswar:*AsamiyaSahityarRuprekha*. Guwahati: Chandra Prakash, 2000.
3. Neog,M:*AsamiyaSahityarRuprekha*,Bani Mandir,1986
4. Saikia, Nagen: ed. DimbeswarNeog*Racanavali, Vol I*. Guwahati: Publication Board of Assam, 2013.
5. Sarma, Banikanta: ed. *AsamiyaSahityarBuranji (Volume-III)*. Guwahati: ABILAC, 2017.
6. Sarma, Satyendranath: *AsamiyaSahityarSamiksatmakItibritta*. Guwahati: Saumer Prakash2018
7. Sarma, Nabinch.: *AsomorSanaskritikItihash, (Part-2)*, Asom Sahitya Sabha, 2009
8. Sarma, S.N. :*AsamiyaSahityarSamikshatmakItibritta*, Guwahati, 1991

## **BEN-122: MIL I- BANGLA BHASHA-BIGYAN**

**(Contact Hours-45, Credits – 3)**

**Course Objective:***The curriculum has been designed with the aim of providing students with a comprehensive understanding of the Bengali language and general grammar, as well as enabling them to develop proficiency in it.*

**Learning Outcomes:***It is highly essential for students of literature to have a solid understanding of the Bengali language's structure and word formation. This lesson will assist students in developing proficiency in the correct usage and application of the Bengali language.*

**Unit 1.** A. Barna Dwani Aksar - Sangya o paraspariksambandha.

B. Bangla Bhashar Uccharanriti.

C. Bangla Dwanir Borgikaran.

**Unit 2.** A. Bangla Bhashar Rupatawik Alochana

B. Bachan, Linga, Sandhi, Purush, Karak, Bibhakti, Pratyay, Pad-Prakaran.

**Unit 3.** A. Bangla sadhu o Chalito Bhasha Samparkito Gyan.

B. Antarjatic Dwanimulak Barnamala (IPA)

### **Suggested Reading:**

1. Sadharan Bhasa bigyan o Bangla Bhasha – Rameswar Shaw.
2. Bhasar Itibritta \_ Sukumar Sen.
3. Bhasa bidye Parichai-- Paresh Chandra Bhattacharjee
4. Bangla Bhasar Byakoran o tar Kromobikash-- Nirmal Das
5. Uchhatoro Bangla Byakoran—Bamondeb Chakraborty
6. Bangla Bhasa parichayer Bhumika – Anilchandra Ghatak

## **AEC- 123: MIL I - GARO MIL**

**(Contact Hours: 45, Credits- 3)**

Ia paperko dingtang dingtang disciplinerangoni poraina re·bagiparangna tariaha. Ia paperko Garo sea-jotani dingtang dingtang genrerangni ki·taprangko poraina tariaha. Skanggipa unito Garo drama, gnigipa unito fiction aro gittamgipa unito Grammar aro Compositionko donaha. Ia paper Garo sea-jotani aro ku·sikni apalaniko porainaon·gen.

### **Courseni Miksonganirang:**

- Poraigiparangko A·chik sea-jotani dingtang dingtang genrerangni namroroani bidingo dramaoni fiction aro A·chik Grammarona u·iatgen.
- Poraigiparangko A·chik sea-jotani dingtang dingtang genrerangni mongsonggipa ki·taprangko u·iatgen.
- Poraigiparang A·chik grammar aro compositionko skie ra·na man·gen

### **Poraie Man·ani:**

Poraigiparang A·chik sea-jotani bidingo ku·ritingoni sea-jotaniona namroroani bidingo skie ra·gen. Ia course poraigiparangna sea-jotanio aro A·chik ku·sikko seanio namdapatna dakchakgen. Poraigiparang A·chik ku·sikona pe·giminrangkoba skie ra·gen.

### **Unit - 1 : Drama**

Llewellyn R. Marak: Dikki- I

### **Unit - II : Fiction**

Linnie M. Hoolbrook : An·chichi Bregimin

Wilson K. Marak: Shakespeareni Golporang

Othello

### **Unit- III: Grammar aro Composition**

Parts of speech, tense, case, gender

Aganme·apa aro ku·jikseko jakkalani

### **Suggested Reading:**

- Burling, Robbins *A Garo Grammar*. Deccan College, Post Graduate and Research Institute, 1961
- Burling, Robbins *The Language Of the Modhupur Mandi (Garo) Vols. I & II*. Promila & Co., Publishers, New Delhi, 2004 (1<sup>st</sup> Ed.)
- Grierson, G. A. *Linguistic Survey of India*. Vol.I,Part -I,Low Price Publications, Delhi, 1927
- Hoolbrook, Linnie M.. *Anchichi Bregimin* L.M.Hoolbrook, Tura, 1936
- Hudson, William Henry *An Introduction to the Study of Literature*, Kalyani, New Delhi, (Reprint 1996
- Marak, Evelyn R. *Chimonggimin A·chik Ku·rang*, Herilla B. Sangma, Tura, 1971
- Marak, Harendra W.: *A·chik Aganbewalrang* (Original Tales of the Garos), NEHU Publications, 1983
- Marak, Icylian R *Kan·dikgipa Dakmesokanirang*, Tura Book Room, Tura, 2014
- Marak, Jobang D.: *A·chik Kata*, (The Garo History), Lawrence K. Marak, Tura, 1982.
- Momin, Keneth M. *A·chik Composition* DVS Publishers, Guwahati, 2002
- Marak. Llewellyn R. *Dikki* -1. Garo Hills Book Emporium, 1983
- Marak, Wilson K. *Shakespearni Golporang* (Othello). Miranda Library, Tura, (yearnot mentioned)
- Phillips, E.G. *A·chik Grammar*, Tura Book Room, Tura, 1991 (7<sup>th</sup> Ed)
- Sangma, Brucellish K. *Sea Jotani Bidingo Seanirang*, Author, Tura, 2005
- Sangma, Milton S. & Julius L.R. Marak *Aganmeapa*, Authors, Tura, 1989 (2<sup>nd</sup> Ed)
- Sangma, Mihir N. :*Pagitchamni Ku·bisring*, Author, Guwahati, 1982



## AEC- 124: MIL I- KA LITERESHOR KHASI BAD KA KYLLA-KTIEN

(Contact Hours: 45, Credtrs-3)

### **Ki jingthmu jong ka phang pule:**

Īa kane ka phang pule (course) la saiñdur ba ki nongpule kin sngewthuh halor ki jait ki sker jong ka litereshor, ki dur ki dar bad ki phangkren bapher ba la wanrah lyngba ka Poitri, ka Sawangka, ka Parom Mutdur bad ka Thohtah. La saiñ dur ruh ban hikai ĩa ki nongpule halor ka Kylla-ktien, ki jingeh bad ki buit ban pynkylla ktien. Kane ka phang pule kan pynlah bad pynbit ruh ĩa ki nongpule ha ka liang ka Kylla-ktien ĩa ki tnat jong ka Litereshor bad ban Kylla-ktien ĩa ki khubor na ka thaiñ bad na ka Ri.

### **Ki jingmyntoi na kane ka phang pule:**

- Kan pynlah ĩa ki nongpule ban sngewthuh ĩa ki tnat bapher jong ka Litereshor.
- Kan pynlah ĩa ki nongpule ban ithuh bad sngewthuh ĩa ki dur ki dar jong ki tnat bapher jong ka litereshor lem bad ki phangkren bapher ba la wanrah ha ki.
- Kan pynlah ĩa ki nongpule ban sngewthuh shai halor ka Kylla-ktien.
- Ka jinglah ban kylla-ktien ĩa ki tnat bapher jong ka litereshor.
- Ka jinglah ban kylla-ktien ĩa ki khubor na ka thaiñ bad na ka Ri.

### **Unit – I Poitri bad Sawangka Lyngkot**

1. Rabon Singh : “Ka Jingphawar Shadwait” na *Ka Kitab Jingphawar*
2. Victor G. Bareh : “Ka Lynti Umiam” na *Ki Poetry Khasi*
3. D.S. Khongdup : “U Syntiew ba nga jied” na *Na Lum Khasi*
4. L.H.Pde : “U Tiew Lili Basaw” na *Shi Hira ki Sawangka*

### **Unit – II Parom Mutdur bad Thohtah**

1. W. Tiewsoh : *Ka Jingkwah U Kpa*
2. Donbok T. Laloo : *Pluh ka Jingieit*
3. L. Gilbert Shullai : “Hima ki Bun, Jaitbynriew Tang Kawei” na *Talwiar u Sohpetbneng*

### **Unit – III Ka Kylla-Ktien**

1. Badaplin War: “Halor ka kylla-ktien” na *Ka Kylla-Ktien bad ka LitereshorKhasi*.
2. Ka kylla-ktien ĩa ki poim bad ĩa ki jingthoh balyngkot.

3. Ka kylla-ktien ïa ki khubor na ka thaiñ bad na ka Ri.

***Ki kot pule baroh ki long na ka bynta ban pule bniah.***

**Ki jingthoh kiba ïadei bad ka phang pule:**

Bareh, Victor G. *Ki Poetry Khasi*. North East Industrial Coop Society, Shillong, 1956.

Khongdup, D.S. *Na Lum Khasi*. Ri Khasi Press, Shillong, 1968.

Laloo, Donbok. T. *Pluh ka Jingieit*. Don Bosco Technical School, Shillong, 1999.

Lynshing, Thomlin. Ka Jingphawar Shadwait: Ki Snap Ka Lariti in *Ka ThwetJingstad* (Quest for knowledge) Vol. IV No.1 December, 2018.

Malone, Joseph L. *The Science of Linguistics in the Art of Translation: Some tools from Linguistics for the analysis and practice of translation*. New York: State University of New York Press, 1998.

Mawphlang, Bulsilian Lyngdoh. “U Syntiew ba nga Jied kumka Sonnet” in *KaThwet Jingstad* (Quest for knowledge) Vol. IV No.3 December, 2020.

Nida, Eugene A. *The Theory and Practice of Translation*. Leiden, Netherlands: E.J. Brill, 1982.

Nonglait, D.R.L. *Literary Criticism and Fiction in Khasi*. SMS Hi-Tech Impression, Shillong, 2005

Pde, L. H. *Shi Hira ki Sawangka*. Shillong, 2008.

Shullai, L. Gilbert. *Talwiar u Sohpetbneng*. Scorpio Printing Press, Shillong, 1993.

Singh, Rabon. *Ka Kitab Jingphawar*. Shillong:6<sup>th</sup> Ed. Mrs. Fair Beulah Lyngdoh, Ri Khasi Press, 1987.

Syiem, Esther. “U Manik Raitongu Nongmuna ka Jingieit bad ka Shna Sur: Ka Jingpynshongdor” in *Ka Dak Sahkynmaw (Unforgettable Impression)*. Society for Khasi Studies, Shillong, 2016.

Tiewsoh, W. *Ka Jingkwah U Kpa*. Khasi Book Stall, Shillong, 1998.

War, Badaplin. *Ka Kylla Ktien bad ka Litereshor Khasi*. Shillong: Ri Lum Printing Press, 2016.

## **AEC- 125: MIL I - MIZO LANGUAGE AND TRADITIONAL CULTURE**

**(Contact Hours: 45, Credits-3)**

### **Course objectives:**

This paper is designed to create awareness for the importance and preservation of the Mizo language. It also includes an essay on how the language has been enriched through the ages. It also includes traditional poems and short stories where students will be educated with the traditional customs and habits together with traditional values. It will also inculcate in students the ability to communicate ideas and opinions thereby expanding their knowledge on the subject.

### **Learning Outcomes:**

Students will gain awareness on the significance of the language. It will also increase their verbal proficiency. The paper will encourage and motivate the students to use their willingness to communicate their thoughts and feelings in the language.

### **Unit-1: Essays on mizo language**

1. Mizo tawnghlutnalehpawimawhna - R. Thangvunga
2. Mizo tawngtihhausak dan tur - Dr. Laltluangliana Khiantge

### **Unit- 2: Poems**

1. Darbuhla
2. Lianchhiari Hla
3. Awithangpahla

### **Unit-3: Short Stories**

1. Silverthangi - Zikpuii Pa
2. Sialton Official - C. Thuamluaia
3. Lali (Lalawmpuii) - L. Biakliana

### **Suggested Readings:**

1. Mizo tawngchhuina – C. Chhuanvawra, Aizawl 2012
2. Mizo tawngzirzaunabu thar. MILLTA Publication, Aizawl, 2012
3. Lalthangliana B. – Zotawngbulpuileh a hmanna, MCI Publication, 2002
4. Mizo hlahlui- R. L. Thanmawia, Din Din Haven. 2012
5. BiaklianaRobawm. LTL Publication. 2017
6. Sailo, Capt. L.R. Awithangpazai, 1993
7. Contemporary short stories from Mizoram- Margaret Ch.Zama .  
Published by Sahitya Akademi

**AEC- 126: MIL I- नेपाली भाषा-साहित्यको परिचय (INTRODUCTION TO NEPALI LANGUAGE AND LITERATURE)**

**(Contact Hours: 45, Credits- 3)**

प्रस्तुत पाठ्यक्रमले नेपाली भाषाको विकास, विशेषता, स्वरवर्ण, व्यञ्जनवर्ण र मात्रा परिचय, नेपाली पदवर्ग, झर्ना नेपाली शब्द र केही प्रतिनिधि कथा र निबन्धकाहरूको अध्ययन गर्ने अवसर प्रदान गर्ने छ। (The course provides learning related to Nepali language and literature with reference to writing skills and use of grammar.

**Course Objectives:** यस पाठ्यक्रमका मुख्य उद्देश्यहरू निम्नप्रकार छन् : (The course objectives strives to)

:CO1 : नेपाली भाषाको अध्ययन र लेखनको आधारभूत ज्ञानको विकास सम्बन्धी निर्देशन दिनु। (Develop the basic idea of learning and writing of Nepali Language).

CO2: लेख्दा व्याकरणहरूका त्रुटिबाट जोगिनु, नेपालीका पदवर्ग र झर्ना नेपाली शब्दको प्रयोगका साथै पारिभाषिक र प्राविधिकका बारेमा जानकारी दिनु। (Learn to avoid the grammatical mistakes, error while writing).

CO3: कथा र निबन्ध लेख्दा सजिलो र सरल बाटाका बारेमा निर्देशन दिनु र व्याख्यात्मक तथा प्रेरक तरिकाले लेख्न समर्थ हुनु। (Enable the expository and persuasive towards essay and story writing on a variety of topics).

**Learning Outcomes:** प्रस्तुत पाठ्यक्रम अध्ययन गरिसकेपछि विद्यार्थीहरू निम्नलिखित ज्ञान र क्षमता प्राप्त गर्न सक्षम हुने छन्। (At the end of the course, students will have developed:)

LO1: नेपाली भाषाको सङ्क्षिप्त परिचय, उत्पत्ति र विकासकासाथै स्वरवर्ण, व्यञ्जनवर्ण र मात्रा परिचय आदिको स्पष्ट अध्ययन गर्ने। ( Ability to know about introduction of Nepali Language such as origin, development, meaning, definition and characteristics and also about the vowels, consonants and vowels sign).

LO2: व्याकरण(नाम सर्वनाम,क्रियापद,विशेषण,क्रियाविशेषण र अव्यय) आदिको प्रयोग गर्नका साथै झर्ना शब्द, पारिभाषिक शब्द र प्राविधिक शब्दको प्रयोग गर्ना(Ability to know the uses of grammar (i.e. Noun, Pronoun, Verb, Adjective, Adverb and infinities) and also about the particular word in parent like words, terminology words and technical words).

LO3: सुन्ने र सिक्रे क्षमताको विकास, विचार तथा भाव व्यक्त गर्न, कथा र निबन्धको अर्थ र परिभाषा राम्ररी बुझ्न कथा र निबन्ध लेखनप्रति प्रेरणा जगाउन , कथा र निबन्धबीच समानता र भिन्नताबारे जानकारी पाउन। (Ability to increase verbal proficiency, listening and learning skill. Encourage and motivate the students to use their willingness to communicate thought and feelings. Able to understand the similarities and dissimilarities between the Story and Essay).

एकाइ-१ (Unit-1) नेपाली भाषाको सङ्क्षिप्त परिचय :

- (i) नेपाली भाषाको उत्पत्ति र विकास
- (ii) नेपाली भाषाको अर्थ, परिभाषा र विशेषता
- (iii) स्वरवर्ण, व्यञ्जनवर्ण र मात्रा परिचय

एकाइ-२ (Unit-2) नेपाली पदवर्ग :

- (i) नाम, सर्वनाम र क्रियापद
- (ii) विशेषण, क्रियाविशेषण र अव्यय
- (iii) झर्ना नेपाली शब्द, पारिभाषिक शब्द र प्राविधिक शब्द

एकाइ-३ (Unit-3) कथा र निबन्ध :

१. कथा :

- (i) शिवकुमार राई – टीका
- (ii) नरबहादुर राई – तीतो बिलौना: मीठो मिलन

२. निबन्ध :

(i)रामकृष्ण शर्मा – जीवन र साहित्य

(ii) कृष्णप्रसाद ज्ञवाली – त्रिफला

**सन्दर्भग्रन्थः**

१. उपाध्याय,केसवप्रसाद, साहित्य-प्रकाश, काठमाडौं: साझा प्रकाशन, सन् २००२।
  २. नेपाल, घनश्याम, निबन्ध नन्दन, गान्ठोक, जनपक्ष प्रकाशन, सन १९९२।
  ३. उपाध्याय,टेकनारायण र जोशी, वसन्तराज, स्नातकीय नेपाली साहित्य, शिलाङ्गःनेपाली पाठ्यपुस्तक प्रकाशन समिति, सन २०१५।
  ४. थापा, मोहन हिमांशु, साहित्य परिचय, काठमाडौं: साझा प्रकाशन, सन् १९९०।
  ५. नेपाल, घनश्याम, नेपाली साहित्यको परिचयात्मक इतिहास,सिलगढी: नेपालीसाहित्य प्रचार समिति, सन् १९९१।
  ६. पराजुली,कृष्णप्रसाद, राम्रो रचना मिठो नेपाली, काठमाडौं: साझा प्रकाशन, सन् १९९८।
  ७. शर्मा, मोहनराज र श्रेष्ठ, दयाराम, नेपाली साहित्यको इतिहास, काठमाडौं: साझा प्रकाशन, सन् १९८९।
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## HIN-127: हिन्दी भाषा का व्यावहारिक अनुप्रयोग

(Contact Hours: 45, Credits- 3)

उद्देश्य: प्रस्तुत पाठ्यक्रम का उद्देश्य विद्यार्थियों में हिन्दी भाषा के प्रयोग की व्यावहारिक दक्षता को संवर्धित करने के साथ-साथ हिन्दी भाषा के शुद्ध उच्चारण के विविध पक्षों का ज्ञान, हिन्दी वर्तनी का ज्ञान एवं सम्प्रेषण कला की योग्यता प्रदान करना है।

उपलब्धि: इस पाठ्यक्रम के अध्ययन से विद्यार्थी जहाँ एक ओर हिन्दी भाषा के शुद्ध उच्चारण में सक्षम हो सकेंगे, वहीं दूसरी ओर हिन्दी लेखन में मानक वर्तनी के प्रयोग और संवाद कौशल में भी दक्षता प्राप्त कर सकेंगे।

इकाई 1 हिन्दी उच्चारण ज्ञान: वर्णमाला; अल्पप्राण, महाप्राण; अघोष, सघोष; कंठ्य, तालव्य, मूर्धन्य, ओष्ठ्य, दन्त्य, दन्त्योष्ठ्य, अन्तस्थ, ऊष्म।

इकाई 2 हिन्दी वर्तनी ज्ञान : ह्रस्व, दीर्घ; स्वर, व्यंजन, मात्रा प्रयोग ।

इकाई 3 सम्प्रेषण कला: संवाद/वार्तालाप – औपचारिक, अनौपचारिक; लिखित सम्प्रेषण; अनौपचारिक पत्रलेखन।

### अभिस्तावित पुस्तकें:

1. हिन्दी भाषा और सम्प्रेषण – एम. एस. पब्लिकेशन, नई दिल्ली. 2020 ई.
2. हिन्दी भाषा का व्यावहारिक व्याकरण - एम. एस. पब्लिकेशन, नई दिल्ली, 2018 ई.
3. सम्पूर्ण हिन्दी व्याकरण और रचना- डॉ. अरविंद कुमार, ल्यूसेंट प्रकाशन, नई दिल्ली, 2019 ई.
4. आधुनिक हिन्दी व्याकरण और रचना- डॉ. वासुदेव नंदन प्रसाद, भारती प्रकाशन, नई दिल्ली, 2020 ई.
5. हिन्दी व्याकरण और रचना- डॉ. विजयपाल सिंह, विश्वविद्यालय प्रकाशन, वाराणसी, 2010 ई.
6. सरल हिन्दी व्याकरण और रचना- डॉ. वासुदेव नंदन प्रसाद, भारती प्रकाशन, नई दिल्ली, 2021 ई.
7. हिन्दी भाषा और सम्प्रेषण- डॉ. वी. डी. विज, लक्ष्मी बुक डिपो, दिल्ली, 2018 ई.



## **SEC- 130: CYBER SECURITY**

*(Contact Hours: 60, Credits-3)*

### **Course Objectives (COs):**

The course objective is to cover the basics of cyber and information security & spread it awareness of this field to help the students to understand the importance of security in their daily lives.

### **Learning Outcomes (LOs):**

Students shall be able to explain various security concepts and apply them in daily cyber use. Perform the malware and spam email identification, analysis, virus scanning and cleaning and other services using security tools and various existing cyber laws.

### **UNIT-I: Basic foundation of Cyber Security**

**15 Hours**

Information security: overview, information security importance, Attributes of Information Security, Authentication, Confidentiality, Integrity, Availability, Non Repudiation, Access Control, Threats and Vulnerabilities, Security Attacks, Unauthorized Access, Impersonation, Denial of Service, Malicious Software, Viruses, Worms, Trojan Horses. Definitions, Types of authentication, Password Authentication, Password Vulnerabilities & Attacks: Brute Force & Dictionary Attacks. Password Policy & Discipline, Single Signon- Kerberos, Biometrics: Types of Biometric Techniques: False Rejection, False Acceptance, Cross over Error Rates.

### **UNIT-II: Email risk, Different types of attacks, IT laws**

**15 Hours**

E-mail Risks, Spam, E-mail Protocols, Basics of Internet Protocol (IP), Email security: web authentication, SSL and SET, Network Attack: Buffer Overflow, TCP Session, Hijacking, Sequence Guessing, SQL injection attack, Cross-site scripting attack, Eavesdropping attack, Birthday attack, Malware attacks, Social Engineering attacks. Firewall, types of firewall.

IT Act: Salient Feature of IT Act 2000, Penalties & Offences, Legal Provisions under the Information Technology Act, Recent amendments by the IT (Amendment Act) 2008, section 66A.

### **UNIT-III: Practicals**

**30 Hours**

**Suggested Hands on Practical Assignments** (Experiments need not be restricted to this list)

#### **Basic Practical:**

1. Installation of antivirus software with different parameter settings.
2. Password management in Windows operating systems.

3. Setting up web browser security, Email Encryption.
4. Demonstration of SQL injection attack.
5. Demonstration of Cross-site scripting attack.

**Advance Practical:**

1. Demonstration of Eavesdropping attack.
2. Demonstrate the use of Network tools: ping, ipconfig, ifconfig, tracert, arp, netstat, whois
3. Use of Password cracking tools : John the Ripper, Ophcrack. Verify the strength of passwords using these tools.
4. Perform encryption and decryption of Caesar cipher.
5. Use nmap/zenmap to analyse a remote machine.
6. Use Burp proxy to capture and modify the message.
7. Demonstrate sending of a protected word document.
8. Demonstrate sending of a digitally signed document.
9. Demonstrate sending of a protected worksheet.
10. Demonstrate use of gpg utility for signing and encrypting purposes.

## SEC- 131: MOTIVATION

*(Contact Hours: 45, Credits-3)*

**Course Objectives:** This course will develop awareness among learners of the importance of Motivation. The programme will create in learners conditions in which they are willing to learn and work with zeal, initiative, interest, and enthusiasm. It will empower the students with diverse knowledge, expertise, skills and helps to develop the essential skills in life.

### Learning Outcomes

At the end of the course students are able to:

1. demonstrate different aspects on how people are motivated
2. value outcomes through improved performance, well-being, personal growth and a sense of purpose
3. propose a pathway to change the way of thinking, feeling and behaving and also willing to work with zeal, initiative, interest and enthusiasm

### UNIT I      **Motivation**

- Concept; Types: Extrinsic and Intrinsic Motivation
- Principles and Importance of Motivation;
- Approaches to Motivation- Physiological, Behavioural, Cognitive and Social;
- Components of Motivation: (i) Activation, (ii) Persistence and (iii) Intensity

### UNIT II      **Skills for Promoting Motivation**

- Fun classroom energizers for motivation
- Group work for team building
- Motivational Talks to Achieve Goals
- Celebrate personal achievements in the classroom

### UNIT III      **Improving Motivation**

- 3 Motivation Activity Ideas for Students
- Strategies for Improving Motivation (i) Set Goals (ii) Develop a Timeline (iii) Assess your progress regularly (iv) Develop a support system (v) Create rewards
- Preparation of a Motivational Worksheet
- Music and games for improving motivation

### Assignments **(Choose any one)**

1. Create a 5 minutes Motivational video

2. Develop your own Motivation skills
3. Identify 2 games for Experiential learning: Write down the steps for playing these motivational games

## References

- Federmeier, K.D (2018)(Ed). Psychology of Learning and Motivation. United States: Elsevier Science.
- Fuller, C., Taylor, P., Wilson, K. (2019). A Toolkit of Motivational Skills: How to Help Others Reach for Change. United Kingdom: Wiley.
- Graham, S., & Weiner, B. (1996). Theories and principles of motivation: *Handbook of educational psychology*, 4(1), 63-84.
- Hoffman, B. (2015). Motivation for Learning and Performance. Netherlands: Elsevier Science.
- Mackay, A. (2010). Motivation, Ability and Confidence Building in People. (n.p.): Taylor & Francis.
- Mangal, S. K. (2004). Advanced Educational Psychology. India: PHI Learning.
- Mangal, S. K. (2007). Essentials Of Educational Psychology. India: PHI Learning.
- Miele & Wentzel.(2016) Handbook of Motivation at School. United Kingdom: Taylor & Francis.
- Morreale, S. P., Spitzberg, B. H., & Barge, J. K. (2001). *Human communication: Motivation, knowledge, and skills*. Belmont, CA: Wadsworth/Thomson Learning.
- Motivation: Theory and Research. (2012). United States: Taylor & Francis.
- Peters, R. S.(2015). *The concept of motivation*. Routledge.
- Shah & Gardner(Eds).(2008)Handbook of Motivation Science. United Kingdom: Guilford Publications.

## SEC-132: PERSONALITY DEVELOPMENT

*(Contact Hours: 45, Credits-3)*

### **Learning Outcomes (LOs):**

1. Comprehending the scope of personality and its development.
2. Enabling development of core skills for development of self.
3. Understanding positive personality traits
4. Cultivating skills for successful life

### **Unit-I Personality Development**

- Personality-Concept, nature, traits of Personality, Social etiquettes and manners
- Determinants of personality- physical, intellectual, emotional, linguistic and cultural
- Importance of personality development, Factors influencing Personality Development
- Self-confidence – Meaning and building techniques, Willpower-Increasing the Willpower for self-improvement.

### **Unit-II Attitude and Motivation**

- Attitude – Concept and types
- Developing a positive attitude in life and factors affecting attitudes
- Motivation– Concept, significance and types
- Importance of self-motivation and factors leading to de-motivation

### **Unit-III Career planning activities**

- Time management skills
- Resume building, Art of Facing Interviews
- Significance of personality Test & Aptitude tests
- Mock Interview Sessions

### **Suggested readings:**

1. Andrews, Sudhir (1988). How to Succeed at Interviews. 21st (rep.) New Delhi, Tata McGraw-Hill.
2. Barun K. Mitra, Personality Development and Group Discussions, Oxford University Press Career Digest
3. Chandra, M.S. Satish (1999). Conflict Management. Delhi. Rajat publication.
4. Hurlock Elizabeth B. Personality Development Tata Mcgraw Hill, New Delhi
5. Jaikishan Roy (2015). Improve your Personality, Mark Publishers, Jaipur.
6. Jegadeesan, M., S.R. Padma, M.R. Naveen kumar (2021). Communication Skills and Personality Development. New India Publishing Agency, New Delhi.
7. Mile, D.J (2004). Power of positive thinking. Delhi. Rohan Book Company.
8. Pravesh Kumar (2005). All about Self- Motivation. New Delhi. Goodwill Publishing House.

9. Sabharwal, D. P. (2021). Personality Development Handbook Paperback, Fingerprint Publishing, New Delhi.
10. Shankar, Uday (1981). Personality Development. Delhi Smith, B (2004). Body Language. Delhi: Rohan Book Company.
11. Swami Vivekananda (2011) Personality Development published by Ramakrishna Math and Ramakrishna Mission.
12. Yadav, R. N. Singh (2016). The Dynamics of Successful personality, Mount Hill Publishing Company, New Delhi.

## SEC-133: PUBLIC SPEAKING

*(Contact Hours: 45, Credits-3)*

### Course Objectives:

This paper aims to impart communication skills to students for public speaking and interaction with the general public.

### Learning Outcomes:

The course will enable the students to overcome the fear of public speaking and enhance their confidence to gain practical experience in effective public speaking.

#### Unit I: Public Speaking: Meaning and Significance.

Types of Public Speaking: Media, Corporate and Political.

#### Unit II: Art of Public Speaking: Language, Etiquettes and Communication Skills.

Techniques of Public Speaking: Audience Applause Technique, Practice with a mini-audience, Practice in front of camera, Soft Sale Storytelling Strategy.

#### Unit III: Tools for Public Speaking: Vocal delivery, Body language, Audio Visual aids.

Effective Speaking: Presentation

### Suggested Readings

Davidson, Jeff, *The Complete Guide to Public Speaking*, Breathing Space Institute, 2003

DiSanza, J. R., & Legge, N. J, *Business and professional communication: Plans, processes, and performance* (3rd ed.). Needham Heights, MA: Allyn & Bacon, 2005.

Goleman, Daniel, *Working with Emotional Intelligence*, London: Banton Books, 1998

Hall, Calvin S, et.al., *Theories of Personality*, New Delhi: Wiley, rpt.2011

Hamilton, C, *Essentials of public speaking* (5th ed.). Belmont, CA: Wadsworth Cengage Learning, 2012

Holtz, Shel, *Corporate Conversations*, New Delhi: PHI.2007

King, Dale, *Effective Communication Skills: The Nine-Keys Guidebook for Developing the Art of Persuasion through Public Speaking, Social Intelligence, Verbal Dexterity, Charisma and Eloquence*, Hamatea Publishing Studio, 2020

Kumar, Sanjay and Pushp Lata, *Communication Skills*, New Delhi: OUP, 2011

- Koch, A. *Speaking with a purpose*. Needham Heights, MA: Allyn & Bacon, 2007.
- Lucas, Stephen E, *The Art of Public Speaking*, McGraw-Hill Book Co. International Edition, 11th Ed., 2014
- O'Hair, D., Rubenstein, H., & Stewart, R, *A pocket guide to public speaking* (2nd ed.). Boston, MA: Bedford/St. Martin's, 2007
- Sharma, Sangeeta and Binod Mishra, *Communication Skills for Engineers and Scientists*, New Delhi: PHI Learning, 2009, 6th Reprint 2015
- Thorpe, Edgar and Showick Thorpe, *Winning at Interviews*, Pearson Education 2004
- Turk, Christopher, *Effective Speaking, South Asia Division*: Taylor & Francis, 1985.
- Zarefsky, David, *Public Speaking: Strategies for Success*, Allyn & Bacon, Incorporated, 1999



## SEC-134: TEAM BUILDING

(Contact Hours: 45, Credits-3)

**Course Objectives (COs):** The course will familiarize the students with the diverse aspects of team building.

**Learning Outcomes (LOs):** The students will be able to understand the importance of team building, its purpose, team spirit and team work. They will be able to effectively address diverse issues relating to team building process. The students will learn how team building helps in conflict resolution, management and use of individual talents.

### Unit- I: Team Building: Conceptual Issues

- Definition and characteristics of a team
- Team spirit and collectivism
- Motivation
- Leadership

### Unit- II: Structure and Process of Team Building

- Characteristics of successful team building
- Effective team performance: issues and challenges
- Accountability
- Obstacles/problems in team building

### Unit- III: Importance of Team Building

- Creative and learning competence
- Improvement of work culture
- Building up of trust
- Collective ownership

### Suggested readings:

- Alley, H. R. 2011. *Becoming the supervisor: Achieving your company's mission and building your team*. UK: Routledge.
- Coyle, D. 2019. *The culture code: The secrets of highly successful groups*. London: RH Business Books.
- M., V. J. 2001. *Group model building: Facilitating team learning using system dynamics*. Chichester: J. Wiley.
- McChrystal, S. 2015. *Team of teams: New rules of engagement for a complex world*. USA: Portfolio Penguin.
- McDaniel, A. 2013. *The Young Professional's Guide to managing: Building, guiding, and motivating your team to achieve awesome results*. USA: The Career Press.
- Roefaro, M. 2011. *Building the team from the inside out: A multi-dimensional view of leadership*. United States: Waterside Publications.
- Tjosvold, D. & Tjosvold, M. M. 2015. *Building the team organization: How to open minds, resolve conflict, and ensure cooperation*. Basingstoke, Hampshire: Palgrave Macmillan.

## VAC-140: ENVIRONMENTAL SCIENCE

**(Contact Hours: 45, Credits:3)**

**Course Objective:** To introduce the basic concepts of environment, natural resources, biodiversity and its conservation and concepts and components of environmental pollution and social issues.

**Learning Outcomes:** Student should be able to gain the knowledge about the environment, its component, natural resources, biodiversity conservation, environmental pollution and social issues pertaining to environmental pollution. **(Contact hours: 15 hrs.)**

Unit I: Environment: Definition, Components of Environment; Natural resources (Renewable and Non-renewable) their conservation and management: Forest resources, Water resources, Mineral resources, Energy resources, Land resources. Soil erosion and desertification. **(Contact hours: 15 hrs.)**

Unit II: Ecosystems: Concept, Structure and Functions. Food Chain and Food web. Energy flow in an ecosystem and biogeochemical cycle. Biodiversity: definition and concepts, biodiversity hot-spots. Conservation of biodiversity: *In-situ* and *ex-situ* conservation. **(Contact hours: 15 hrs.)**

Unit III: Environmental Pollution and Social Issues: Definition, causes, effects and control measures for Air pollution, Water pollution, Soil pollution, Noise pollution; Important issues of environmental pollution: Climate change (Greenhouse effect & Global warming), acid rain, ozone layer depletion; Environmental Legislation: Salient features of Environmental Protection Act, Air (Prevention & Control of Pollution) Act, Water (Prevention & Control of Pollution) Act; Sustainable development; Role of Information Technology in Environment, Environmental ethics and movements. **(Contact hours: 15 hrs.)**

### **Suggested Readings:** (All latest edition)

Botkin, D.B. and Keller, E.A. Environmental Science: Earth as a Living Planet. John Wiley and Sons, New Delhi.

Chapin III, F.S., Matson, P.A. and Vitousek, P.M. Principles of Terrestrial Ecosystem Ecology. Springer, New Delhi.

Purohit, S.S., Shammi, Q.J. and Agarwal, A.K. A Textbook of Environmental Science. Students Edition, Jodhpur.

Sharma, P.D. Ecology and Environment. Thirteenth Edition. Rastogi Publication, Meerut.

Odum, E.P. Fundamentals of Ecology. Nataraj Publisher, DehraDun.

Rana, S.V.S. Essentials of Ecology and Environmental Science. Prentice Hall of India, New Delhi.

De, A.K. Environmental Chemistry. New Age International Pvt. Ltd., New Delhi.

Viswanatha, C.R., Hegadal, R.V. and Hegadal, S.V. Disaster Management. Himalaya Publishing House

## SEMESTER-II

SL NO	CODE	NAME OF THE COURSE (MDC) SEM II
1	MDC 160	DISASTER MANAGEMENT
2	MDC 161	ENTREPRENEURSHIP
3	MDC 162	ENVIRONMENTAL ETHICS
4	MDC 163	FUNDAMENTALS OF STATISTICS
5	MDC 164	HEALTH & HYGIENE, ENVIRONMENTAL EDUCATION AND DISASTER MANAGEMENT
6	MDC 165	INTRODUCTION TO EDUCATIONAL PSYCHOLOGY
7	MDC 166	INTRODUCTION TO THEATRE AND PERFORMANCE
8	MDC 167	PHYSICAL EDUCATION AND SPORTS SCIENCE
9	MDC 168	PHYSICAL GEOLOGY & GEODYNAMICS
10	MDC 169	UNDERSTANDING HUMAN RIGHTS

SL NO	CODE	NAME OF THE COURSE (AEC) SEM II
1	AEC 170	COMMUNICATIVE ENGLISH
2	AEC 171	MIL-II: ASOMIYA JOGAJOG
3	AEC 172	MIL-II: BANGLA BHASHARBYABOHARIKPRAYOG
4	AEC 173	MIL-II: COMMUNICATIVE GARO
5	AEC 174	MIL-II: COMMUNICATIVE LANGUAGE
6	AEC 175	MIL-II: KAKRENKATHOH KHASI
7	AEC 176	MIL-II: NEPALI
8	AEC 177	MIL-II: हिन्दीभाषाकातकनीकीअनुप्रयोग

SL NO	CODE	NAME OF THE COURSE (SEC) SEM II
1	SEC 180	COMMUNICATION SKILLS
2	SEC 181	CONFIDENCE BUILDING
3	SEC 182	E- COMMERCE
4	SEC 183	PYTHON PROGRAMMING

SL NO	CODE	NAME OF THE COURSE (VAC) SEM II
2	VAC 190	HEALTH WELLNESS AND
1	VAC 191	LIFE SKILLS EDUCATION
3	VAC 192	UNDERSTANDING INDIA

## **MDC-160: DISASTER MANAGEMENT**

**(Contact Hour-45, Credit-3)**

### **Course Objectives (COs):**

1. To acquaint and familiarize students with the fundamentals of disaster and disaster management
2. To develop critical thinking in disaster response, preparedness and mitigation
3. To acquaint students on policy matters and role of different stakeholders

### **Learning Outcomes (LOs):**

Students are able-

1. To explain the fundamentals of disaster and disaster management
2. To develop critical thinking in terms of response, preparedness and mitigation strategies in all phases of disaster
3. To examine policy related matters and the role of different agencies and stakeholders in disaster management

### **Unit I: Fundamentals of Disaster and Disaster Management**

- Concept – disaster, hazard, vulnerability, capacity, risk, disaster management
- Characteristics of disaster
- Natural and man-made disasters
- India: Vulnerability profile

### **Unit II: Disaster Management Framework and Policies in India**

- National disaster management act 2005
- National policy on disaster management 2009
- National disaster management plan 2016
- Disaster management cycle – mitigation, preparedness, response, recovery

### **Unit III: Stakeholders response to disasters**

- UNDP
- Role of State government
- Community and NGOs
- Role of media

### **Assignment (*Choose any one*)**

1. Prepare a Disaster Management Plan at the locality or village level
2. Prepare a Disaster Management Plan at the institutional level
3. Highlight the Do's and Don'ts – during and after an earthquake

### **Suggested Readings:**

1. Government of India, Ministry of Home affairs, National Disaster Management Division, *Disaster Risk reduction: The Indian Model*, 2005, New Delhi.

2. Government of India, Ministry of Home affairs, NIDM, *Reading Material, Training Programme on Disaster management*, 2005 New Delhi,
3. Government of India, Ministry of Home Affairs, NDM Division, *Disaster Management in India: A Status Report*, August 2004, New Delhi.
4. Dhawan, Nidhi Gauba & Khan, Ambrina Sardar. *Disaster Management and Preparedness*. CBS Publication, 2012.
5. Anon. *Dealing with disasters-Awareness, Preparedness*. Ahmedabad: Response (an educator's Manual) Centre for environmental Education, 2004.
6. Carter, Nick. *Disaster Management: A Disaster Manager's Handbook*. Asian Development Bank, 1992.
7. Kapur, A. *Disaster in India: Studies of Grim Reality*. Jaipur: Rawat Publication, 2005.
8. Narayan, B. *Disaster Management*. New Delhi: APH Publication, 2000.
9. Paul, Yashwant P.Raj. *Volunteer's Handbook for Disaster Preparedness*. UNDP, UN Volunteers, 2002.
10. Prakash, Indu. *Disaster Management: Societal Vulnerability to natural calamities and Man-made*. Ghaziabad: Rashtra PrahariPrakashan, 1994.

## **MDC-161: ENTREPRENEURSHIP**

**(Contact Hour-45, Credit-3)**

**Course Objective:** To provide exposure to the students to the concept and process of entrepreneurship, and industrial growth so as to prepare them to set-up their own small enterprises.

**Learning outcome:** Students will

- a. Understand the concepts and process of Entrepreneurship
- b. Know the importance of entrepreneurship in different context
- c. Be able to develop and design entrepreneurship development programs

### **Unit-I: Introduction**

Entrepreneurship- Concepts and Definitions

Theories of Entrepreneurship

Entrepreneurial Behavior

Entrepreneurial Culture vs. Administrative Culture

Entrepreneurship vs. Intrapreneurship

Entrepreneurship as an Alternative Career Option

Social Entrepreneurship

Corporate Entrepreneurship Women Entrepreneurship International Entrepreneurship

### **Unit-II: The Entrepreneur and Entrepreneurship**

Types and Classification of entrepreneurs

Functions of Entrepreneurs

Entrepreneurial traits

Entrepreneur distinguished from manager and leader Entrepreneurial functional different stages of enterprise life cycle Cases of successful entrepreneurs

Steps involved in starting a business venture

### **Unit-III: Entrepreneurship Development**

Needs for EDPs

Objectives of EDPs

Designing Comprehensive EDPs

Evaluating an EDP

Startups.

Institutional Supports – Financial (SFCs, NSIC, SIDBI, CBs) and Non-Financial (EDII, IIE, DIC, KVIC)

**Suggested Readings (Latest Edition)**

- Coulter: Entrepreneurship in Action, Prentice Hall of India, N. Delhi
- Roy, Rajeev: Entrepreneurship, Oxford University Press, New Delhi
- Kuratko, Donald F. & Richard M Hodgetts: Entrepreneurship in the New Millennium, South Western Cengage learning
- Desai, Vasant: Entrepreneurial Development, Vol. I, Himalaya Publications, N. Delhi.
- Drucker, Peter: Innovation and Entrepreneurship, Heineman.
- Hisrich, RD & Peter, MP: Entrepreneurship, Tata Mc Graw Hill.

## MDC-162: ENVIRONMENTAL ETHICS

(Contact Hour-45, Credit-3)

**Course Objectives (COs):** Teaching ethical aspects of Human-Environment relations, Making students aware of ethical ways of dealing with environmental problems.

**Learning Outcomes (LOs):** Sensibility to larger issues of environment and climate crisis, how to think about restoration, replenishment and recycling and other such ethical means of preserving the environment.

### Unit-I: Possibility of Environmental Ethics

- (a) Concept of Environment.
- (b) Moral standing of Non-human World
- (c) Ecocentrism, Anthropocentrism, Zoocentrism

### Unit-II: Deep Ecology

- (a) Deep Ecology of Arne Naess.
- (b) Ecofeminism
- (c) Bioethics

### Unit-III: Climate Change

- (a) Global Warming and Disaster Resilience.
- (b) Ethics of Sustainability
- (c) Development Ethics

### Suggested Readings

1. White, Lynn Jr., "The Historical Roots of Our Ecologic Crisis", *Science*, Vol. 155, 1967.
2. Carson, Rachel, *The Silent spring*, A Mariner Book Houghton Mifflin Company, Boston and New York, 1962.
3. Naess, Arne, *Selected works of Arne Naess (SWAN)*, Series Editor, Harold Glasser. Alan Drengson, Associate Editor, 10 Volumes. Springer, Netherlands, 2005.
4. Naess, Arne, "The Shallow and the Deep, Long-Range Ecology Movement: A Summary", *Inquiry: An Interdisciplinary Journal of Philosophy and the Social Sciences*, vol.16:1-4, pp.95-100, 1973.
5. Naess, Arne, "The Shallow and the Deep Ecology Movement", *The Trumpeter*, (tr.), Erling Schøller, Vol 24, Number 1, 2008.
6. Naess, Arne, "A Defence of the deep ecology movement", *Environmental Ethics*, Vol. 6, 1984.



7. Norton, Bryan G., "Environmental Ethics and Weak Anthropocentrism" ,*Environmental Ethics*, Vol. 6, Issue 2, 1984.
8. Marangos, John, *Alternative Perspectives of a Good Society*, Palgrave Macmillan, New York,2012.
9. Sylvan, Richard, "A Critique of Deep Ecology",*Radical Philosophy*, vol.40, 1985.
10. Watson, Richard A., "A critique of anti-anthropocentric biocentrism",*Environmental Ethics*, 5 (3), 1983.
11. Henk ten Have, Maria doCéuPatrão Neves, *Dictionary of Global Bioethics*, Springer Cham, Switzerland AG, 2021.
12. Shiva, Vandana, *Who Really Feeds the World?*,Zed Books,London, 2016.
13. Shiva, Vandana, *Earth Democracy*, Bloomsbury Academic, London, 2016.

## MDC-163: FUNDAMENTALS OF STATISTICS

(Contact Hour-45, Credit-3)

**Course Objectives:** To impart the students a knowledge on the development, meaning, Importance and scope of Statistics, summary measures of data sets and concepts of probability.

**Learning Outcomes:** Upon successful completion of this course, the students will be able to understand the types of data and its scales of measurements, various data representations, types of averages and variations, what probability is as well as associated concepts.

### UNIT-I: Introduction to Statistics (15 hours)

Historical development of Statistics. Definition and meaning of Statistics. Collection of Data: meaning and need of data, primary and secondary data, scientific methods of collecting primary data, sources of secondary data. Types of data: Qualitative, Quantitative, Cross-Sectional, Time series, Discrete and Continuous, Univariate, bivariate and multivariate data. Scales of Measurement. Presentation of data (Univariate): Classification, tabulation and diagrammatic representation of data.

### UNIT-II: Descriptive measures (15 hours)

Descriptive Measures of data- concepts and properties of different measures of central tendency and dispersion (univariate data) and their application in different scales of measurement. Moments; skewness and kurtosis.

### UNIT-III: Elementary Probability (15 hours)

Concept of probability: Random experiment, outcome, trial, event, sample points, sample space (Discrete and Continuous), favourable events, equally likely events, mutually exclusive, independent and exhaustive events. Concept of Permutation and Combination. Definition of probability: Classical and statistical and their limitations. Additive and multiplicative theory of probability. Conditional probability. Bayes' theorem and its applications.

#### Suggested readings:

1. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2002): Fundamentals of Statistics, Vol. I, 8th Edn. The World Press, Kolkata.
2. Gupta, S. C., & Kapoor, V. K. (2002). Fundamental of Mathematical Statistics. Sultan Chand & sons. New Delhi.
3. Mann, Prem S. (2007). Introductory Statistics, 7<sup>th</sup> Edition. John Wiley & Sons.
4. Medhi, J. (2006). Statistical Methods: An Introductory Text. New Age International (Pvt) Limited, New Delhi.
5. Agarwal, B.L. (2020). Basic Statistics, 6<sup>th</sup> Edition. New Age International (P) Limited. New Delhi
6. Bansal, Archana. (2017). Survey Sampling. Narosa Publishing House Pvt Ltd. New Delhi
7. Gupta, S.C. & Kapoor, V. K. (2007), 'Fundamentals of Applied Statistics', S. Chand and Sons. New Delhi.

## **MDC -164: HEALTH & HYGIENE, ENVIRONMENTAL EDUCATION AND DISASTER MANAGEMENT**

**(Contact Hour-45, Credit-3)**

**Course Objectives (COs):** The objective of this course is to educate on the importance of maintaining good health and hygiene practices, understanding the principles of environmental education, and preparing for and responding to disasters.

**Learning Outcomes (LOs):** The students will develop an understanding of health and hygiene practices to maintain personal and community well-being. They will be able to apply principles of environmental education to promote sustainability and reduce environmental impact and develop skills in disaster management to prepare and respond effectively to emergencies and natural disasters.

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<b>UNIT I</b>	Structure and Function of Human Body, Hygiene and Sanitation, Preventable Diseases, First Aid, Yoga: Introduction and Exercises, Physical and Mental Health, Fractures: Types and Treatment.
<b>UNIT II</b>	Civil Defense: Meaning, Organization and its Duties, Civil Defense Services, Fire Fighting: Meaning, Mode of Fire, Fire Fighting Parties, Fire Fighting Equipment. Introduction and Classification of Disaster: Natural Disaster & Man-Made Disaster, Disaster Management with special reference to Flood, Cyclone and Earthquake, Assistance in Removal of Debris, Collection and Distribution of Aid Material, Message Services.
<b>UNIT III</b>	Environment: Definition, Global Warming, Acid Rain, Depletion of Ozone Layer, Conservation of Environment. Ecology: Introduction, Component of Ecological System, Forest Ecology, Wildlife, Pollution Control.
<b>Practical</b>	a. First aid and CPR b. Yogic exercises c. Team composition & equip for specific disaster. d. Environmental awareness & conservation e. Practical on Environmental Education f. Fire Fighting Equipment

### **Suggested Readings:**

Business Communication, VK Jain, Omprakash Biyani, S. Chand Publishing (2008), 283pp  
Cadet's Handbook- Common Subject, All Wings, by DG NCC, New Delhi  
Cadet's Handbook -Specialized Subject, Army, by DG NCC, New Delhi  
NCC Common Subjects, SD/SW  
The Cadet, Journal of the NCC.  
The book of Leadership, Anthoni Gell (2014), Published by Piatkus, 368pp  
The Written Word, Vandana R. Singh. (2012), Published by Oxford University Press.

## **MDC- 165: INTRODUCTION TO EDUCATIONAL PSYCHOLOGY**

**(Contact Hour-45, Credit-3)**

### **Course Objectives:**

This course will sensitize learners towards the applications of psychological concepts and principles in Education in order to improve educational practice. The learners will acquire detail knowledge of the relation between psychology and education. It will also help learners to understand human behaviour in educational situations during the learning process and the psychological requirements for completing the educational process.

### **Learning Outcomes**

At the end of the course students are able to:

1. explain the fundamentals of Educational Psychology
2. assess individual differences in learning, intelligence, personality and creativity
3. make use of skills related to Educational Psychology

### **UNIT I      Concept of Educational Psychology**

- Meaning, Nature and Scope of Educational Psychology
- Aspects of Educational Psychology
- Problems of Educational Psychology
- Importance of Educational Psychology to the Teacher

### **UNIT II      Basic Introduction to**

- Learning : Concept, Nature, Factors
- Intelligence: Concept & Determinants
- Personality: Concept, Determinants, Types
- Creativity: Concept, Component ,Process

### **UNIT III      The Teacher**

- Psychological Characteristics of a Teacher
- Role of a Teacher in Teaching Process
- Teaching Competencies
- Psychological Wellbeing of a Teacher

### **Assignments (Choose any one)**

1. Measure the IQ of an individual and write a report on it.
2. Develop strategies for improving Creativity
3. Assess the personality of a subject by using any personality test

### **References**

Bhatia, H. R. (1973). Elements of Educational Psychology. Orient Blackswan, 1973.

- C., A. J. (2014). Essential of Educational Psychology (Third Edition 2014 Ed.). New Delhi: Vikas Publishing House.
- Chauhan, S. S. (2007). Advanced Educational Psychology. New Delhi: Vikas Publishing House Pvt Ltd.
- Jeanne Ellis Ormrod, E. M. (2017). Educational Psychology: Developing Learners (9 Ed.). Pearson.
- Jones, J. E. (2018). Essentials of Educational Psychology: Big Ideas To Guide Effective Teaching. Pearson.
- Lyn Corno, E. M. (Ed.). (2016). Handbook of Educational Psychology (3rd Edition Ed.).
- Mangal, S. K. (2002). Advanced Educational Psychology. New Delhi: Phi Learning Pvt. Ltd.
- Mangal, S. K. (2007). Essentials of Educational Psychology. New Delhi: Phi Learning Pvt. Ltd.
- Pathak, R. (2011). Research In Education And Psychology: Always Learning. Pearson Education India.
- Rao, S. (2002). Educational Psychology. New Delhi: New Age International.

## MDC-166: INTRODUCTION TO THEATRE AND PERFORMANCE

(Contact Hour-45, Credit-3)

### Objectives:

1. To familiarize students with the basic concepts of Theatre and Performance.
2. To equip students with practical knowledge and understanding of theatre and performance.
3. To encourage creative expression, thinking and collaborative exploration.

### Learning Outcomes:

Students will gain the basics of theatre and performance, a theoretical introduction to theatre and performance and the ability to translate dramatic theory into practice. The course will also facilitate an understanding of technical aspects such as stagecraft and theatre design, scriptwriting and acting etc.

### UNIT I

#### Introduction to theatre and performance

- a. Brief Introduction to Performance Traditions
- b. Brief Introduction to Classical Greek Plays and playwrights: Sophocles, Aeschylus, Aristophanes.

### UNIT II

#### Brief introduction to some of the major contemporary theatre movements:

Realism in Theatre, Theatre of the Absurd, Modern Indian Drama (Theatre of Roots Theatre of the Earth)

#### Detailed Study of any one of the following plays:

- a. *A Doll's House* by Henrik Ibsen
- b. *The Zoo Story* by Edward Albee
- c. *Charandas Chor* by Habib Tanvir
- d. *Pebe* by Heisnam Kanhailal

### UNIT III

#### Practicals of Theatre and Performance:

Basics of Scriptwriting

Basics of Acting

Fundamentals of Theatre Design

A play (any play) to be adapted/ designed and performed by the students.

### Suggested Readings

- Albee, Edward. *The Zoo Story* Ed. by Samuel French, Samuel French Ltd, 1998.
- Arnott, P. *An Introduction to the Greek Theatre*. Palgrave MacMillan, 1991.
- Bharucha, Rustom. *The Theatre of Kanhailal Pebet and Memoirs of Africa*.  
Kolkata: Seagull Books, 1992.
- Bogart, Anne and Tina Landau. *The Viewpoints Book A  
Practical Guide to Viewpoints and Composition*. New  
York: Theatre Communications Group 2005.
- Bogart, Anne. *And then you Act: Making Art in an Unpredictable World*. Routledge, 2007.
- Carlson, Marwin. *Theatre: A Very Short Introduction*. Oxford University Press, 2014.
- Deshpande, G.S. *Modern Indian Drama by: An Anthology*, Sahitya Akademi, 2015.
- Egan, Michael. *Henrik Ibsen: The Critical Heritage*. Routledge, 2009.
- Herpham, Geoffrey Galt and M. H. Abrams. *Glossary of Literary Terms* by,  
Wordsworth Publishing Co Inc, 2014.
- Ibsen, Henrik. *A Doll's House*. SMS Books, 2008.
- Kanhailal, Heisnam. *Theatre of the Earth: Essays and Interviews* Seagull Books, 2016.
- Moore, Frank Ladlie and Mary Varchaver. *Dictionary of the Performing Arts*.  
Contemporary Books Inc, 2001.
- Stanislavski, Constantine. *An Actor Prepares*, Bloomsbury Publishing India Pvt Ltd,  
2001. Tanvir, Habib. *Charandas Chor and Other Plays*. Seagull Books, 2018.
- Wiles, David. *Greek Theatre Performance: An Introduction*. Cambridge  
University Press, 2000.

## **MDC-167: PHYSICAL EDUCATION AND SPORTS SCIENCE**

**(Contact Hour-45, Credit-3)**

### **Course objective:**

The course will provide general concept of physical education and its significance for overall growth and development of body and mind. It will also provide valuable information on the impact of physical activities on our vital physiological systems and first-aid measures. It will also encompass the significance of recreational sports and provide information about Sports Bodies of India.

### **Learning outcome:**

On successful completion of the course, the students should be able to understand:

1. The significance of physical education in overall well-being and to maintain physical fitness.
2. Basic concept of muscle contraction and the need to have warm-up before the physical exercises.
3. The sources of energy in the body during physical activities.
4. Sport injuries and administration of first aids.
5. The effects of exercises on various physiological systems of our body.
6. The cardiac cycle and how it is regulated during exercises.
7. The significance of recreational sports in maintaining good health.
8. The role of various traditional and modern centers of physical trainings.
9. The role of different sports bodies and awards at various levels

### **Unit 1**

Meaning, definition, scope and functions of physical education; Different interpretations of physical education; Concept of movement education; Physical education as an integral part of education; Life time physical education for fitness; Physical fitness and its components; Training, conditioning, and warm-up; Types of muscle contraction; Lactic acid and its influence on sports performance; Fuels for exercise and energy production; Metabolic response to short term and prolonged exercise; Common sports injuries in different parts of body; First aids for sports injuries; Common causes of sports injuries and its prevention; Rest, ice, compression, and elevation (RICE) & bandage.

### **Unit 2**

Definition and importance of physiology and exercise physiology; Effect of exercise on various system of the body-circulatory system, respiratory system & muscular system; Cardiac cycle and its function in human body; First aid and Management



of fracture, nose bleeding, electric shocks, other shocks, fever, fainting, drowning/near-drowning.

### **Unit 3**

**Recreational Sports:** meaning, definition, scope & functions of recreations; Recreation in rural, urban & industrial area; Age-wise planning & leadership in recreation; Movement of Akhadas & Vyayam Shalas; Sports Bodies of India-Central Advisory Board of Physical Education, All India Council of Sports, Sports Authority of India (SAI) & Nehru Yuva Kendra; Sport Awards-State, National & International level.

#### **Suggested readings:**

1. Deshpande SH (1992). Physical Education in ancient India. Bharatiya Vidya Prakashan, India.
2. Fox EL (1994). Sports Physiology. W.B. Saunders Co. USA.
3. Guyton AC and Hall JE (1996). Textbook of Medical Physiology, 9<sup>th</sup> Edition. W.B. Saunders Co., USA.
4. Hunter M (1964). Dictionary for Physical Educators. In H. M. Borrow & R. McGee, (Eds.), A Practical approach to measurement in Physical Education (pp. 573-74). Lea &Febiger, USA.
5. Hyensmith CW (1966). History of Physical Education. Joanna Cotler Books, USA.
6. Marieb EN (1995). Human Anatomy and Physiology. Benjamin-Cummings Publishing Company, USA.
7. Pearce E (1993). Anatomy and Physiology for nurses. Jaypee Brothers, India.
8. Rice EA, Hutchinson JL and Lee M (1969). A Brief History of Physical Education. Ronald Press, USA.
9. Seeley RR, Stephens TD and Tate P (2005). Anatomy and Physiology, 7<sup>th</sup> Edition. McGraw-Hill Higher Education, Australia.
10. Tortora GJ and Derrickson BH (2017). Introduction to Human Body, 11th Edition. Wiley, USA.
11. Van Dalen DB and Bennett BL (1971). A World History of Physical Education: Cultural, Philosophical, Comparative, Volume 10, Prentice Hall, USA.
12. Wakharkar DG (1967). Manual of Physical Education of India. Pearl Publication, India.
13. Willam JE (2000). The Principles of Physical Education, 8th Revised Edition. W.B. Saunders Co. Ltd, USA.
14. Wuest DA and Walton-Fisette J (2020). Foundations of Physical Education, Exercise Science, and Sport, 20<sup>th</sup> Edition. McGraw-Hill, New York.

## MDC-168: PHYSICAL GEOLOGY & GEODYNAMICS

(Contact Hour-45, Credit-3)

**Course Objectives (COs):** To familiarise students about the internal structure of the earth, endogenetic processes, deformation in the rocks. To understand the various principles of Stratigraphy and its correlation.

**Learning Outcomes (LOs):** The students will be able to understand the process of earthquakes, interpret the structural features of deformed rocks, and stratigraphic units.

**UNIT I (15 hours)** Primary differentiation; Internal structure of the Earth. Earthquakes: Seismic waves and causes. Plate Tectonics: Types of Plate, Plate boundaries and Plate movement.

**UNIT II (15 hours)** Rock deformation. Stress: Concept and types. Strain: Concept and types. Preliminary concepts of Linear and Planar Structures: Bedding plane, Fold, Joints, & Faults.

**UNIT III (15 hours)** Principles of Stratigraphy. Stratigraphic correlation. Tertiary rocks of Upper Assam and Lithostratigraphy of Meghalaya.

### Suggested Readings:

Billings, M. P., 1987. Structural Geology, 4th edition, Prentice-Hall.

Datta A. K., An introduction to Physical Geology – Dastane Ram Chandra and Co. Pune.

Holmes A., 1993. Principle of Physical Geology 4th Ed., Chapman and Hall, London.

Park, R. G., 2004. Foundations of Structural Geology. Chapman & Hall.

Verma, V. K. 2002. Lectures on Geomorphology, Pilgrims Book House.

## MDC-169: UNDERSTANDING HUMAN RIGHTS

(Contact Hour-45, Credit-3)

### Course Objectives:

The objective of the course is to understand the basic concepts of human rights, its contemporary significance and measures for protecting and promoting human rights. It also aims to sensitize the students regarding principles and aspects of human rights.

### Learning Outcomes:

This course will enable students to understand the historical growth of human rights and demonstrate awareness in international and national contexts.

**Unit I:** Human Rights: Meaning and evolution; Universal Declaration of Human Rights 1948.

**Unit II:** Group Rights: Indigenous People's Rights, Workers' Rights, Women's Rights.

**Unit III:** Human Rights and Environment, Globalization and Challenges to Human Rights, United Nations Human Rights Commission, National Human Rights Commission of India.

### Suggested Readings:

Alston, P., *The United Nations and Human Rights: A Critical Appraisal*, Oxford, the Clarendon Press, 1995.

Alston, P. & Ryan Goodman (ed.), *International Human Rights*, OUP, India, 2012.

Brownlie, I. (ed.), *Basic Documents on Human Rights*, Oxford, The Clarendon Press, 1992.

Chandler, David, *From Kosovo to Kabul, Human Rights and International Intervention*, London Pluto, 2002.

Donnelley, J., *The Concept of Human Rights*, London, Croom Helm, 1985.

Donnelly, J. *Universal Human Rights in Theory and Practice* (3<sup>rd</sup> Edn.), Rawat Publications, Jaipur, 2014.

Eide, A. and Bernt, H., *Human Rights in Perspective: A Global Assessment*, London, Blackwell, 1992.

Evans, T., *The Politics of Human Rights: A Global Perspective*, London, Pluto, 2004.

Freeman, Michael, *Human Rights: An Interdisciplinary Approach*, Blackwell Publishing Company, UK, 2002.

Goodhart, Michael (ed.), *Human Rights: Politics and Practice*, OUP, Oxford, 2013

Gupta, U.N., *The Human Rights*, Atlantic, 2007.

Nirmal Chiranjivi J. (ed.), *Human Rights in India: Historical, Social and Political Perspectives*, OUP, New Delhi, 2002.

Mishra, Pramod, *Human Rights: Global Issues*, Delhi, Kalauz Publications, 2002.

Saksena, I.P. (ed.), *Human Rights, Fifty Years of India's Independence*, Delhi, Gyan, 1999.

Rosad, A and J. Helgrsen (eds.), *Human Rights in a Changing East-West Perspective*, London, Pinter Publishers, 1990.

Subramaniam, S., *Human Rights: International Challenges*, Delhi, Manas, 1997.

## **AEC-170: COMMUNICATIVE ENGLISH**

**(Contact Hours-45, Credits-3)**

### **Course Objectives:**

- \*To know about the fundamentals of Communicative English and communication skills in general.
- \*The use of body language as non-verbal cues in communication (gestures)
- \*Developing active listening and speaking skills
- \*To teach students to identify the nuances of phonetics and intonation
- \*To enhance pronunciation skills for better communication
- \*To build English vocabulary and language proficiency
- \*To encourage teamwork in making basic presentations
- \*To orient students in e-learning in Communicative English

### **Course Outcomes:**

- \*Learn the basics of good language and speaking proficiency.
- \*Write accurately on what is expected.
- \*Personality development.

*Marks have been distributed as per the skill components in the respective units:*

**Unit-I 10 marks, Unit II 30 marks:** *Listening Skill 10 marks (5X2); Spoken Skill 20 marks (4X5).*

**Unit III 35marks:** *Reading Skill 10 marks; Writing Skill 25 (Introduction to Writing 10; Written Composition 5X3=15; Business writing 5 marks, Formal letters 5 marks)*

## **UNIT I: COMMUNICATION**

1.1 Introduction, Meaning, Definition, Objectives and its Importance: Print and Digital

1.2 Types of Communication: Verbal, Non-Verbal, Spoken and Written

1.3 Barriers to Communication: Physical, Physiological, Psychological, Language and Cultural Barriers

## **UNIT II : LANGUAGE SKILLS: LISTENING AND SPEAKING**

### **LISTENING SKILLS**

2.1 Effective Listening: Introduction

2.1.1 Intensive & Extensive Types of Listening

2.1.2 Hearing vs Listening

2.1.3 Process of Listening: Receiving, Understanding, Evaluating, and Responding

2.1.4 Listening Strategies: eye-contact, paraphrasing, supportive body language, unspoken messages and attentive listening.

### **SPEAKING SKILLS**

2.2 Speech sounds and Phonetic Symbols: Consonants and Vowels

2.3 Dialogues and Monologues

2.4 Conversation Skills

2.4.1 Types of Conversations: Formal & Informal

2.4.2 Factors Influencing Conversations: Setting, Topic, Attitude & Language

2.5 Basic Presentation Skills

2.5.1 Coordinating, Organising and Making a Presentation

2.6 Vocabulary Building and Situation-Specifics

## **UNIT III: LANGUAGE SKILLS: READING AND WRITING SKILLS**

### **READING SKILLS:**

3.1 Introduction

3.2 Types of Reading: Loud Reading and

## Silent Reading

### 3.3 Types of Silent Reading: Intensive and Extensive

#### 3.4 Reading Techniques: Skimming & Scanning

### 3.5 Reading Comprehension: Unseen Passages

## **WRITING SKILLS**

### 3.6 Introduction to Writing: Print and Digital

#### 3.6.1 **Written Composition**

#### 3.6.2 Passage Writing: Expansion of a Sentence; Short Passage and a Story-line, Pictorial Analysis

#### 3.6.3 Precis Writing

#### 3.6.4 Content Writing for Social Media: Reviews, Emails, Infographics, Press Releases, Marketing and Creating Memes

### 3.7 **Communication Practice:**

#### 3.7.1 Business Writing

Memoranda, Announcements, Circulars, Notices, Agenda, Minutes, Reports

#### 3.7.2 Formal Letters

Writing Applications, Letters to the Editor, Letters lodging formal Complaint

#### 3.7.3 Informal Ways of Communication: WhatsApp, SMS, Messenger

## **Suggested Reading**

Aarts, Bas. *Oxford Modern English Grammar*. Oxford University Press. 2011.

Bamon, T.K. *Spoken English and the Non-Native Speaker*. Bookland. Guwahati.

Brown, Kristine and Susan Hood. *Writing Matters*. CUP, 1989.

Carnegie, Dale. *The Quick and Easy Way to Effective Speaking*. Rupa. 1st ed. 2016.

Collins, Sandra D. *Listening and Responding*. Ed. James S. O'Riurke, IV, South-Western, CENGAGE Learning. Dwivedi, R. K. and A. Kumar. *Macmillan Foundation English*.

Dwivedi, R. K. and A. Kumar. *Macmillan Foundation English*. Macmillan India Limited. 2011.

Ehrenborg. Jons & Jones Mattock. *Powerful Presentation*. Kogan Page. Delhi

Ghosh, R. P. *English: (Spoken and Written)*. Modern Book Agency Private Limited. 2008.

Hedge, Tricia. *Writing*. Orford University Press. 1991.

Kaul, Asha. *Business Communication* Prentice- Hall of India. New Delhi 1998.

Lewis, Norman. *How to Read Better and Faster*. Goyal Publishers and Distributors Private Limited. 4th Ed. 1980.

Murphy, Raymond. *English Grammar in Use*. Cambridge University Press. 2012.

Murphy, Raymond. *Intermediate English Grammar (Reference and Practice for South Asain Students)* Cambridge University Press. 2nd ed. 1999.

Narayanaswami, V.R. *Strengthen Your Writing*. Hyderabad: Orient Longman Pvt. Ltd 2002.

Nesfield, J.C. *English Grammar, Composition and Usage*. Chennai: Macmillan India Ltd 2002.

O'Brien, Terry. *Effective Speaking Skills*. Rupa. 2011.

O' Brien, Terry. *Modern Writing Skills*. Rupa. 2011.

Seeley, John. *The Oxford Guide to Writing and Speaking*. Oxford:OUP 2002.

Swan Michael and Catherine Walter. *Oxford English Grammar Course(Basic)*.  
Oxford University Press. 2019.

Swan Michael and Catherine Walter. *Oxford English Grammar Course(Intermediate)*. Oxford University Press. 2019.

Swan, Michael. *Practical English Usage*. Oxford University Press. 4th ed. 2016.

Vanikar, Ranu. *Corridors to Communication*. Hyderabad: Orient Longman Pvt. Ltd. 2003.

Weiss, Donald H. *Improve Your Reading Power*. Goyalsaab. 2011

Wren and Martin. *High School English Grammar and Composition*. Revised edition by Dr. N D. V. Prasada Rao. S. Chand Publishing. 2017.

Woodhead, Chris, Ann Miller and Pat O' Shea. *Writing and Responding: A Course for English Language Examinations*. Oxford University Press. 1987.

Yates, Jean. *English Conversation (Practice Makes Perfect)*. McGraw-Hill Education. 3rd Ed. 2020.

## AEC-171: MIL II - ASOMIYA JOGAJOG (COMMUNICATIVE ASSAMESE)

(Contact Hours-45, Credits-3)

**Objectives:** The course is designed to introduce the students to the basics of developing effective communication skills in the Assamese language in the day-to-day situations.

**Learning Outcome:** Students will be able to enhance their ability to communicate in Assamese. The students will learn the effective methods of verbal communications and writings in the Assamese language including the key features of Assamese lexicons, speech modulations and word formations among others.

### UNIT-I

Likhitajogajug: Sabdabhandar, Bakyagathani, bivinnasinhaorprayog

### UNIT-II

Bhallexhorgunagun, Moukhukjogajug

### UNIT-III

Matortibrata, khathonr beg, konthaswarorkompan, uccharanorspastata  
uccharanorkhudhyata, khamoyikbirati

### Suggested Readings:

Goswami, Golakchandra, *Asomiya bhasarucchran*: Deccan College, Poona, 1966.

Goswami, Basanta Kumar. *Bebaharik Asomiya Abhidhan*: SwarastiPrakhakon, Ist Edition 2020.

Goswami, Golock Chandra. *AsamiyaVarnaparakash*.Guwahati: Bina Library, 1990.

Goswami, Golock Chandra. *AsamiyaByakaranarMaulikBicar*.Guwahati: Bina Library, 1993.

Goswami, Golock Chandra. *DhvaniBijnanarBhumika*. Guwahati: Bina Library, 1985.

Goswami, Upendranath. *AsamiyaBhasarUddhavSamriddhi aru Bikas*.Guwahati: Barua Agency, 1991.

Goswami, Upendranath. *AsamiyaBhasarRupkatha*. Guwahati: D.B Prakasan:1984.

Mahanta, Niranjana. *Jugajug Kala*. Published by Bnalata, 4<sup>th</sup> Edition, 2017

Neog, Maheswar. *Nika Asomiya Bhasa*:Lowers Book Stall Guwahati.2019



## AEC-172: MIL II - BANGLA BHASHARBYABOHARIKPRAYOG

(Contact Hours: 45, Credits – 3)

**Course Objective:** *The objective of this curriculum is to provide students with basic knowledge of computer-related concepts and their initial application in Bengali, through discussions, practices, and methods of using the Bengali language.*

**Learning Outcomes:** *By acquiring basic knowledge of practical usage of the Bengali language and computer-related concepts, individuals will become proficient and articulate in both spoken and written skills.*

**Unit 1.** MS word – Prathamikgyan.

**Unit 2.** Internet samparkeprathamikgyan:

- a. Parichay, Bikash o prayog, Bangla lipi.
- b. Google application ermadhdyamebhinnabhashathekebanglayanubad.
- c. Application: text to speech, speech to text.

**Unit 3.** E-samagri: Parichay o byaboharikprayog – e-book, e-library, e-paper;KathanDakshata.

### Suggested Reading

1. Mastering Microsoft Office Power Point – Bappi Ashraf.
2. Dynamic memory Computer Course – Debendra Singh Minhas.
3. BhasarItibritta \_ SukumarSen
4. BhasabidyeParichai--Paresh Chandra Bhattacharjee
5. Bangla BhasarByakoran o tarKromobikash-- Nirmal Das
6. Uchhatoro Bangla Byakoran--BamondebChakraborty
7. Bangla BhasaparichayerBhumika -- AnilchandraGhatak
8. SadharanBhasabigyan o Bangla Bhasa --Rameshwarsha

## **AEC-173: MIL II- COMMUNICATIVE GARO**

**(Contact Hours: 45, Credits – 3)**

Ia Course poraigiparangna kan·dike A·chikkuni bidingo talatna miksongani ong·a. Ia course soft skillrango poraigiparangko tarie (train) uamangni bewalrangko (personality) bilakbatatna aro mikrakataniko on·a. Ian uamangni chu·sokgipa agangrikaniko namdapatna ka·donganiko bariatna dakchakgen.

### **Courseni Miksonganirang:**

1. Kan·dike A·chikkuni bidingo talataniko on·na.
2. Ku·sikni bimangni (structure) bidingo talataniko on·na.
3. A·chikkuchi aganani aro seanio chu·sokgipa ong·na talataniko on·na.
4. (Gital chanchibewalani aro neng·nikaniko namatani bewalko ong·atna.

### **Poraie Man·ani:**

Poraigiparang tik ong·e aganani aro seaniko dakna man·na gita, uamangko A·chik ku·sikni bakrangko (components) u·iatna man·gen. A·chikkuo seaniko nambatatna ia course dakchakgen. Da·ororoni ong·enganirangko mikkangchakna aro kam man·ani cholrangko ia course bariatgen.

### **Unit-1:A·chik Ku·sikni Bidingo Talatani:**

A·chik Ku·sikni bidingo talatani:Ku·sikni bidingo aganani, Ku·sikni gunrang (characteristics), Mande aro matburingrangni agangrikanio dingtangrikani

Gam·anirangni bidingo poraiani (Phonetics aro Phonology): Phone, Phoneme, Allophone

Kattarangni bidingo poraiani (Morphology): Morph, Morpheme, Allomorph, Affixes, Word order

Kattani miksonganirang (Semantics): Sense Relations, Word Sense Disambiguation

Sentenceni bidingo poraiani (Syntax): Sentence rikani, Phrase aro Clauserang

### **Unit - II : Ku·sik Man·ani**

1. Name Knatimna man·ani: U·iani aro aganchakani (understanding and responding); Dakna nanganirang: mikron niani, be·en bimangchi dake mesokani/ jak- mikronrangko jakkale mesokani

Agangrikani aro Lekka Poraina man·ani: Agangrikanirang: Aganani bewalrang aro ku·sik, tarie mesokani, dingtang dingtang bewalo lekka poraiani (gam·e aro jripjrip poraiani), poraie u·iani (nikgijagipa passagerang)

### Unit – III

#### A·chikkuchi sena man·ani

1. Sena-jotna man·aniko talatchengani - Sentence rikani aro tariani, sentence ko ong·e seanirang, sea jotaniko man·e seani aro mesokani
2. Passageko seani: Sentenceko apalbate seani, golpo bikotani, noksako nie seani Precisko seani
3. A·chikkuko computer jakkale poraiani Dictionaryko tariani

#### Suggested Reading:

Aitchison, Jean. 1999. *Linguistics: teach yourself*. Mac Graw Hill.

Burling, R. 1961. *A Garo Grammar* (1st edn.). Poona: Linguistics Society of India.

Devy, G. N & Syiem, E. (Eds.). 2014. *People's Linguistic Survey of India: The Languages of Meghalaya Vol.19, Part 2*. Orient Blackswan Private Limited, New Delhi.

Finch, G. 1999. *Linguistic Terms and Concepts*. Macmillan Press LTD

Fromkin, Victoria et al. 2003. *Introduction to Language*. Thomson/Heinle publishers.

Fuertes-Olivera, Pedro A. *The Routledge Handbook of Lexicography* (1<sup>st</sup> Edn.). Routledge publishers.

Marak, Caroline. 2018. *Studies on Garo and its Cognate Languages*. Anundoram Borooh Institute of Language, Art and Culture (ABILAC), Assam.

Syiem, E & Marak, Caroline. 2014. *Peoples Linguistic Study of India, Meghalaya, Volume 19, Part 1*. RI KHASI BOOK AGENCY, Shillong.

Wilkins, D. A. 1972. *Linguistics in Language Teaching*. Edward Arnold Publishers.

## **AEC-174: MIL II - COMMUNICATIVE LANGUAGE (MIZO)**

**(Contact Hours: 45, Credits – 3)**

### **Course Objectives:**

This course in its early section stresses on communicative language. Its main objective is to educate students with the correct way of communicating in the Mizo language. It also includes in learning traditional culture and ways including the taboos in different spheres of life. It also incorporates poems on nature. This will create awareness on the different seasons and life's experiences.

### **Learning outcomes:**

It will improve their communication skills in general and thereby developing their writing and speaking skills. It will also enhance their pronunciation skills and vocabulary.

It will also help them in understanding nature and seasons as understood by a traditional Mizo thereby learning life's lessons and values from it.

### **UNIT-1: COMMUNICATIVE LANGUAGE**

(1) Mizo tawngman dan diklehnik lo - C. Chhuanvawra

(2) Tawngawm ze inhnaih - James Dokhuma

### **UNIT-2: CULTURE AND TRADITION**

(1) Mizo Nula Tlangval nun - B. Lalthangliana

(2) Pi pute duh lohthil - James Dokhuma

(3) Mizo Lo neih dan - Lalsangzuala

### **UNIT-3: NATURE AND ENVIRONMENT**

(1) Zan Lalnu - RolianaRalte

(2) Buannel Ram Dai - Ch. Malsawma

(3) Thal-Kaphleia

### **Suggested Readings:**

(1) Mizo tawngchhuina -C. Chhuanvawra, Aizawl 2012

(2) Mizo tawngkalphung -James Dokhuma, Aizawl, 2006

(3) Fungki Bu thar - CTBEB Publication, 2012

(4) Thanmawia R. L. , Mizo poetry. Din Din Heaven, Aizawl:1998

(5) Pi puchhuahtlanghlui, Saingenga, 2001

## AEC-175: MIL II- KA KREN KA THOH KHASI

(Contact Hours: 45, Credits – 3)

### **Ki jingthmu jong ka phang pule:**

Īa kane ka phang pule (course) la saiñdur ban hikai bad pynlah ĩa ki nongpule ba kin sngewthuh ĩa ka ktien Khasi bad ĩa ki buit ban nang bad ban pyndonkam ĩa ka ktien. La saiñdur ruh ĩa kane ka phang pule ba kin nang ĩa ka kramar bad ban nang ban kren ĩa ka ktien. Kane ka phang pule kan pynlah ruh ĩakinongpuleba kin pyndonkamĭakaktienlyngbaki jingleh jingkambapher bad ban kyntiewĭaka sap thoh jong ki.

### **Ki jingmyntoi na kane ka phang pule:**

- Kan pynlah ĩa ki nongpule ha ka ki buit ban nang bad ban pyndonkam ĩa ka ktien.
- Ki nongpule ki ĩoh ĩa ka jinglah ha ka liang ka tbit kren.
- Ka jinglah ban thoh ha ka rukom kaba shai bad kaba dei.

### **Unit I:**

1. Ka jingdonkam ban pule ĩa ka ktien Khasi
2. Ki buit ban nang bad ban pyndonkam ĩa ka ktien
3. Ka jingnang ĩa ka kramar bad ka jingnang ban kren
4. Ka jingsei ĩa ki kyntien: *synonyms, antonyms, hyponymy, homonyms, homophone, polysemy*

### **Unit II:**

Ka jingpyndonkam ĩa ka ktien ha ki khen bapher:

Ka Jingpynbna, KaJingkrenpdian, Ka jingkrenaikhublei, Ka jingpynithuh ĩa u nongkren, Ka jingkren paidbah halor kano kano ka phang (kum ka jingpynneh mariang, ka jingktah jong ki jingdih bapynbuaid bad kiwei kiwei ki phang), ban thoh ĩa ki khubor, ban pule ĩa ki khubor.

### **Unit III:**

1. Ban thoh shithi sha ki seng bad ki bor trei kam.
2. Ban thoh shithi thep kam.
3. Ban thoh jingtip shaphang ĩa lade.
4. Ban thoh ĩa ki jingĭakut jong ki jingĭalang.
5. Ban thoh kaiphot halor kano kano ka kam ba la pyndep.

### **Ki jingthoh kiba ĩadei bad ka phang pule:**

- Jack. C. Richards. *Communicative Language today*, Cambridge: CUP, 2006.
- Kharmalki, A. *Ki Nongrim ka Pule-Ktien bad KaHikai-Ktien*: Shillong, Lianmeroschse, 2006.
- . “KaTbitKren (Communicative Competence) bad kaTbitAiñKtien (Linguistic Competence) in *KaDakSahKynmaw*. Society for Khasi Studies, Shillong, 2016.
- . “KaKtienla jong: KaJingideijongka bad ka Pule puthi bad kanangkastad” in *KaThwetJingstad* (Quest for knowledge) Vol III No.2. August, 2015.
- . “KaKtien bad kaJinglongKyrpang” in *KaThiarkiNongthohThup – XIII KAS*, 2018.
- Malmkjaer, Kirsten and John Williams. *Context in Language Learning and Language Understanding*: Cambridge University Press, 1998.
- Munvy, J. *Teaching Language as communication*: Oxford University Press, 1978.
- Nonglait, D.R.L. *Ka Poetics u Aristotle bad kiwei pat kiJingthohBisharBniah*: Shillong, 2023.
- War, B. “Semantics” in *KaThwetJingstad* (Quest for knowledge), Vol. IV No.3. December, 2020.

AEC-176: MIL II- नेपाली संस्कृति, लोकसाहित्य र कविता

**(NEPALI CULTURE, FOLK LITERATURE AND POEMS)**

**(Contact Hours: 45, Credits – 3)**

प्रस्तुत पाठ्यक्रमले नेपाली भाषाको विकासमा नेपाली संस्कृति, नेपाली लोकसाहित्य र केही नेपाली प्रमुख कविहरूका कविताको महत्वबारे बुझ्न र जान्न सहयोग गर्ने छः (The course provides opportunity to learn about the significance of culture, folk practices and poems in the development of Nepali language).

**Course Objectives:** यस पाठ्यक्रमका मुख्य उद्देश्यहरू यस प्रकार छन् : (The course objectives aim to)

CO1: नेपाली संस्कृति, चाडपर्व र नेपाली संस्कारसँग जोडिने क्षमता प्राप्त गर्न सक्षम हुने छन्। (Develop the connectivity with the Nepali Culture, festival and rituals).

CO2: लोकसाहित्यको मौलिक अवधारणाको अध्ययन गर्न सक्ने छन्। (Learn the fundamental concept of Folk Literature).

CO3: नेपाली कविताहरूप्रति साहित्यिक रूचि जगाउन सक्ने छन्। (Develop aesthetic sense and literary taste towards Nepali poems).

**Learning Outcomes:** At the end of the course, students would have developed competence to: (प्रस्तुत पाठ्यक्रम अध्ययन पूरा गरिसकेपछि विद्यार्थीहरू निम्नलिखित ज्ञान र क्षमता प्राप्त गर्न सक्षम हुने छन् :)

LO1: नेपाली संस्कृतिको परिचय, नेपाली जातिका चाडपर्व, खानपान, गरगहना, वेशभूषा र वाद्ययन्त्रहरूको जानकारी, प्रचलित रीतिरिवाज, संस्कारहरूका बारेमा जान्न र विश्लेषण गर्न। (Know and understand about the Nepali culture, festivals, rituals, traditional ornaments, attires, foods and musical instruments).

LO2: नेपाली लोकसाहित्यको सम्पूर्ण ज्ञान सङ्कलन गर्न, नेपाली लोकसाहित्य(लोककथा, लोकगीत, लोकनाटक)प्रति विद्यार्थीले लेखन सीप अभिवृद्धि गर्न। ( Gather complete knowledge about Nepali folk Literature and enhance the writing skills towards Nepali folk Literature i.e. folk story, folk song and folk drama)

LO3:नेपाली कवितामार्फत आफ्ना भावनाहरू व्यक्त गर्न,अभिव्यक्ति र लयको प्रयोग बुझ्न र भाषा सुधार गर्ने ज्ञान र क्षमता प्राप्त गर्न।(Express their emotion, understand the meaning of words in context, the use of rhyme and articulation and improved Language comprehension).

एकाइ-१ (Unit-1) नेपालीसंस्कृति :

- (i) नेपाली संस्कृति( अर्थ, स्वरूप र परिभाषा)
- (ii) नेपाली चाडपर्व ( तीज, दसैं, तिहार, लोसार)
- (iii) नेपाली संस्कार (जन्म,मृत्यु, बिवाह, गर-गहना, पोषाक, खान-पान, बाजा)

एकाइ-२ (Unit-2) नेपाली लोकसाहित्य :

- (i) लोककथाको परिचय (अर्थ, परिभाषा र प्रकार)
- (ii) लोकगीतको परिचय ( अर्थ, परिभाषा र केही प्रमुख लोकगीत)
- (iii) लोकनाटकको परिचय (अर्थ, परिभाषा)

एकाइ-३ (Unit-3)नेपाली कविता :

- (i) रामप्रसाद उपाध्याय ज्ञवाली – मातृभाषा
- (ii)गोपीनारायण प्रधान – भाडाघर
- (iii)पुष्पलाल उपाध्याय – देश महिमा



- (iv) अगमसिंह गिरी – नचिनिने भएछौ
- (v) टेकनारायण उपाध्याय – नेपाली भाषा र एक्काइसौं शताब्दी

### सन्दर्भग्रन्थः

१. उपाध्याय, टेकनारायण र जोशी, वसन्तराज, **स्नातकीय नेपाली साहित्य**, शिलाङ्गः नेपाली पाठ्यपुस्तक प्रकाशन समिति, सन् २०१५।
२. गुरूड, एम.एम., **बिर्सिएको संस्कृति**, दार्जिलिङ्ग : नेपाली साहित्य परिषद, सन् १९९५।
३. घिमिरे, हिरण्य(सम्पा०), **नेपाली संस्कृति सुधा**, असम : गोर्खा उन्यन परिषद, सन् २०१५।
४. थापा, धर्मराज र सुवेदी, हंसपुरे, **नेपाली लोकसाहित्यको विवेचना**: काठमाडौं : पाठ्यक्रम विकास केन्द्र, सन् १९८५।
५. बन्धु चुणामणि, नेपाली लोकसाहित्य, काठमाडौं : एकता बुक्स, सन् २००७।
६. शर्मा, जनकलाल, **हाम्रो संस्कृति र समाज**, काठमाडौं : साझा प्रकाशन, सन् २००२।
७. शर्मा, मोहनराज र लुइटेल, खगेन्द्रप्रसाद, **लोकवार्ताविज्ञान र लोकसाहित्य**, काठमाडौं : विद्यार्थी पुस्तक भण्डार, सन् २००८।
८. शर्मा, शान्तिराज, **गोर्खाका जातीय संस्कृति**, सिलीगुडी : एन०बी०यू०, सन् २०००।

## HIN-177: MIL II- हिन्दी भाषा का तकनीकी अनुप्रयोग

(Contact Hours: 45, Credits – 3)

*उद्देश्य :* इस पाठ्यक्रम का उद्देश्य विद्यार्थियों को हिन्दी भाषा के तकनीकी प्रयोग में दक्ष बनाना है। इसके लिए कंप्यूटर के विविध पक्षों जैसे एम. एस. वर्ड, हिन्दी फॉन्ट, गूगल हिन्दी फॉन्ट आदि आधुनिक संचार संसाधनों के प्रयोग का तकनीकी कौशल प्रदान करना है।

*उपलब्धि:* इस पाठ्यक्रम के अध्ययन से विद्यार्थी हिन्दी भाषा के प्रयोग के लिए आवश्यक कंप्यूटर एवं अन्य संचार साधनों के प्रयोग में तकनीकी दक्षता प्राप्त कर कंप्यूटर का सार्थक उपयोग कर सकेंगे।

इकाई 1 एम. एस. वर्ड: परिचय एवं प्रयोग ।

इकाई 2 इन्टरनेट: परिचय, विकास एवं प्रयोग, हिन्दी फॉन्ट, गूगल हिन्दी फॉन्ट, मौखिक भाषा लिप्यांकन, हस्तलेख लिप्यांकन ।

इकाई 3 ई-सामग्री: परिचय एवं प्रयोग; ई- पुस्तक; ई-पत्रिका; ई-पुस्तकालय।

### अभिस्तावित पुस्तकें:

1. हिन्दी कंप्यूटिंग- त्रिभुवन नाथ शुक्ल, विकास प्रकाशन, कानपुर, 2017ई.
2. कंप्यूटर- डॉ. सी. एल. गर्ग, राजपाल एंड संस, दिल्ली, 2021ई.
3. कंप्यूटर ज्ञान – एक्सीड पब्लिकेशन, नई दिल्ली, 2022ई.
4. बेसिक कंप्यूटर ज्ञान- एग्जाम अटैक, नईदिल्ली, 2023ई.
5. वस्तुनिष्ठ कम्प्यूटर ज्ञान एवं सूचना प्रौद्योगिकी- डॉ. राजीव रंजन सिंह, उपकार प्रकाशन, नई दिल्ली, 2021ई.

## SEC-180: COMMUNICATION SKILLS

(Contact Hrs-45, Credits-3)

### Learning Outcomes (LOs):

1. Comprehending the fundamentals of communication.
2. Assessing the importance of communication.
3. Equipping themselves with communication skills.
4. Enabling to communicate effectively.

### Unit-I An introduction to Communication

- Concept, types, scope and process of communication
- Importance and purpose of communication
- Criteria of effective communication
- Barriers to communication

### Unit-II Communication skills and techniques

- Listening, speaking, writing skills,
- Interacting skills, Negotiation skills,
- Influence skills, Assertiveness skills
- Communication techniques

### Unit-III Activity based

Activities based on communication skills

- Listening Comprehension and Writing Skills
- E-Mail etiquette
- Presentation Skills
- Interview Handling Skills

### Suggested readings:

1. Andreja. J. Ruther Ford, 2nd Edition, (2011). Basic Communication Skills for Technology. Pearson Education
2. Anjane Sethi & Bhavana Adhikari (2009). Business Communication, Tata McGraw Hill
3. Baldoni, John (2003). Great Communication Secrets of Great Leaders. Tata McGraw-Hill Publishing Co., New Delhi.
4. Bhattanagar, O.P., and O.P. Dahama (1980). Education and Communication for Development. Oxford and IBH Publishing House, New Delhi.
5. Kumar, Sanjay, Pushpalata 1 st Edition (2011). Communication Skills, Oxford Press.
6. Konar, Nira (2022). Communication skills for Professionals, PHI Publishing, New Delhi.

7. Tuhovsky, Ian (2019). *Communication Skills Training: A Practical Guide to Improving Your Social Intelligence, Presentation and Social Speaking*, Rupa Publications, New Delhi, India
8. Singh, J.K. (2012). *Text Book of Mass Communication*. DVS Publishers, Guwahati.

## **SEC-181: CONFIDENCE BUILDING**

**(Contact Hrs-45, Credits-3)**

**Course Objectives:** This course will help learners to explore the concept of self-confidence: how it is acquired, how it can be sabotaged, and how it can be changed. It will enable the learners to develop strategies, tools and techniques to build a positive self-image. It will also help the learners across all programs understand the nature of identity, the factors and forces that affect personal development, and maintenance of personal identity.

### **Learning Outcomes**

At the end of the Course students are able to:

1. translate concepts to real life situations
2. identify the problems and situations
3. acquire skills and to achieve self-defined goals

### **Unit I Self –Confidence**

- Concept and Types of Self – Confidence
- Self Confidence : Nature or Nurture
- Needs and Importance of Self- Confidence
- Goals – Setting for Building Self- Confidence

### **Unit II Skills for Confidence Building**

- Physical exercise to boost confidence
- Yoga for mindfulness
- Outdoor confidence building activities
- Practice public speaking

### **Unit III Life Skills**

- Practice communication skills in the classroom
- Interpersonal Relationship Skill with peer mates
- Self awareness building skills in the classroom
- Group activity in the classroom

### Assignments (Choose any one)

1. Transforming Negative Self- Talk: Identify the things that triggers negative self-talk, and reframe these thoughts positively and boost confidence.
2. Maintain a Gratitude Journal by intentionally noticing the positive in the self, in others and the world around.
3. Maintain a Goal Journal by setting and achieving goals.

### References

- Adams, George Matthew. (2020). *You Can*. Fingerprint! Publishing.
- Andrews, Bill. (2017). *Self Confidence: Unleash Your Hidden Potential and Breakthrough Your Limitations of Confidence: 1 (Self Confidence Books, Self Esteem, Building Self Confidence)*. Createspace Independent Pub.
- Branden, N. (2011). *How to Raise Your Self-Esteem*. Random House USA Inc.
- Carnegie, Dale. (2016). *How to Develop Self-Confidence & Influence People by Public Speaking*. Rupa Publications India: India.
- Carnegie, D. (). *How to Stop Worrying and Start Living*. Rupa & Co.
- Elliott, Anthony. (2020). *Concepts of the Self*. 4th Edition. Polity.
- Giblin, Les. (2019). *How to have Confidence and Power in Dealing with People*. Manjul Publishing House.
- Gradales, Apostolos. (2017). *Building Confidence: How to Overcome Self Doubt and Social Anxiety (Social Skills)*. Youuniversal Publishing.
- Kumari, Reeta. (2019). *Introduction To Psychology Text Book*. Vinita Publishing House: India.
- Pillai, J. (2023). *Building Confidence Through Self-Love - A Guide to Achieving Self-Acceptance*. Notion Press.
- Morgan, C., King, R. A., Weisz, J. R., & Schopler, J. (2022). *Introduction to Psychology* 7th Ed. Tata McGraw Hill.
- Thomas, S. (2022). *Walk in Confidence - Building a healthy Self-Esteem*. Notion Press.
- Tracy, Brian. (2012). *The Power of Self-Confidence: Become Unstoppable, Irresistible, and Unafraid in Every Area of Your Life*. Wiley.
- Tucker, E. J. (2015). *A Matter of Self-confidence - Part I (A Matter of Self-Confidence: An Introduction to Self-Confidence Coaching in a Book)*. Shepherd Creative Learning.

## **SEC-182: E-COMMERCE**

**(Contact Hrs-45, Credits-3)**

**Course Objective:** To provide exposure to students on E-Commerce and its intricacies.

**Learning Outcomes:** Students will:

- a. Have an understanding of e-commerce and
- b. Understand the major issues associated with online marketing, E-finance and Cyber security.

### **Unit – I: Introduction to E-Commerce**

Brief history of E-Commerce in India; Meaning, characteristics, significance and limitations of E-Commerce; Types of E-Commerce; E-Commerce practices v/s Traditional commerce practices.

Identifying E-Commerce Opportunities and International nature of E-Commerce

### **Unit – II: E-Payment, Marketing and Finance**

Transactions through the Internet; Requirements of E-payment systems; Impact of E-commerce on market; Online Marketing(E-advertising, E-branding); Marketing issues in E-marketing; Areas of e-financing; Traditional v/s E-banking.

### **Unit – III: Cyber Security**

Legal environment of E-Commerce. Use and protection of Intellectual property in Online business.

Setting up Internet security; Maintaining secure information(Data Encryption, Digital Signature and other Security Measures); Laws Relating to online transactions – Salient Features; Ethical issues in E-Commerce.

### **Suggested References (latest editions)**

- P.T. Joseph, S.J., “E-Commerce - An Indian Perspective”, PHI.
- David Whiteley, “E-Commerce Strategy, Technologies and Applications”, Tata McGraw Hill.
- Ravi Kalakota, Andrew B Whinston, “Frontiers of Electronic Commerce”, Pearson.
- Daniel Amor: “E Business R(Evolution)” Pearson Edude.
- Krishnamurthy: “E-Commerce Management” Vikas Publishing House.
- Schnieder, Gary P, Ecommerce: Strategy and Implementation. Cengage Learning Publisher

## SEC-183: PYTHON PROGRAMMING

(Contact Hrs-60, Credits-3)

### Course Objectives (COs):

To Introduce Python Programming Language as Multipurpose Programming Language with Features and Applications. This course is designed to equip students with the basic skills and knowledge of python programming.

### Learning outcomes (LOs):

Students shall be able to Develop programs in Python platforms using lists, tuples and strings along with several libraries. Learn core Python structures and flow control, Create and run python function. Install and use Python on Various Platform.

### UNIT-I:Introduction to basics of Python (Theory) 15 Hours

Introduction to Python:Python overview, Python interpreter and shell, Python identifiers, keywords, variables, standard data types, numbers(integers, floating point numbers, complex numbers), operators, statement and expression, string operations, Boolean expression, control expressions, Iteration- while statement, break, continue and pass.

### UNIT-II:Function, Built in data-structures (Theory) 15 Hours

Functions, Built-in functions, composition of functions, user defined functions, parameters and arguments, Function calls, Recursion, stack diagrams for recursive functions, the anonymous functions, writing Python scripts,errors and exceptions. Built-in Data structures in Python: Strings, Lists, Ranges, Tuples, Dictionaries, Text files, Directories, Manipulations Building blocks of python program.

### UNIT-III: Practicals 30 Hours

**Suggested Practical Assignments** (Questions need not be restricted to this list)

#### Basic Practicals:

1. Write Python program to demonstrate the use of operators and expressions
2. Write Python program to demonstrate the use of control statements
3. Write Python program to demonstrate the use of integers, floating point and complex
4. Numbers.



5. Write Python program to demonstrate the use of built-in functions
6. Write Python program to demonstrate the use of user defined functions
7. Write Python program to demonstrate the use of Lists and ranges
8. Write Python program to demonstrate the use of dictionaries
9. Write Python program to demonstrate the use of strings.
10. Find all numbers between 2000 and 2500 which are multiples of 17, but not the multiple of 5.
11. Print the first 2 and first 3 Characters in a given String using string slicing.
12. Write a program that eliminates duplicates in a list.

### Advance Practicals:

1. Implement shallow copy and deep copy of a list.
2. Find the largest of n numbers, using a user defined function largest().
3. Write a function that capitalizes all vowels in a string.
4. Read a line containing digits and letters. Write a program to give the count of digits and letters.
5. Write a function *myReversal()* which receives a string as an input and returns the reverse of the string.
6. Use the list comprehension methodology in Python to generate the squares of all odd numbers in a given list.
7. Generate a dictionary and print the same. The keys of the dictionary should be integers between *L* and *LO* (both inclusive). The values should be the cubes of the corresponding keys.
8. Create a nested dictionary. The roll number of a student maps to a dictionary. This inner dictionary will have name, age and place as keys. Read details of at least three students.
9. Enter a word. Create a dictionary with the letters of this word as keys, and the corresponding ASCII values as values.
10. Write a Python function that takes a list and returns a new list with distinct elements from the list.
11. Python program to search a Word location in String.
12. Write a Python program to find repeated items in a tuple.
13. Program to concatenate the two dictionaries and create a new one.

### Instructions to Paper Setter

- Questions should be set according to the following scheme.

<b>UNIT</b>	<b>Questions</b>	
	<b>To be set</b>	<b>To be Answered</b>

<b>I</b>	2	1
<b>II</b>	2	1

**For Practical a total of 10 questions, each carrying 19 marks, shall be set. For each question, there shall be two sub-questions, one carrying 9 marks and the other carrying 10 marks. A student shall be allotted any one of the questions on a LOTTERY basis.**

**Exam Duration:**

<b>Theory</b>	<b>Practical</b>
2 Hours	2 Hours

**Evaluation of marks for practical Exam:**

- 10% :Syntax and input/output screens
- 30% :Logic and efficiency(source code, pseudo code, and algorithm)
- 20% :Error trapping(illegalorinvalidinput,stackoverflow,underflow,insufficientphysicalmemoryetc.)
- 20% :Completion
- 20% : Result

**Suggested Readings:**

**Text Books:**

1. R.Thareja, Python Programming: Using Problem Solving Approach, First Edition, Oxford University Press, 2019.
2. E. Balaguruswamy , Introduction to Computing And Problem Solving Using Python, 1<sup>st</sup> Edition, McGraw Hill, 2016.

**Reference Books:**

1. S. Gowrishankar, A. Veena , Introduction to Python Programming, 1st Edition, CRC Press/Taylor & Francis, 2018.
2. J. W. Chun, Core Python Programming, Second Edition, Pearson, 2010.
3. M. C. Brown, Python: The Complete Reference, Osborne/McGraw-Hill, 4<sup>th</sup> Edition, 2018.

## **VAC-190: HEALTH AND WELLNESS**

**(Contact Hrs: 45, Credits: 3)**

### **Course objective:**

The course is designed to provide a general concept of health and its importance in wellbeing of individual, community and nation as a whole. It will provide ways and means to stay fit by adopting healthy lifestyle, indulging in physical activities such as games and sports, dance movement therapy, yoga etc. and avoiding sedentary lifestyle and alcohol, tobacco and drug abuses.

### **Learning outcome:**

On successful completion of the course, the students should be able to understand:

1. The general concept of good health and wellness and its significance.
2. The benefit of exercises for fitness and wellness.
3. The role of parents and the community for healthy society.
4. Role of balanced diet and water in maintaining good health and wellness.
5. The significance of having appropriate life style and body weight management.
6. Sleep and its health benefits.
7. Different types of exercise for good health and overall wellness.
8. How to prevent diseases through general fitness and wellbeing.
9. Sedentary lifestyle and its harmful impact of health and wellness.
10. Prevention of cardiovascular diseases and influence of exercise in healthy ageing.
11. The harmful effects of alcohol, tobacco and drug abuse and addiction management strategies.
12. The ways of stress management and spirituality.
13. The concept of yoga and its beneficial effects in health and wellness.
14. The health benefits of dance movement therapy and different forms of dance for wellness.

**Unit 1-** Health-meaning, dimensions of health and their interrelationships; Importance of health for individual, family, community and nation; Spectrum of health; Definition of fitness & wellness; Components of fitness & wellness; Benefits of exercise & health; Fitness & wellness strategy; Fitness potential for popular sports; Fitness & wellness activities; Role of parents & community for the maintenance of fitness & wellness.

**Unit 2-** Factors affecting Health; Balanced diet and water; Life style changes & weight management; Daily Schedule effect on health and wellness; Socio-economic factors & wellness; Sleep: Definition, types & health benefits; Principles of training & physical fitness; Benefits of exercise & health, Walking exercise & fitness; Components of physical and performance related fitness; Calisthenics & health.

**Unit 3-** Concept on diseases; Sedentary lifestyle; Prevention of diseases through fitness & wellness; BMI; Diabetes & exercise; Cardiovascular diseases and exercise; Ageing and exercise; Contemporary health problems of youth-alcohol, drugs, use of tobacco (chewing, sniffing, smoking) & their harmful effects; substance abuse management; Addiction management; Stress management, Spiritual management; Origin of yoga, definition and scope of yoga, limitations and misconceptions; Importance of yoga; Dance movement therapy; Different forms of dance & wellness.

**Suggested readings:**

1. Anspaugh D and Ezell G (2012). Teaching Today's Health, 10<sup>th</sup> Edition. Pearson; UK.
2. Balayan D (2007). Swasthya Shiksha Evam Prathmik Chikitsa. Khel Sahitya. Delhi.
3. Clear J (2018). Atomic Habits, 1st edition. Cornerstone Digital, San Diego, California.
4. Debnath M (2007). Basic Core Fitness through Yoga and Naturopathy. Sports Publication, India.
5. Dougherty NJ et al. (2002). Sport, Physical Activity and the Law. Sagamore Pub. Champaign, USA.
6. Driskell JA and Wolinky I (2002). Nutritional Assessment of Athletes. CRC Press, Boca Raton, USA.
7. Greenberg JS Diutriman GB and Oakes BM (2004). Physical Fitness and Wellness: Changing the way you look, feel and perform. Human Kinetics. Champaign, USA.
8. Hoeger WW and Hoeger S (2007). Fitness & Wellness. Thomson Wadsworth, USA.
9. Kumar ER (1988). Heal Yourself With Yoga: Specific Disease. Taraporevala, India.
10. Maughan RJ Burke LM and Coyle EF (2004). Food, Nutrition and Sports Performance II: The International Olympic Committee Consensus on Sports Nutrition. Routledge, USA.
11. Siedentop D (2004). Introduction to physical education, Fitness and sports. McGraw Hill, USA
12. Singh MK and Jain P (2008). Yoga aur Manoranjan. Khel Sahitya Kendra, India.

## VAC-191: LIFE SKILLS EDUCATION

(Contact Hours: 45, Credits-3)

### Learning Outcomes (LOs):

1. Acquainting with concept of life skills
2. Understanding core life skills, its concept, process
3. Enhancing one's ability to be adaptive
4. Acquiring career skills and fully pursue to partake in a successful career path

### Unit-I Introduction to Life skills

- Concept, characteristics and significance of life skills
- Livelihood and survival skills
- Life skills approach
- Core Life skills

### Unit-II Fundamentals of Life skills education

- Concept and understanding Life skills education
- Genesis of Life skills education
- Perspectives in Life skills education
- The Four Pillars of Education - Learning to Know - Learning to Do - Learning to Live Together - Learning to Be and Learning Throughout Life.

### Unit-III Career skills activities

- Resume, its importance and essential components of a good resume
- Interview Skills - Preparation and Presentation
- Meaning and types of interview (F2F, telephonic, video, etc.)
- Approach and Response (STAR Approach) for facing an interview

### Suggested readings:

1. Debra McGregor, (2007). Developing Thinking; Developing Learning - A guide to thinking skills in education, Open University Press, New York, USA
2. Duffy Grover Karen, Atwater Eastwood, (2008). (8th Edn.), Psychology for Living Adjustment, Growth and Behaviour Today, Pearson Education Inc, New Delhi.
3. Family Health International, NACO, USAID (2007), Life Skills Education tool kit for Orphans and vulnerable children in India
4. Mahajan, Gourav (2022). Life Skills Education, Shipra Publications, New Delhi.
5. Nair. A. Radhakrishnan, (2010). Life Skills Training for Positive Behaviour, Rajiv Gandhi National Institute of Youth Development, Tamil Nadu.
6. Nair .V. Rajasenan, (2010). Life Skills, Personality and Leadership, Rajiv Gandhi National Institute of Youth Development, Tamil Nadu.
7. Prakash B. (Ed). (2003). Adolescence and life skills. Common Wealth Youth Program, Asian Center, Common wealth Secretariat. New Delhi: Tata McGraw Hill.
8. Rao, K. Ravikanth and Dr. P. Dinakar (2021). Life Skills Education, Neelkamal Publications, New Delhi.

9. RGNIYD. (2008). Facilitators Manual on Enhancing Life Skills. Tamil Nadu
10. Santrock, W. J. (2007). Adolescence, Tata Mc Graw Hill, Boston
11. Stella Cottrell, (2005). Critical Thinking Skills: Developing Effective Analysis and Argument, Palgrave Macmillan Ltd., New York.

## VAC- 192: UNDERSTANDING INDIA

(Contact Hrs: 45. Credits-3)

### Objective

To provide an overview of the growth and development of the socio-cultural past and heritage of India from ancient to the modern period.

### Learning Outcome

It will acquaint students with the historical trajectory of India's composite cultural heritage.

**Unit I** The concept and evolution of India: Bharatvarsha, Hindusthan and India; Geographical Background of India's Culture; Harappan civilization, India through the lens of visitors- select foreign accounts (Megasthenes, Hiuntsang, Alberuni, Ibn Batuta, Marco Polo, Francois Bernier)

**Unit II** Literature and Religious Tradition: Vedic, Brahmanical and Sramanic traditions, ,Tantrism- cult of Mother Goddess; Islam; Sufism; Bhakti movement: South India - Vaishnava *Alvars* and Shaiva *Nayanars* ; North India- Chaitanya, Kabir, Guru Nanak; Assam-Sankaradeva and Neo-Vaishnavism; Christianity in Northeast India.

**Unit III** Social Institutions: Caste and Tribe in India; Indian Awakening and Socio-religious reform movements – Brahmo Samaj, Arya Samaj, Ramakrishna Mission, Wahabi and Farazi Movements; Aligarh Movement; Seng Khasi; Non-Brahmin movements in western and southern India - Jyotirao Phule, Shree Narayan Guru and E. V. Ramaswami Naicker; Contribution of Northeast India to Indian Culture.

### Suggested Readings

- |                       |   |
|-----------------------|---|
| Asif, Manan           | <i>The Loss of Hindusthan: The Invention of India</i> , Harvard University Press, 2020                            |
| Ahmed,                |   |
| Basham,A. L.,         | <i>A Cultural History of India</i> , Oxford University Press, 1997  |
| -----                 | <i>The Wonder that was India</i> , Rupa, New Delhi, 1994  |
| Chattopadhyaya, B.D., | <i>The Concept of Bharatavarsha and Other Essays</i> , Permanent Black, 2019                                      |
| Dirks, Nicholas       | <i>Castes of Mind: Colonialism and the Making of Modern India</i> , Princeton University Press, New Jersey, 2001. |
| B.,                   |   |
| Habib, Irfan,         | <i>Medieval India: The Story of a Civilisation</i> , National Book Trust, 2007                                    |
| Jaiswal, Suvira,      | <i>Caste, Origin Function and Dimensions of Change</i> , Manohar, New Delhi, 2000.                                |
| Jones, Kenneth,       | <i>Socio- religious Reform Movements in British India</i> , Cambridge University Press, 1989                      |
| Khilnani,Sunil,       | <i>The Idea of India</i> , New York, 1999   |

- Majumdar, R.C., (ed.), *History and Culture of Indian People* (Relevant Volumes and Chapters), Bhartiya Vidya Bhawan Series, Bombay
- Rizvi, S.A.A., *The Wonder that was India*, Rupa, New Delhi, 2002
- Sastri, K.A.N., *A History of South India from Prehistoric Times to the Fall of Vijayanagar*, Oxford University Press, 1955
- Srinivas, M.N., *Social Change in Modern India*, Orient Longman, 1972
- Bayly, Susan, *Caste, Society and Politics in India from the Eighteenth Century to the Modern Age*, Cambridge University Press, 1999.
- Bhandarkar, D.R., *Some Aspects of Ancient Indian Culture*, Asian Educational Services, New Delhi, 1989.
- Barua, B.K., *A Cultural History of Assam*, Satya Ranjan Dey, Bina Library, Gauhati, 1986
- Chand, Tara, *The Influence of Islam on Indian Culture*, The Indian Press, Ltd., Allahabad, 1986.
- Chatterjee, S.K., *Kirata-Jana-Kriti*, Assam Publishing Company, Guwahati, 2015.
- Habib, Irfan, *People's History of India*, Tulika Books, New Delhi. (relevant volumes)
- Inden, Ronald, *Imagining India*, Indiana University Press, 2000.
- Kakati, Banikanta, *The Mother Goddess Kamakhya*, Publication Board Assam, Guwahati, 1989.
- Kharchandy, D. A, (ed.), *Understanding the Tribes of Asia*, Lakshi Publishers, New Delhi, 2018.
- Lahiri, Nayanjot, *Marshaling the Past: Ancient India and its Modern Histories*, Permanent Black, 2012.
- Luniya, B.N., *Evolution of Indian Culture*, Lakshmi Narain Agarwal, Agra, 1994.
- Mawlong, C.A., Gurung, T., (ed.), *Religion and Society in Northeast India: An Interface*, DVS, Publishers, Guwahati, 2022.
- Mehta, J.L., *Advanced Study in the History of Medieval India, Vol. III*, Sterling Publishers, New Delhi, 1981.
- Sarkar, Jagadish Narayan, *Thoughts on Trends of Cultural Contacts in Medieval India*, Creative Media Partners, LLC, Sacramento, 2015
- Singh, K.S, (ed.) *Tribal Situation in India :An Anthro-Historical Perspective*, Manohar, New Delhi, 1986.
- Srivastava, M.P., *Society and Culture in Medieval India*, Chugh Publications, 2007
- Thapar, Romila, *Ancient Indian Social History; Some Interpretations*, Orient Longman, New Delhi, 1978.



**FOUR YEAR UNDER GRADUATE (FYUG)  
PROGRAMME UNDER  
NEW EDUCATION POLICY, 2020  
(1<sup>st</sup> and 2<sup>nd</sup> Semester)**



**Date of approval in Academic Council - 02.06.2023**

**STRUCTURE OF THE SYLLABUS, FYUG PROGRAMME, NEP 2020**

**(Example- Subject: Economics Major and History Minor)**

**1<sup>ST</sup> SEMESTER**

<b>COURSE CATEGORY</b>	<b>COURSE CODE</b>	<b>CREDIT</b>	<b>TOTAL CONTACT HOURS</b>	<b>REMARK</b>
MAJOR	ECO-100*	4	60/75	
MINOR	HIS-100	4	60/75	Student to choose one course from other department
MDC		3	45	Student to choose one course out of the offered courses by the college under each category
AEC		3	45	Student to choose either English or any MIL and continue the same in 2 <sup>nd</sup> Semester.
SEC				Student to choose one course out of the offered courses by the college under each category
VAC	VAC-104	3	45	Compulsory
<b>Total</b>		<b>20</b>		

**2<sup>ND</sup> SEMESTER**

<b>COURSE CATEGORY</b>	<b>COURSE CODE</b>	<b>CREDIT</b>	<b>TOTAL CONTACT HOURS</b>	<b>REMARK</b>
MAJOR	ECO-150	4	60/75	
MINOR	HIS-150	4	60/75	Student to choose one course from other department
MDC		3	45	Student to choose one course out of the offered courses by the college under each category
AEC		3	45	Student to continue the same as chosen in the 1 <sup>st</sup> Semester.
SEC				Student to choose one course out of the offered courses by the college under each category
VAC		3	45	Student to choose one course out of the offered courses by the college under each category
<b>Total</b>		<b>20</b>		

**NOTE: ALL MAJOR AND MINOR COURSES ARE THE CORE COURSES FOR MULTIDISCIPLINARY PROGRAMME**

## MAJOR/CORE PAPERS SEMESTER I & II

SL NO	SUBJECT	SEMESTER I		SEMESTER II	
		COURSE CODE	NAME OF THE COURSE	COURSE CODE	NAME OF THE COURSE
1	ANTHROPOLOGY	ANT-100	INTRODUCTION TO ANTHROPOLOGY	ANT-150	SOCIAL AND CULTURAL ANTHROPOLOGY
2	ASSAMESE	ASM-100	ASOMIYA SAHITYAR ASDHYAYON	ASM-150	ASOMIYA BHAXA ARU ASOMIYA LIPI
3	BENGALI	BEN-100	BANGLA SAHITYERITIHAS – ADIYO MADHYAYUG	BEN-150	BANGLASAHITYERITIHAS – ADIYO ANT-MADHYAYUG
4	BIO CHEMISTRY	BCH-100	INTRODUCTORY BIOCHEMISTRY	BCH-150	BIOMOLECULES
5	BIOTECHNOLOGY	BIT-100	CELL BIOLOGY & GENETICS	BIT-150	BIOCHEMISTRY
6	BOTANY	BOT-100	PLANT DIVERSITY - I ALGAE, BRYOPHYTES AND PTERIDOPHYTES	BOT-150	PLANT DIVERSITY - II GYMNOSPERMS AND PALEOBOTANY, ANGIOSPERM MORPHOLOGY, PLANT ANATOMY
7	CHEMISTRY	CHE-100	INTRODUCTORY CHEMISTRY-I	CHE-150	INTRODUCTORY CHEMISTRY-II
8	CLINICAL NUTRITION AND DIETETICS	CND-100	BASIC NUTRITION	CND-150	HUMAN PHYSIOLOGY
9	COMMERCE	COM-100	ACCOUNTING FOR BUSINESS	COM-150	PRINCIPLES OF MANAGEMENT
10	COMPUTER APPLICATION	BCA-100	PROBLEM SOLVING AND PROGRAMMING IN C	BCA-150	INTERNET TECHNOLOGY WITH PHP AND MYSQL
11	COMPUTER SCIENCE	CSC-100	PROGRAMMING IN C AND INTRODUCTION TO DATA STRUCTURES	CSC-150	DATABASE MANAGEMENT SYSTEM
12	ECONOMICS	ECO-100	MICROECONOMIC S I	ECO-150	MACROECONOMICS I
13	EDUCATION	EDU-100	INTRODUCTION TO EDUCATION	EDU-150	FOUNDATION OF EDUCATION

14	ELECTRONICS	ELE-100	BASIC NETWORK ANALYSIS	ELE-150	SEMICONDUCTOR DEVICES
15	ENGLISH	ENG-100	INTRODUCTION TO ENGLISH LITERATURE	ENG-150	BRITISH POETRY: MILTON TO THE PRESENT
16	ENVIRONMENTAL SCIENCE	EVS-100	CONCEPTS AND COMPONENTS OF ENVIRONMENT	EVS-150	POPULATION AND COMMUNITY ECOLOGY
17	FISHERY SCIENCE	FSC-100	INTRODUCTION TO FISH AND FISHERIES	FSC-150	FUNDAMENTALS OF AQUATIC ECOLOGY
18	GARO	GAR -0	INTRODUCTION TO GARO PROSE AND POETRY	GAR-150	ORAL NARRATIVES & FOLKLORE
19	GEOGRAPHY	GEO-100	INTRODUCTION TO HUMAN GEOGRAPHY	GEO-150	INTRODUCTION TO PHYSICAL GEOGRAPHY
20	GEOLOGY	GEL-100	INTRODUCTION TO GEOLOGY	GEL-150	ROCKS AND MINERALS
21	HINDI	HIN-100	हिन्दी भाषा एवं लिपि	HIN-150	हिन्दी व्याकरण
22	HISTORY	HIS-100	HISTORY OF INDIA: EARLIEST TIMES TO THE POST VEDIC PERIOD	HIS-150	HISTORY OF INDIA: MAURYA TO POST GUPTA PERIOD
23	HOME SCIENCE	HSC-100	INTRODUCTORY HOME SCIENCE	HSC-150	INTRODUCTORY HOME SCIENCE 2
24	KHASI	KHA-100	KA MAITPHANG ĪA KA LITERESHOR KHASI	KHA – 150	POITRI, SAWANGKA BAD PAROM MUTDUR
25	MASS COMMUNICATION AND VIDEO PRODUCTION	MVP-100	INTRODUCTION TO COMMUNICATION THEORY	MVP 150	VISUAL COMMUNICATION
26	MATHEMATICS	MTH-100	FUNDAMENTAL MATHEMATICS-I	MTH-150	FUNDAMENTAL MATHEMATICS-II
27	MEDIA TECHNOLOGY	MET-100	INTRODUCTION TO COMMUNICATION THEORY	MET 150	INTRODUCTION TO NEW MEDIA
28	MICROBIOLOGY	MIC-100	INTRODUCTORY MICROBIOLOGY	MIC-150	BACTERIOLOGY

29	MIZO	MIZ-100	INTRODUCTION TO MIZO LANGUAGE	MIZ- 150	MIZO POETRY SHORT PLAY AND LEGENDS
30	NEPALI	NPL-100	HISTORY OF NEPALI LITERATURE AND POETRY	NPL-150	LINGUISTICS, POETICS AND GRAMMAR
31	PHILOSOPHY	PHI-100	UNDERSTANDING PHILOSOPHY	PHI-150	ETHICS
32	PHYSICS	PHY-100	MATHEMATICAL PHYSICS, PROPERTIES OF MATTER AND WAVES	PHY-150	ELECTRICITY AND MAGNETISM, OPTICS AND ELECTRONICS
33	POLITICAL SCIENCE	POL-100	POLITICAL THEORY	POL-150	INDIAN POLITICAL SYSTEM
34	SOCIAL WORK	BSW-100	SOCIAL WORK : AN INTRODUCTION	BSW-150	ORIENTATION FOR FIELD WORK
35	SOCIOLOGY	SOC-100	INTRODUCTION TO SOCIOLOGY	SOC-150	PRINCIPLES OF SOCIOLOGY
36	STATISTICS	STA-100	INTRODUCTORY STATISTICS	STA-150	INTRODUCTORY TO PROBABILITY AND APPLIED STATISTICS
37	ZOOLOGY	ZOO-100	TAXONOMY AND ANIMAL DIVERSITY	ZOO -150	FUNCTIONAL AND COMPARATIVE ANATOMY

# 1. ANTHROPOLOGY

## A. Preface

Anthropology poises itself as a discipline of infinite curiosity about human beings. As the study of humankind, it seeks to produce useful generalisations about people and their behaviour to arrive at the fullest possible understanding of human diversity. Anthropologists try to seek answers to an enormous variety of questions about humans. They are interested in discovering when, where and why humans first appeared on the earth, by uncovering the fossil remains or tools of people who lived long ago; how and why they have changed since then; how and why modern human populations vary/overlap in certain physical features. They are also interested in knowing how and why societies in the past and present have similar/different norms, values, customs, beliefs and practices. In fact, every human population, and not just the tribes and forest tribes as is often made out, is of interest to anthropologists.

Anthropologists not only study all varieties of people, they also study all aspects of human population. For example, when describing a group of people, an anthropologist might discuss the history of the area in which the people live, the physical environment, the organisation of family life, the general features of their language, the group's settlement patterns, political and economic systems, religion, styles of art and dress. Some are of course concerned primarily with biological or physical characteristics of human populations; others are interested principally in what we call cultural characteristics. There are also some who study the prehistoric cultures and still others who study the human languages in order to understand their culture and society.

### **Learning outcomes-based approach to curriculum planning and development**

The fundamental premise underlying the learning outcomes-based approach to curriculum planning and development is that higher education qualifications such as Bachelor's Degree and Master's Degree programmes are awarded on the basis of demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes and values) and academic standards expected of the under- and post- graduates in Anthropology. Learning outcomes specify what students completing a particular programme of study are expected to know and be able to do at the end of their programme of study. The learning outcomes indicate the knowledge, skills, attitudes and values that are required to enable the students to effectively participate in knowledge production and in the knowledge economy, improve national competitiveness in a globalized world and for equipping young people with skills relevant for global and national labour markets and enhancing the opportunities for social mobility.

### **Programme Outcomes (POs):**

- help formulate graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes that are expected to be demonstrated by the holder of a qualification;
- enable prospective students, parents, employers and others to understand the nature and level of learning outcomes (knowledge, skills, attitudes and values) or attributes a graduate/postgraduate should be capable of demonstrating on successful completion of a

- programme of study;
- maintain national standards and international comparability of standards to ensure global competitiveness, and to facilitate graduate/postgraduate mobility; and
  - provide higher education institutions and their external examiners an important point of reference for setting and assessing standards.

## **ANT- 100: INTRODUCTION TO ANTHROPOLOGY**

**(Contact Hours: 60, Credits: 4)**

**Course Objective:** Introduce the subject of study ‘Anthropology’ as an academic discipline

**Learning Outcomes:**

- Students will learn about the genesis and development of anthropology.
- Learn about the aspects of anthropology – branches, field practice and pioneer anthropologists.

**Unit 1:** Introduction: Definition, Meaning and Scope of Anthropology; Historical Development; Anthropology, Relationship with other related disciplines: sociology, political science, economics, and psychology.

**Unit 2:** Branches: major branches of anthropology and their interrelatedness – Social and Cultural Anthropology, Biological Anthropology, Archaeological Anthropology, Linguistic Anthropology.

**Unit 3:** Ethnology, comparative method, ethnography, fieldwork, holism and cultural relativism.

**Unit 4:** Anthropologists at work: Bronislaw Malinowski, Radcliffe-Brown, Edmund Leach, Franz Boas, Ruth Benedict, Margaret Mead, N. K. Bose, D. N. Majumdar, Iravati Karve, M.N. Srinivas.

**Suggested Reading:**

Barnouw, Victor. 1971. *An Introduction to Anthropology*. Illinois: Dorsey Press.

Coleman, Simon. 1990. *An Introduction to Anthropology*. N.J.: Chartwell Books.

Coleman Simon, Ann Kingsolver and Susan Hyatt (Eds.). 2017. *Routledge Companion to Contemporary Anthropology*.

Delaney, C. L. 2004. *Investigating Culture*. Malden: Blackwell.

- Haviland W.A., E.L.P. Harald, W. Dana and Bunny McBride. 2008. *Cultural Anthropology*. New Delhi: Cengage India Learning Private Limited.
- Hawkes, C., Jennifer Watt et al. 2001. *Images of Society*. Toronto: McGraw-hill Ryerson.
- Ingold Tim (Ed.) 1994. *Routledge Companion Encyclopedia of Anthropology*.
- Jha Makhan. 2019. *An Introduction to Social Anthropology* (2<sup>nd</sup> Revised edition). New Delhi: Vikas Publication House Private Limited.
- Lewis, R. Barry et al. 2010. *Understanding Humans*. Belmont: Wadsworth Cengage Learning.
- Majumdar, D. N. and T. N. Madan. 2022. *An Introduction to Social Anthropology*. New Delhi: Mayur Books
- Marcus, J. 2010. *Introduction to Anthropology*. Workbook Edition US: Kendall Hunt Publishing Company.
- Miller, E. S. and C. A. Weitz. 1979. *Introduction to Anthropology*. N.J.: Prentice-Hall.
- Montagu, A. 1969. *Man: His First Two Million Years*. New York: Columbia University Press.
- Moore Henrietta and Tod Saunders (eds). 2014. *Anthropology in Theory: Issues in Epistemology*. Sussex, UK: John Wiley & Sons Inc. (2<sup>nd</sup> editon).
- Rapport Nigel and Joanna Overing. 2000. *Social and Cultural Anthropology: The Key Concepts*. London and New York: Routledge (Taylor and Francis Company – e Edition 2003)
- Sproule, W. 2001. *Our Social World*. Toronto: Prentice-Hall.
- Srivastava, A.R.N. 2013. *Essentials of Cultural Anthropology*. (2<sup>nd</sup> edition) Delhi: PHI Learning Private Limited
- Titiev, M. 1964. *The Science of Man*. New York: Holt.
- .....



**ANT-150: SOCIAL AND CULTURAL ANTHROPOLOGY**  
**(Contact Hours: 60, Credits: 4)**

**Course Objective:** Provide understanding of the essence of Social and Cultural Anthropology.

**Learning Outcomes:**

- Students will learn about the genesis and historical development of Social and Cultural Anthropology.
- Learn basic concepts of society and culture, family, marriage and kinship extending to the understanding of socio-cultural life that includes religion, economic and political institutions.

**Unit 1:** Introduction: scope and aims; historical development; relationship with other branches of anthropology and with other social sciences and humanities.

**Unit 2:** Basic concepts: society, community, social institutions, association, social group, band and tribe; social structure and social function; culture, material & non-material culture, dynamism of culture, multiculturalism, transculturalism, cultural identity.

**Unit 3:** Family, marriage & kinship: definitions, forms, types and function; clan, phratry, moiety, rules of descent and kinship terminologies.

**Unit 4:** Anthropology of Religion: Concept of sacred, animism, totemism, naturism; magic, witchcraft and sorcery myth and cosmology; Economic Anthropology: Economic institutions, principles of production, distribution and consumption in simple societies, monetary and non-monetary economies, market exchange and commodities ; Political Anthropology: Political institutions; concepts of power and authority; types of authority; state and stateless societies; law and justice in simple and societies, development of legal institutions.

**Suggested readings:**

Beattie, John. 1976. *Other Cultures*. London: Oxford University Press.

Deliege, R. 2011. *Anthropology of the Family and Kinship*. New Delhi: PHI Learning Pvt. Ltd.

Ember, C.R. and M. Ember. 1981. *Cultural Anthropology*. New Jersey: Prentice Hall.

Evans-Pritchard, E.E. 1951. *Social Anthropology*. London: Cohen and West Ltd.

Fox Robin. 1984. *Kinship and Marriage: An Anthropological Perspective* (Cambridge Studies in

- Social and Cultural Anthropology) (reprint 1998) London: Cambridge University Press.
- Haviland W.A., E.L.P. Harald, W. Dana and Bunny McBride. 2008. *Cultural Anthropology*.  
New Delhi: Cengage India Learning Private limited.
- Honigman, J.J. 1976. *Handbook of Cultural and Social Anthropology*. New York: Harper &  
Row.
- Jha Makhan. 2019. *An Introduction to Social Anthropology* (2<sup>nd</sup> Revised edition). New Delhi:  
Vikas Publication House Private Limited.
- Johnson Allen W. and Timothy Earle. 2000. *The Evolution of Human Societies: From Foraging  
Group to Agrarian State* (Second Edition) California: Stanford University Press
- Leach, E.R. 1982. *Social Anthropology*. London: Fontana.
- Lewis, I.M. 1994. *Social Anthropology in Perspective*. Cambridge: Cambridge Univ. Press.
- Linton, Ralph. 1936. *The Study of Man*. New York: Appleton Century Crafts.
- Mair, Lucy. 1985. *An Introduction to Social Anthropology*. Delhi: OUP.
- Majumdar, D. N. and T. N. Madan. 2022. *An Introduction to Social Anthropology*. New Delhi:  
Mayur Books
- Miller, B. 2011. *Cultural Anthropology*. New Delhi: PHI Learning Pvt. Ltd.
- Royal Anthropological Institute. 1954. *Notes and Queries on Anthropology*. London: RKP.
- Srivastava, A.R.N. 2005. *Essentials of Cultural anthropology*. New Delhi: Prentice Hall of India  
Pvt Ltd.

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## 2. ASSAMESE

### **Preface**

The FYUG programme in Assamese, up to the second semester, comprises two Major/ Minor Courses and two Ability Enhancement Courses (AEC). The Major/ Minor Courses, being subjects in a core discipline and comprising Introduction to Assamese Literature and History of Assamese literature. The Ability Enhancement Courses, comprising of History of Assamese literature and Communicative Assamese are included in the second semester.

The two Major/ Minor Courses are designed to introduce students to the origin and development of Assamese literature and provide a comprehensive guide to Assamese prose, poetry, drama and short stories and their development, forms and movements over the ages. So is the Alternative Assamese paper under AEC. Communicative Assamese is designed to enhance their communication skills in dealing with day to day situations.

### **Programme Outcome**

Through these courses, the students are expected to gain the knowledge of various literary texts. These courses will enable the students to think critically and demonstrate a coherent and systematic knowledge of the different aspects of the Assamese language and literature. In addition, Communicative Assamese will help them develop effective communication skills.

### **ASM-100: ASOMIYA SAHITYAR ASDHYAYON**

**(Study of Assamese Literature)**

**(Contact Hours: 60, Credits: 4)**

**Course Objective:** This paper will introduce the student to the poetry and drama of the early and early modern periods of Assamese Literature including Assamese prose and short stories. The selection of texts is representative of the historical and socio-cultural periods mentioned above. It aims at acquainting students with the history and development of Assamese literary forms from the early periods, especially poetry, drama and prose. The paper also includes short stories from early modern to contemporary. This course will enable the students to read and respond to select texts of major Assamese poetry, drama, prose and short stories

**Learning Outcome:** Students will be able to learn the various literary genres in Assamese including early and short stories belonging to early and early modern periods.

Students would also be familiar with the socio-cultural period. The students will understand the growth and development of various Assamese literary genres like poetry, poetry, drama, prose and also short stories. Besides students will be able to analyze interpret and appreciate Assamese literary texts from the early periods to modern times.

### **Unit-I: Kabita (Poetry)**

1. SaratBornona; Sankardeva
2. TezoreKomolaPoti; Madhabdev
3. Niyor; ChandrakumarAgarwala
4. Garha Kori MokJharudar; AmbikagiriRaychoudhury
5. MorDesh; Hiren Bhattacharjya

### **Unit-- II: Prabandha (Prose)**

1. Guru ShisyarMonikanchanSanjog;Kothaguruchorit
2. Jibonor Omiya;Satyanath Bora
3. MoniramDewanorPhanchi; Benudhar Sharma

### **Unit-- III: (Drama)**

*Chordhara*; Madhabdev

### **Unit-- IV: Sutigalpa (Short stories)**

1. Lakhminath Bezbaroa “Dhowakhowa”
2. BhabendranathSaikia, “Prohori”
3. HomenBorgohain“Hati”

### **Suggested Readings:**

1. Barua, Bhaben: AsamiyaKabita: *BivartanarParba*. Guwahati: Grantha, 2012.
2. Baruah, Satya Prasad:*Natak aru AbhinayaPrasanga*. Guwahati: Banalata, 2016.
3. Bordoloi, N.P.( ed.) : *KabitaManjuri*,University Publication Deptt, Gauhati University 11<sup>th</sup>ed 2003
4. Neog, Maheswar (ed) : *SnatokorKothabondho*, Gauhati University, Published by Gauhati University,1995
5. Neog, Maheswar, et al: ed. *AsamiyaGalpagucca*. Jorhat: AsamSahitya Sabha, 1978.
6. Sarma, Benudhar: ed. *HemchandraGoswamiRacanavali*. Jorhat: AsamSahitya Sabha, 1972.
7. Talukdar Nanda: *Kabi aru Kabita*, Bandana Publisher, 2014

## ASM-150: ASOMIYA BHAXA ARU ASOMIYA LIPI

(Assamese Language and Assamese Script)

(Contact Hours: 60, Credits: 4)

**Objective:** The paper aims at introducing students to the history and development of the Assamese language and Assamese scripts including its various sub-dialects.

**Learning Outcome:** Students will be able to learn about the history, development and characteristics of the Assamese language and the Assamese sub-languages. The course will also enable the students to read Assamese scripts and texts.

### Unit-I:

Asomiya vasarutbhav aru bikash

### Unit-II:

Asomiya vasarbhasatatik baisistha

### Unit-III:

Asomiya vasarupavasara parisoy

### Unit-IV:

Asomiya lipirutbhav aru bikash

### Suggested Readings:

1. Baruah, Bhimkanta: *Asomiya Bhasa*, Banalata Publisher, 2012
2. Goswami, UpendraNath: *Asomiya vasarutbhav aru bikash*, Collected: Digital Libraryindia, JaiGyan, 1991
3. Goswami, Keshavananda Deva. *PuraniPuthi Adhyayan aru Sampadana*. Ghy.: AsamPrakasanParisad, 2015
4. Kakati, Sarbeswar Sarma: *Asomiya prasinlipi*, Library collection 2003
5. Goswami, *UpendraNathAsamiyaLipi*. Guwahati: Assam PrakasanParisad, 1987.
6. Neog, Maheswar. *Path-Samiksa*. Guwahati: Chandra Prakash, 2012.
7. Sharma, Dimbeswar, ed. *Kamarupasanavali*. Guwahati, 1981

### 3. BENGALI

#### Preface

According to the National New Education Policy 2020, this curriculum has been developed. Through this curriculum, students will become familiar with the glorious history of Bengal, its socio-political and cultural rise and fall, and the transformation of the Bengali language. They will gain knowledge about the impact of contemporary influences on the Bengali mindset, values, and literature. The curriculum will also provide vocational benefits. Furthermore, through the study of neighboring states, local cultures, folktales, and other related subjects, the curriculum aims to acquaint students with the diverse values and rich literature of a broader India.

রাষ্ট্রীয়নব্যশিক্ষানীতি ২০২০ অনুসারে এই পাঠ্যক্রমটি তৈরী করা হয়েছে। এই পাঠ্যক্রমের মাধ্যমে ছাত্ররা  
বাংলার গৌরবোজ্জ্বল ইতিহাস, তার সামাজিক-  
রাজনৈতিক ও সাংস্কৃতিক উত্থান পতন এবং বাংলা ভাষার বিবর্তন সম্পর্কে অবহিত হতে পারবে। ঔপনিবে  
শিক আধুনিকতার সংস্পর্শে এসে বাঙালীর চিন্তা-চেতনা,  
জীবনমান ও সাহিত্যে যে আধুনিকতার সঞ্চার হয়েছে সে সম্পর্কে ছাত্ররা জ্ঞান লাভ করবে। পেশাগত দিক  
থেকে ও পাঠ্যক্রমটি সুবিধা প্রদান করবে। এছাড়াও প্রতিবেশী রাজ্য ও লোকসংস্কৃতি,  
লোকগাথা ইত্যাদি পঠন পাঠনের মাধ্যমে একবৃহত্তর ভারতবর্ষের মূল্যবোধ ও বৈচিত্রময় সাহিত্যের সাথে ছা  
ত্রদের পরিচয় করানো ও এই পাঠ্যক্রমের উদ্দেশ্য।

#### **BEN-100: BANGLA SAHITYERITIHAS – ADIYUG O MADHYAYUG (History of Bengali Literature)**

**(Contact Hours: 60, Credits: 4)**

**Course Objective:** *The purpose of this lesson is to introduce students to the history of Bengali literature from its inception during the emergence period to the end of the medieval period.*

**Learning Outcomes:** *Students will acquire the skills to analyze and interpret the language, literary works, history, and potential themes of the ancient and early medieval Bengali literature (Charyapada) in depth.*

**UNIT 1.** A. Charyapad, Srikrishnakirtan

B. BhaisnavPadaboli (Bidyapati, Chandidas, Gyanadas, Gobindodas)

**UNIT 2.** A. MangalKavya (ManasaMangal, ChandiMangal, Dharma Mangal).

C. ChaitanyaJiboni (Brindabandas, KrishnadasKabiraj)

**UNIT 3.** Charyapad (Selective poems)-1

- i. Kaya tarubarapanchwidaal
- ii. Bhabanoigahanganbhirbegebahi
- iii. SoneBharati karunanawi

**UNIT4.** Charyapad (Selective poems)-2

- i. Nagar bahiredombitoharikuriya
- ii. Unchunchapawattahibasoisabaribali
- iii. Talatmorgharnahipabeshi

**Suggested Reading:**

1. BandopadhyayAsit kr. *Bangla SahityerItihas*,(Vol. 1-3)
2. HaldarGopal, *Bangla SahityerRuprekha* (1-2)
3. Choudhury Bhudeb, *Bangla SahityerItikotha* (1-2)
4. BhattacharjeeAsutosh, *Bangla MongalKavyerItihas*.
5. Acharya Debesh Kr, *Bangla SahityerItihas* (Adi O Madhyayug)
6. NathroyAmarendra,( Edited) *ShaktoPodaboli (Chayan)*
7. BasuArun Kr. *Shaktopodaboli*
8. DeySatyabrata, *CharyageetiParichay*
9. Basu,Manindramohan, *Charyageeti*.

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## 4. BIOCHEMISTRY

**Programme in Biochemistry:** A student will learn in-depth about how the chemical properties of molecules determine the ways in which they interact and react with each other in creating and sustaining life; there will be comprehensive teaching on enzymology, metabolism, structural biology, bioenergetics, molecular biology and genetic engineering leading to understanding of life as chemical process.

**Programme Outcomes (POs):** A biochemistry graduate will acquire exhaustive knowledge and understanding of biochemical reactions that he/she would be able to apply in research in fields of pharmacology, drug discovery, bioremediation, medicine, immunology, neurochemistry, endocrinology, etc. Other attributes gained from working in the laboratories would be hands-on training on scientific equipment, developing patience, learning to modify research protocols and being disciplined. There are ample job opportunities for a biochemistry graduate in higher studies, as academic researcher, analytical chemist, biomedical scientist, biotechnologist, clinical research associate, clinical scientist, forensic scientist, medicinal biochemist.

### BCH-100: INTRODUCTORY BIOCHEMISTRY

(Contact Hours: 75, Credits: 4)

#### Course Objectives (COs):

1. To impart foundation in chemical nature of life
2. To clarify numerical concepts used in biochemistry
3. To teach concepts such as buffer, chemical bonds, functional groups and their importance
4. To relate the significance of biochemistry in everyday life

#### Learning Outcomes (LOs):

1. A graduate will have specific knowledge of biochemical concepts of origin and sustenance of life
2. Will be proficient in calculating strength/concentration of solutions and in preparing reagents and buffers
3. Will have a comprehensive knowledge of application of biochemistry in scientific fields such as agriculture, medicine, pharmaceutical, forensic science, nutrition and food processing, etc.

#### Unit I

**Foundations of biochemistry:** Physical foundations; chemical foundations; cellular foundations; distinguishing features of living organisms; energy source in living organisms

(chemotrophs and phototrophs); micromolecules and macromolecules; significance of *in vitro* and *in vivo* studies.

Historical perspective in biochemistry: Carl Neuberg, Lavoisier and oxidation of food, Wohler and synthesis of urea, Emil Fischer, Claude Bernard, Louis Pasteur and fermentation, Buchner Experiment, payen and diastase; Joseph Priestly and oxygen; Friedrich Miescher, Meyer and von Helmholtz, Hans Adolf Krebs, James B Sumner, Meyerhof and Hill, Miller-Urey Experiment.

**Applications of biochemistry:** Role of biochemistry in agriculture, medical science, pharmaceutical, nutrition and food processing, forensic science.

### **Unit II**

**Numerical concept:** An overview on the metric system, atomic weight, molecular weight, equivalent weight, basicity of acids, acidity of bases, Avogadro's number, mole concept, percentage, molarity, molality, normality, Dalton concept, density, specific gravity, assay percentage, stock solution and working reagent, dilution factor, standard conditions in biological system.

**Chemical bonds and common functional groups in biomolecules:** Formation and properties of covalent bonds, non-covalent bonds (hydrogen bonds, ionic bonds, Vander Waals interactions, London forces, dipole-dipole interactions, electrostatic interactions and hydrophobic interactions), sigma, pi and co-ordinate bonds. versatility of carbon bonding in living organisms; some common functional groups in biomolecules.

### **Unit III:**

**Water and buffer:** Biological significance of water, physical and chemical properties of water, colligative properties of water, molecular structure of water, ionization of water; ionic product of water, pH and pOH of water, water as a reactant, ultrapure water, deionized water, RO water, distilled water and double distilled water; buffer, pH and pKa, Henderson-Hasselbach equation, titration curve of weak acids, buffering capacity, buffering region, buffers in living organisms: phosphate buffer, bicarbonate buffer, proteins buffering ability.

### **Unit IV: Practical**

1. Preparation of x gm/ml of Glucose and conversion into y M Glucose.
2. Preparation of 1M Potassium Dichromate and performing serial dilution of 0.1 M, 0.2 M,...to..., 0.9 M, 1M Potassium dichromate.
3. Calibration of pH meter.
4. Finding the pKa of Sodium acetate buffer.
5. Preparation of Buffer by Henderson-Hasselbalch Equation & Study on the Effect of different concentrations of buffer on the Buffering Capacity.
6. Titration Curve of acetic acid with NaOH.

### **Suggested readings:**

1. Berg J M, John L, Stryer L (2012) Biochemistry 7<sup>th</sup> Ed., W H Freeman & Co. Ltd.
2. Garrett R H & Grisham C M (2012) Biochemistry 5<sup>th</sup> Ed., Brooks Cole Publ.
3. Harper's Illustrated Biochemistry 32<sup>nd</sup> Ed. (2022), Murray et al. McGraw Hill Publ.

4. Jayaraman (2011) Laboratory Manual in Biochemistry, New Age Int. Publ.
5. Nelson D L and Cox M M (2021) Lehninger's Principles of Biochemistry, Macmillan Publ.
6. Plummer D T (2008 reprint) An Introduction to Practicals in Biochemistry 3<sup>rd</sup> Ed., Tata McGraw- Hill .
7. Powar C B & Chatwal G R , Biochemistry (2011), Himalaya Publishing House
8. Rosenberg J, Epstein L (2015) College Chemistry, McGraw Hill Education, India
9. Sadasivam S and Manickam A (2018) Biochemical Methods, 3<sup>rd</sup> Ed. New Age Int. Publ., New Delhi.
10. Segel Irwin H. (2010), Biochemical Calculations 2<sup>nd</sup> Ed., John Wiley & Sons.
11. Solomon T W G, Frhyle C B & Snyder S A (2016) Organic Chemistry 11<sup>th</sup> Ed., Wiley Madan R D (2018) Modern Inorganic Chemistry, S Chand Publ.
12. Voet D & Voet J G (2010) Biochemistry 4<sup>th</sup> Ed., John Wiley & Sons.
13. Zubay G (2020) Biochemistry 5<sup>th</sup> Ed., W C Brown Commun, Inc.

## **BCH-150: BIOMOLECULES**

**(Contact Hours: 75, Credits: 4)**

### **Course Objectives (COs)**

1. To understand the organization of simple molecules into macromolecular and supra molecular structure
2. To recall the Classification of Biomolecules
3. To compare the function of the various Biomolecules to sustain Life
4. To examine the role played by the functional groups and chemical bonds in Biomolecules
5. To estimate the concentration of Biomolecules

### **Learning Outcomes (LOs):**

1. A graduate will have specific knowledge on the organization of monomers into macromolecular and supra molecular structure
2. Will be able to analyze the structure-function relation of a biomolecule
3. Will be able to estimate the amount of any biomolecule in a sample
4. Will be able to explain the importance of the various biomolecules to sustain Life

### **Unit I**

**Carbohydrates and sugars:** Properties, structure and classification of monosaccharides (glucose & fructose), disaccharides (sucrose, maltose and lactose) and polysaccharides (dextrins, starch, glycogen and cellulose); glycosidic bonds, ketal, hemiketal, acetal and hemiacetal, reducing and non-reducing sugars; Stereochemistry of sugars: chiral carbon, epimers, anomers, mutarotation, chair and boat forms, glycosides, glucopyranose and fructopyranose; Fischer projection, Haworth projection; ABO blood group.

**Fatty acids and lipids:** Fatty acids: nomenclature and chemical properties; Lipid classification: simple and complex; general structure and function of the major lipid sub-classes; acylglycerols, phosphoglycerides, sphingolipids, waxes and terpenes, steroids and prostaglandins; Supra molecular structure: lipid membrane.

#### **Unit II**

**Amino acids and proteins:** Alpha amino acids: structure and properties of amino acids; Proteins: primary structure (structure of peptide bond-restricted rotation, *cis/trans*); secondary structure ( $\alpha$ ,  $\beta$  and super secondary structures); tertiary structure and quaternary structure of proteins, Ramachandran plot.

#### **Unit III**

**Nucleotides and nucleic acids:** Nucleotides: chemistry and properties. Nucleic acids: double helical structure of DNA, different forms and function of DNA; Functions of RNA: mRNA, tRNA, rRNA, siRNA, miRNA; Supra molecular complexes: chromosomes & ribosomes.

**Application of spectrophotometry in the analysis of biomolecules:** Absorption of UV-Vis light by biomolecules & spectral analysis, maximal wavelength of absorbance, Beer-Lambert's Law, instrumentation of spectrophotometer, chromogen, concept of blank, glass cuvette, quartz cuvette.

#### **Unit IV: Practical**

1. Verification of Beer-Lambert's Law
2. Estimation of amino acid using ninhydrin
3. Estimation of protein by Lowry's method
4. Estimation of protein by Bradford's method.
5. Estimation of DNA using diphenylamine
6. Estimation of RNA using orcinol
7. Estimation of Carbohydrates by Anthrone's Method
8. Estimation of Cholesterol by Zak's Method

#### **Suggested readings:**

1. Berg J M, John L, Stryer L (2012) Biochemistry 6<sup>th</sup> Ed., W H Freeman & Co. Ltd.
2. Boyer R F (2009) Modern Experimental Biochemistry 3<sup>rd</sup> Ed., 5<sup>th</sup> Impression Pearson Educ.
3. Damodaran G (2011) Practical Biochemistry, Jaypee Bros. Publ.
4. Devlin T. M. (2010) Textbook of Biochemistry with Clinical Correlations 7<sup>th</sup> Ed., Wiley Publ.
5. Freifelder D (1983) Physical Biochemistry, W H Freeman.
6. Garrett R H & Grisham C M (2012) Biochemistry 5<sup>th</sup> Ed., Brooks Cole Publ.
7. Harper's Illustrated Biochemistry 32<sup>nd</sup> Ed. (2022), Murray et al. McGraw Hill Publ.
8. Jayaraman (2011) Laboratory Manual in Biochemistry, New Age Int. Publ.
9. Nelson D L and Cox M M (2021) Lehninger's Principles of Biochemistry, Macmillan Publ.

10. Nigam A & Ayyagiri A (2008) Lab Manual in Biochemistry, Immunology & Biotechnology, Tata McGraw Hill.
11. Plummer D T (2008 reprint) An Introduction to Practicals in Biochemistry 3<sup>rd</sup> Ed., Tata McGraw- Hill Sambrook J and Russel D W (2012) Molecular Cloning 4<sup>th</sup> Ed., CSH Lab Press.
12. Rao B S & Deshpande V (2005) Experimental Biochemistry Students Companion I K International Publ.
13. Sadasivam S and Manickam A (2018) Biochemical Methods, 3<sup>rd</sup> Ed. New Age Int. Publ., New Delhi.
14. Voet D & Voet J G (2010) Biochemistry 4<sup>th</sup> Ed., John Wiley & Sons.
15. Wilson K and Walker J (2002) Principles and Techniques of Practical Biochemistry 5<sup>th</sup> Ed. Cambridge Publ.
16. Yadav V. K. et al (2012) Biochemistry & Biotechnology- A Lab Manual, Pointer Publ.
17. Zubay G (2020) Biochemistry 5<sup>th</sup> Ed., W C Brown Commun, Inc.

## 5. BIOTECHNOLOGY

### **Programme in Biotechnology:**

Under Graduate Biotechnology Programme is aimed at providing platform for students to get trained to become a scientist, researcher, or entrepreneur to work in the fields of medicine, agriculture, and food production as well as prepare them for industries R & D. The course covers aspects from fundamentals and principles of cellular systems, bioprocess engineering to advancement in genetic engineering and recombinant DNA technology.

### **Programme outcomes (PO):**

At the end of the B.Sc Biotechnology Programme, the graduates will be able to:

**PO 1:** Apply knowledge of Bio-techniques and experiments at an appropriate level to the discipline

**PO 2:** Analyse a problem and define the Biological requirements, appropriate to its solution

**PO3:** Understand new concepts and be articulate while executing knowledge with peers

**PO4:** Acquire knowledge in domain of biotechnology enabling their applications in industry and research

**PO5:** Recognize social and ethical responsibilities of a professional working in the discipline.

**PO6:** Acquire technological knowhow by connecting disciplinary and interdisciplinary aspects of biotechnology

**PO7:** Apply written and oral communication skills to communicate effectively in healthcare, industry, academia and research.

## **BIT-100: CELL BIOLOGY AND GENETICS**

**(Contact Hours: 75, Credits: 4)**

### **Course Objective (CO):**

Students will be taught to understand the concepts of cellular structure and function, application of cell biology tools and to analyze the complex idea of genetics.

**Learning Outcomes (LO):** At the end of the course, students will be able to:

- LO1** Able to understand the concepts of cellular structure & functions
- LO2** Characterize the various aspects of cell biology and its wider applications
- LO3** Analyze the complex idea in genetics into its constituent parts and an elaborate study of their organization
- LO4** Evaluation of mental construction of ideas and concepts from genetics to form new, integrated, and meaningful pattern.
- LO5** Demonstrate skills to use modern analytical tools to analyze and solve problems in various aspects of cell biology & genetics

## **THEORY**

### **Unit I**

Structure, composition and general functions of plasma membrane, cytoskeleton, mitochondria, endoplasmic reticulum, Golgi complex, ribosomes, centrioles, and lysosomes. Nucleus-Nuclear envelope, nuclear matrix, nucleolus. Chromosome types and structure; Special types of chromosomes (polytene, lamp brush, supernumerary-B Chromosome); Eu- and heterochromatin, Sex chromosomes and sex determination, genic-balance theory of sex determination, Dosage compensation, Cell cycle and checkpoints, Mitosis and meiosis.

### **Unit II**

Mendelian genetics: Law of dominance, law of segregation and independent assortment. Gene Interactions (complementary, supplementary, inhibitory, and pleiotropic genes). Chromosome theory of inheritance. Lethal alleles (coat color in mice), multiple alleles (ABO blood groups in man), multifactorial inheritance (skin color in man), Introduction to Linkage, crossing over and recombination of genes.; coupling and repulsion hypothesis, two point and three-point test cross, crossing over, recombination frequencies and mapping of genes. Basic concept of cytoplasmic inheritance (with examples human mitochondrial inheritance kappa particles in *Paramecium*, maternal effect on *Lymnaea*).

### Unit III

Human Genetics- background and history, Autosomal and Sex- linked Traits , Human pedigrees, genetic disorders (Color blindness, /haemophilia, sickle cell disease, Huntington's disease, vitamin D resistant rickets) in human and their pattern of inheritance. Mutation: mutation rates, mutation types (somatic, germline, induced, spontaneous, gene and chromosome mutations); Mutagenic agents, Detection of mutation in autosomes and X-chromosome in *Drosophila*.

### Unit IV: PRACTICAL

- Demonstration of cytochemical methods: Fixation of plant material and nuclear staining for mitotic and meiotic studies.
- Preparation and study of mitotic stages from onion root tip cells.
- Preparation and study of different stages of meiosis in male grasshopper.
- Construction of linkage maps; two and three point test cross (problem solving).
- Human Karyotype analysis.
- Preparation of Nuclear, Mitochondrial & cytoplasmic fractions
- Determination of relative sizes of nucleus and cytoplasm of squamous cells

### Suggested Readings:

1. Alberts B, Johnson A, Lewis J, Raff M, Roberts K & Walter P, 2002. Molecular Biology of the Cell, 4<sup>th</sup> Edition, New York & London, Garland Science
2. DeRobertis EDP, Francisco AS & DeRobertis EMF2005. Cell Biology 6<sup>th</sup> Edition, WB Saunders Co Ltd.
3. Gardner EJ and Snustad DP, 2008. Principles of Genetics, John Wiley & Sons.
4. Gupta PK, 2005. Cytology Genetics and Evolution, Rastogi Publications.
5. Hartl DL, 1991. Basic Genetics, Jones & Bartlett Publications.
6. Harvey L, Arnold B, Chris AK, Monty K, Matthew PS, Anthony B & Paul M, 2016. Molecular Cell Biology 8th Edition, WH Freeman & Co Ltd
7. James W, Richard L, Michael L, Alexander G, Tania B & Stephen B, 2003. Molecular Biology of the Gene, 5th Edition, Benjamin-Cummings Publishing Company.
8. Julie B. Wolf, 2008. Molecular Biology Lab Manual, Department of Biological Sciences, UMBC IHC World Life Science Products and services.



9. Strachan T & Read A, 2010. Human Molecular Genetics, 4<sup>th</sup> revised Edition, Garland Science, USA.
10. Wilson K and Walker J, 2006. Principles and Techniques of Practical Biochemistry, Cambridge University Press.

**BIT-150: BIOCHEMISTRY**  
**(Contact Hours: 75, Credits: 4)**

**Course Objective (CO):**

The course aims to develop concepts and understanding of biomolecules, metabolic pathways, enzymes and analytical reasoning on biochemical techniques.

**Learning Outcomes (LO):** At the end of the course, students will be able to :

- |            |  |
|------------|--|
| <b>LO1</b> | Conceptualize the understanding of Biomolecules and their utility in Industries      |
| <b>LO2</b> | Establish a comprehensive understanding of the biological & metabolic pathways.      |
| <b>LO3</b> | Execute and analyze the different bio techniques and its various biological sources. |
| <b>LO4</b> | Interpret the concepts of Enzymes and their daily applications.                      |
| <b>LO5</b> | Derive conclusions based on analytical reasoning and experimental evidence           |

**Unit I**

Chemical basis of life, Composition of living matter, Ionization of water, pH, pKa, buffer system and their applications; Henderson-Hasselbalch equation, Bio-energetic: Concept of entropy, free energy, electrical properties of biological compartments, electro-chemical gradients, membrane potential, electron transport chain in bacteria, plants and animals. chemiosmotic hypothesis. Classification, Properties and structure of carbohydrates, amino acids, proteins and fats, and nucleic acids, Oxidative phosphorylation, mechanism of ATP synthesis,

**Unit II**

Metabolism: Introduction to metabolism (catabolism and anabolism), Carbohydrate metabolism: Aerobic respiration- glycogenolysis, glycolysis, gluconeogenesis, Krebs cycle, glyoxylate shunt, cataplerosis and anaplerosis, pentose phosphate pathway. Anaerobic respiration- Fermentation

(ethanol and lactic acid) Lipid metabolism: Importance of fats, types of fatty acid, beta oxidation of fatty acids (odd number and even carbon number saturated and monosaturated fatty acids), ketone bodies.

### **Unit III**

Enzymes: Nomenclature and classification of Enzymes, Holoenzyme, apoenzyme, Cofactors, coenzyme, prosthetic groups, metalloenzymes, monomeric & oligomeric enzymes, activation energy and transition state, complementarity. Regulation of enzyme activity (one example with allosteric and zymogenicity), coenzymes – structure & function (pyridoxyl phosphate,  $\text{NAD}^+/\text{NADH}/\text{NADH}_2$  and  $\text{FAD}/\text{FADH}/\text{FADH}_2$ ), Enzyme Kinetics: enzyme substrate complex: concept of E-S complex, binding sites, active site, specificity, Michaelis-Menten equation and its derivation, Lineweaver-Burk plot, Eadie Hofstee plot. Enzyme inhibitions.

### **Unit IV: PRACTICAL**

- Qualitative tests of sugars, amino acids and lipids
- Preparation of buffers using Handerson Hasselbalch equation.
- Verification of Beer-Lambert law
- Estimation of protein by Lowry's method.
- Paper chromatography of amino acids
- Paper chromatography of sugars
- Determination of  $K_m$  &  $V_{max}$  of an enzyme.

### **Suggested Readings:**

1. Bowden Athel Cornish, 2004. Fundamentals of Enzyme Kinetics, Portland Press.
2. Jayaraman J, 1988. Laboratory manual of Biochemistry, Wiley East
3. Jo Keith Willson, 2000. Principles and Techniques of Practical Biochemistry, 5th Edition, Cambridge University Press.
4. Murray R K et al., 2005. Harper's Biochemistry, Prentice Hall International
5. Nelson DL & Cox MM, 2008. Lehninger's Principle of Biochemistry, Worth Publishers.
6. Plummer M & Plummer DT, 2017. Introduction to Practical Biochemistry, McGraw Hill Education

7. Robert KM, Darryl KG, Peter AM & Victor WR, 2018. Harper's Illustrated Biochemistry, 31st Edition, Lange Publishers
8. Tanford, C., Physical Chemistry of Macromolecules, John Wiley & Sons (2005)
9. Voet Donald & Voet Judith , 1995. Biochemistry, 2nd Edition, John Wiley and Sons.
10. Wilson, K. and Walker, J. 2010. Principles and techniques of Biochemistry and Molecular Biology. 7th Edition. Cambridge University Press
11. Zubay G, Biochemistry, 2000. Wm. C Brown Publishers

## 6. BOTANY

The Botany curriculum provides students with a comprehensive understanding of plants, incorporating subject knowledge, technical skills, and interdisciplinary components. It equips them with cutting-edge technologies used in plant science research and emphasizes the social and environmental importance of plants. Students gain awareness of plants' role in maintaining ecological balance, conserving biodiversity, and mitigating environmental challenges. The curriculum also highlights the economic relevance of plants in sectors like agriculture, horticulture, and pharmaceuticals. By integrating these elements, the curriculum prepares students as well-rounded professionals capable of addressing complex challenges, contributing to scientific advancements, and making informed decisions for the benefit of society, the environment, and the economy.

**Programme Outcomes (POs):** Expected outcome of the programme:

1. Gain comprehensive understanding of different branches of Botany: Systematics, evolution, ecology, developmental biology, physiology, biochemistry, plant interactions, morphology, anatomy, reproduction, genetics, and molecular biology.
2. Acquire competence in analytical and technical skills relevant to plant sciences.
3. Develop abilities in plant identification, experimental design, database utilization, and statistical analysis.
4. Conduct short research projects using various tools and techniques in plant sciences, fostering a scientific and research-oriented mindset.

### **BOT-100: PLANT DIVERSITY–I:ALGAE, BRYOPHYTES AND PTERIDOPHYTES**

**(Contact Hours: 75, Credits: 4)**

#### **Course Objectives (Cos):**

This paper aims to provide students with a comprehensive understanding of the lower groups of plants, enabling them to grasp the interrelationships and evolutionary affinities among these plant groups. Additionally, it will equip students with proficiency in experimental techniques for analyzing and studying these plant groups.

#### **Learning Outcomes (LOs):**

After the completion of the course, the students will be able to:

1. Acquire knowledge regarding the classification, diversity, and life cycles of various groups of algae, including their economic significance.
2. Develop a critical understanding of the morphology, anatomy, reproduction, and life cycles of bryophytes.
3. Gain a critical understanding of the morphology, anatomy, reproduction, and life cycles of pteridophytes.

4. Understand the ecological and economic uses of archegoniate plants.
5. Demonstrate proficiency in employing experimental techniques and methods for the appropriate analysis of algae, bryophytes, and pteridophytes.

#### **Unit – I: Algae**

1. Salient features of algae and Classification by Fritsch (1935) with characteristic features of each class.
2. Range of thallus and reproductive structures in algae.
3. Life cycles of *Chara*, *Oedogonium*, and *Polysiphonia*.
4. Economic importance of algae.

#### **Unit – II: Bryophytes** Salient features of bryophytes and classification by Proskauer (1957).

1. Origin and range of gametophytic structures in Bryophytes.
2. Life cycle of *Marchantia*, *Anthoceros* and *Funaria*.
3. Economic importance of Bryophytes.

#### **Unit- III: Pteridophytes**

1. Salient features of pteridophytes and classification by Smith (1955).
2. Types of stelar structures in Pteridophytes.
3. Life cycle of *Lycopodium* and *Selaginella*.
4. Economic importance of Pteridophytes.

#### **Unit - IV: Practical**

1. Study of vegetative and reproductive parts with the help of temporary preparations of all genera prescribed in Paper BOT-100-T.
2. Dissection, sectioning, drawing, description and identification of the specimens covered in the preparations.
3. Spotting: Includes those specimens not covered in experiments 1 and 2.
4. Field visit to nearby areas to observe different groups of plants prescribed in the theory syllabus.

#### **Suggested Readings:**

1. Bold, H.C. and Wynne, M.J. (1978). Introduction to Algae: Structure and Reproduction. Prentice Hall, New Jersey.
2. Bux, F. and Chisti, Y. (2018). Algae Biotechnology: Products and Processes. Springer, International Publishing, Cham.
3. Geissler, P and Greene, S.W. (1982). Bryophyte Taxonomy: Methods, Practices and Floristic Exploration. J Cramer, Germany.
4. Hait, G., Bhattacharya, K. and Ghosh, A.K. (2011). Textbook of Botany. Volume 1. New Central Book Agency (P) Ltd., New Delhi.
5. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West Press Pvt. Ltd., New Delhi.
6. Lee, R.E. (2008). Phycology. Fourth Edition. Cambridge University Press.

7. Mitra, J.N., Mitra, D. and Chaudhuri, S.K. (2023). Studies in Botany. Volume I. 10<sup>th</sup> Revised Edition. Moulik Library, Kolkata.
8. Pandey, B.P. (2017). Botany for degree students. Biodiversity. S. Chand & Company Ltd., New Delhi.
9. Shaw, A.J. and Goffinet, B. (2000). Bryophyte Biology. Cambridge University Press.
10. Stevenson, R.J., Bothwell, M.L. and Lowe, R.L. (1996). Algal Ecology: Freshwater Benthic Ecosystems. Academic Press, Cambridge.
11. Van den Hoek, C., Mann, D.G. and Jahns, H.M. (1995). Algae. An Introduction to Phycology, Cambridge University Press.
12. Vanderpoorten, A. and Goffinet, B. (2009). Introduction to Bryophytes. Cambridge University Press.
13. Vashishta, P.C., Sinha, A.K., and Kumar, A. (2006). Botany for degree students. Pteridophyta (Vascular Cryptogams). S. Chand & Company Ltd., New Delhi.
14. Vashishta, B.R., Sinha, A.K., and Singh, V.P. (2010). Botany for degree students. Part-I Algae. S. Chand & Company Ltd., New Delhi
15. Vashishta, B.R., Sinha, A.K., and Kumar, A. (2010). Botany for degree students. Part-III Bryophyta. S. Chand & Company Ltd., New Delhi.

**BOT-150: PLANT DIVERSITY–II: GYMNOSPERMS, PALAEOBOTANY,  
ANGIOSPERM MORPHOLOGY AND ANATOMY**

**(Contact Hours: 75, Credits: 4)**

**Course Objectives (Cos):**

This paper provides an overview of the higher groups of plants, focusing on the interrelationships and evolutionary pathways that connect them. By studying this topic, students will develop a comprehensive understanding of how different plant groups are related to each other and how they have evolved over time. Through exploring the interconnections and evolutionary trajectories of higher plant groups, students will gain valuable insights into the diversity and complexity of the plant kingdom, enriching their knowledge of plant biology and evolution.

**Learning Outcomes (LOs):** Upon completion of the course, students will be able to:

1. Develop a critical understanding of the morphology, anatomy, and reproduction of Gymnosperms and Angiosperms.
2. Gain knowledge about the geological history of the Earth and the life forms that existed during prehistoric periods.
3. Comprehend the process of fossil formation and recognize different types of fossils.
4. Understand the fundamental concepts of plant morphogenesis and the development of organs.
5. Analyze the variations in morphology and internal structures among different parts of plants and across various plant groups, supporting the concept of evolution.
6. Demonstrate proficiency in utilizing experimental techniques and methods for the appropriate analysis of Gymnosperms.

7. Master the techniques for preparing double-stained specimens and studying anomalous growth in angiosperms.

### **Unit-I:Gymnosperms and Paleobotany**

1. Salient features and classification of gymnosperms by Coulter and Chamberlain (1910).
2. Phylogenetic relationship and affinities of gymnosperms.
3. Life cycle of *Cycas*, *Pinus*, and *Gnetum*.
4. Economic importance of gymnosperms.
5. Geological time scale; Fossil formation and plant fossil types.

### **Unit-II: Angiosperm Morphology**

1. Leaf morphology: Phyllotaxy and venation.
2. Types of stipules, bracts and inflorescence.
3. Floral morphology: Forms of calyx, corolla, and their aestivation.
4. Types of stamens and carpels.
5. Types of fruits, ovule forms, and placentation.
6. Types of seeds: albuminous and exalbuminous

### **Unit- III: Plant Anatomy**

1. Organization of apical meristem.
2. Types of stomata in angiosperms.
3. Components of xylem and phloem with their functions.
4. Concept of primary and secondary growth; Secondary growth in stem and root of dicots.
5. Anomalous secondary growth in *Bignonia* and *Dracaena*.
6. Root-stem transition.

### **Unit - IV: Practical**

1. Study of vegetative and reproductive structures of all prescribed gymnosperms by preparing temporary stained slides (dissection, sectioning, drawing, description, and identification up to genus).
2. Study of fossils through slides or specimens.
3. Sectioning and observation of placentation types, ovule structure, and anther through temporary preparations.
4. Study of permanent slide preparation by double staining techniques (Safranin and Haematoxylin or Safranin and fast green).
5. Anatomical studies of anomalous secondary structures of *Bignonia* and *Dracaena* by temporary double staining techniques (Safranin and Haematoxylin or Safranin and fast green).
6. Spotting: Includes those groups and sections not covered in the preparations.

### **Suggested Readings:**

1. Beck, B. (1988). Origin and Evolution of Gymnosperms. Columbia University Press.
2. Bhatnagar, A. K. and Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi.
3. Bhattacharya, K., Hait, G. and Ghosh, A.K. (2015). A Textbook of Botany. Volume II. New Central Book Agency (P) Ltd., New Delhi.

4. Bhojwani, S.S. and Bhatnagar, S.P. (2000). The Embryology of Angiosperms. Vikas Publishing House.
5. Crang, R., Lyons-Sobaski, S., and Wise, R. (2018). Plant anatomy: A concept-based approach to the structure of seed plants. Springer.
6. Dickison, W.C. (2000). Integrative Plant Anatomy. Harcourt Academic Press, USA.
7. Evert, R.F. (2006). Esau's Plant Anatomy: Meristems, Cells, and Tissues of the Plant Body: Their Structure, Function, and Development. John Wiley and Sons, Inc.
8. Fahn, A. (1990). Plant Anatomy. Pergamon Press.
9. Mauseth, J.D. (1988). Plant Anatomy. The Benjamin/Cummings Publisher, USA.
10. Mishra, S. R. (2010). Textbook of Palaeobotany. Discovery Publishing House Pvt Ltd.
11. Mitra, J.N., Mitra, D. and Chaudhuri, S.K. (2023). Studies in Botany. Volume I. 10th Revised Edition. Moulik Library, Kolkata.
12. Pandey, B.P. (2017) A Textbook of Botany: Angiosperms. S. Chand & Company Pvt Ltd.

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## 7. CHEMISTRY

### **Preface**

The FYUG syllabus for Chemistry has been framed as per NEP-2020 guidelines. This undergraduate course in Chemistry has been addressed to the students enrolled for 3-year UG Major and Multidisciplinary program, 4-year UG Honours, and Honours with the Research program of the University at the beginning of their careers. This course aims to disseminate knowledge in the field of academic, research, and professional development of students. The course in Chemistry has been divided into three sections, one each in Inorganic, Organic, and Physical Chemistry. The course on Inorganic Chemistry covers the basic understanding of atomic models, periodic properties of elements, and chemical bonding. A unit has been devoted to elementary knowledge of the nucleus and nuclear reactions. The course also covers theoretical and practical aspects of qualitative and quantitative analysis. A large part of Organic Chemistry is concerned with reactions leading to the formation and breaking of carbon-carbon bonds and the synthesis of various organic compounds including natural products. It also aims to impart knowledge to the students on the various oxidation and reduction methods for the modification of functional groups. Emphasis has been given to learning the scope and limitations of the reactions and the effect of structure on reactivity and selectivity. The course on Physical Chemistry includes the determination of structure and the geometrical arrangement of atoms in solids, the liquefaction of gases, and a quantitative relation between the heat capacities of a substance at constant pressure and constant volume. It aims to introduce the students to thermodynamic parameters and state functions and develop the basic concepts of thermodynamics and the direction of spontaneous change. The course also covers some elementary ideas on the kinetics of the reaction and the feasibility of a given reaction.

### **Programme Outcomes**

At the end of the programme, the students are expected to have sound knowledge of fundamental concepts of inorganic, organic, and physical chemistry. The acquired hands-on training will enable the students to analyze and identify various ions and functional groups.

## CHE-100: INTRODUCTORY CHEMISTRY – I

(Contact Hours: 75, Credits: 4)

**Objective:** *The main objective of this course is to demonstrate scientific understanding of the structure of matter and its physical and chemical transformations so that students will be able to apply appropriate theories to predict chemical structure, reactivity, and physical properties. It would also provide students with hands-on training in qualitative analysis of various inorganic ions.*

**Learning outcomes:** *The contents assignments and assessments of this course are aligned to understand the fundamental concepts of chemistry in all three branches viz. inorganic, organic, and physical chemistry. Also, they will learn inorganic qualitative analysis to identify the acidic and basic radicals present in inorganic salts.*

### PART-A (Theory)

**Unit I: Inorganic Chemistry-I**      **Marks: 7 (Internal); 18 (End Sem.)**      **15 hours**

**(a) Structure of Atom:** Bohr's Atomic model and its limitations, De- Broglie's matter waves, Heisenberg's Uncertainty principle, Schrodinger's wave equation and its importance, Physical concepts of  $\Psi$  and  $\Psi^2$ , Quantum numbers, Shapes of s, p and d orbitals, Principles of electronic configuration: Hund's Rule, Pauli's exclusion Principle, and Aufbau principle, Screening effect and effective nuclear charge.

(6 marks, 5 hours)

**(b) Chemical periodicity:** Long form of periodic table, Modern periodic law, Types of elements on the basis of electronic configuration, Periodic variation in properties: atomic and ionic radii, ionization enthalpy, electron gain enthalpy and electronegativity, Diagonal relationships.

(5 marks, 4 hours)

**(c) Chemical Bonding :** Valence shell electron pair repulsion (VSEPR) theory and shapes of molecules and ions:-  $\text{BeF}_2$ ,  $\text{CO}_2$ ,  $\text{BF}_3$ ,  $\text{BO}_3^{3-}$ ,  $\text{O}_3$ ,  $\text{H}_3\text{O}^+$ ,  $\text{NH}_3$ ,  $\text{H}_2\text{O}$ ,  $\text{PCl}_3$ ,  $\text{PCl}_5$ ,  $\text{SF}_4$ ,  $\text{SF}_6$ , Basic idea of valence bond theory and its limitations, Concept of hybridization of orbitals and its implications on bond length, bond energy, bond angles and shapes of molecules with following examples:  $\text{BeF}_2$ ,  $\text{BF}_3$ ,  $\text{AlCl}_3$ ,  $\text{H}_3\text{O}^+$ ,  $\text{NH}_3$ ,  $\text{H}_2\text{O}$ ,  $\text{PCl}_3$ ,  $\text{PCl}_5$ ,  $\text{SF}_4$ ,  $\text{SF}_6$ ,  $\text{ClF}_3$ ,  $\text{I}_3^-$ , LCAO-MO theory and its application to homonuclear diatomic molecules ( $\text{H}_2$ ,  $\text{Be}_2$ ,  $\text{N}_2$ ,  $\text{N}_2^+$ ,  $\text{N}_2^{2+}$ ,  $\text{N}_2^-$ ,  $\text{N}_2^{2-}$ ,  $\text{O}_2$ ,  $\text{O}_2^-$ ,  $\text{O}_2^{2-}$ ,  $\text{O}_2^+$ ,  $\text{O}_2^{2+}$ ), Polarity of covalent bonds and dipole moment, Polarizing power, Polarizability

of ions and Fajan's rule, Concept of lattice energy and Born-Haber cycle (NaCl).

*(8 marks, 6 hours)*

**Unit II: Organic Chemistry-I      Marks: 6 (Internal); 19 (End Sem.)      15 hours**

**(a) Nomenclature, Structure, Bonding, and Properties:** Nomenclature of organic molecules (hydrocarbons, halogen compounds, aldehydes, ketones, alcohols, ethers, amines, carboxylic acids, esters, amides and nitro compounds). Hybridisation and its implications on the bond length, bond energy, bond angles, shape of the molecules with following examples: (i)  $\text{CH}_4$ ,  $\text{CH}_3^-$ ,  $\text{RNH}_2$  (ii)  $\text{C}_2\text{H}_4$ ,  $\text{CH}_3^+$ , carbonyl compounds ( $\text{C}=\text{O}$ ) and (iii)  $\text{C}_2\text{H}_2$ ,  $\text{R}-\text{C}\equiv\text{N}$ , ketene. Nature of covalent bond and its orbital representation in molecules listed above, Electronegativity, Inductive effect, Effect of H-bonding on boiling point and solubility of organic compounds, Conjugation, Resonance, Hyperconjugation (propene and toluene), Heterolytic and homolytic bond cleavage, Electrophiles and nucleophiles, Reactive intermediates: carbocations, carbanions and free radicals.

*(8 marks, 6 hours)*

**(b) Alkanes and Cycloalkanes:** Methods of preparation of alkanes (with special reference to mechanism of Kolbe, Würtz, Würtz-Fittig and Corey-House reactions), Chemical reactivity (oxidation and cracking). Mechanism of chlorination, Relative reactivity of halogens towards different types of alkanes. General methods of preparation of cycloalkanes (up to cyclohexane) and their reactions with halogens and HX, Baeyer's strain theory – modifications and its limitations.

*(5 marks, 4 hours)*

**(c) Alkenes and Alkynes:** Synthesis and reactivity of alkenes, Markownikoff's rule and anti-Markownikoff's rule, Mechanism of hydrogenation, bromination, hydration, halohydrate, hydroboration, oxidation, epoxidation, ozonolysis, hydroxylation and polymerization, Comparative acidity of ethane, ethane and ethyne, Synthesis and reactivity of alkynes: electrophilic addition reactions (halogenation, hydration, HX and HOX), ozonolysis; alkynides (Na, Cu and Ag) and polymerization.

*(6 marks, 5 hours)*

**Unit III: Physical Chemistry-I      Marks: 6 (Internal); 19 (End Sem.)      15 hours**

**(a) States of Matter**

**(i) Gaseous State-I:** Postulates of kinetic theory of gases, Collisions and gas pressure, Average kinetic energy, Root mean square velocity and absolute temperature of gas, Boltzmann constant, Gas laws and kinetic theory, Liquefaction of  $\text{CO}_2$  gas, Real gases - deviation from ideality,

Compressibility factor and its variation with pressure and temperature for different gases, and van der Waals equation of state.

(7 marks, 6 hours)

**(ii) Liquid State-I:** Qualitative description of the structure of liquids, Physical properties of liquids: vapour pressure, Surface tension, Viscosity, Refractive index (definitions and descriptions). Effect of additive (sodium chloride and ethanol) on surface tension and viscosity of liquid.

(4 marks, 3 hours)

**(iii) Solid State-I:** Elementary discussion on the types of unit cells, Crystal systems, Crystal defects, Bragg's law.

(3 marks, 2 hours)

**(b) Chemical Kinetics-I:** Rate of reaction and rate constant, Molecularity and order of a reaction, Zero order reaction, Differential and integrated forms of rate equations of first and second order reactions, Pseudo-first order reactions, Determination of order of reactions, Effect of temperature on reaction rates and energy of activation, Effect of catalyst.

(5 marks, 4 hours)

## PART-B (Practical)

Unit IV: Inorganic Laboratory-I

Marks: 6 (Internal); 19 (End Sem.)

30 hours

**Experiment:** Qualitative analysis of inorganic mixtures containing at least five radicals/ions (from the list given below) to be completed - one of the radicals/ions must be interfering (borate, chromate or phosphate).

List of ions/radicals:

Cations:  $\text{Pb}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Bi}^{3+}$ ,  $\text{As}^{3+}$ ,  $\text{Sb}^{3+}$ ,  $\text{Sn}^{2+}$ ,  $\text{Sn}^{4+}$ ,  $\text{Fe}^{2+}$ ,  $\text{Fe}^{3+}$ ,  $\text{Al}^{3+}$ ,  $\text{Ba}^{2+}$ ,  $\text{Cr}^{3+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Mn}^{2+}$ ,  $\text{Co}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{K}^+$ ,  $\text{NH}_4^+$ .

Anions:  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{NO}_3^-$ ,  $\text{BO}_3^{3-}$ ,  $\text{PO}_4^{3-}$ ,  $\text{CrO}_4^{2-}$ .

Interfering radicals/ions: borate, chromate, phosphate.

<b>End-semester External Evaluation Distribution (Duration: 6 hours)</b>		
1	Qualitative Analysis	12 Marks
2	Viva voce	5 Marks
3	Laboratory record	2 Marks
<b>In-semester Internal Evaluation Distribution</b>		
1	Laboratory attendance and performance	2 Marks
2	Test and Viva voce	4 Marks

**Suggested books:**

1. Concise Inorganic Chemistry, J. D. Lee, 5<sup>th</sup> Ed., Wiley India, New Delhi (2014).
2. General and Inorganic Chemistry (Part-I), R. Sarkar, 3<sup>rd</sup> Revised Ed., New Central Book Agency, India (2011).
3. Vogel's Qualitative Inorganic Analysis, G. Svehla, 6<sup>th</sup> Revised Ed., Orient Longman, London (1987).
4. Modern Organic Chemistry, M. K. Jain and S. P. Sharma, Vishal Publishing Co., Jalandhar (2020).
5. Organic Chemistry, J. Clayden, N. Greeves, S. Warren and P. Wothers, Oxford University Press, London (2012).
6. Principles of Physical Chemistry, B. R. Puri, L. R. Sharma and M. S. Pathania, Vishal Publication Co., Jalandhar (2020).
7. Physical Chemistry, P. W. Atkins and De-Paula Atkins, 7<sup>th</sup> Ed, Oxford University Press, London (2006).
8. University Chemistry Practical, P. C. Kamboj, Vishal Publishing Co., Jalandhar (2009-2010).

**Notes:**

(i) A candidate must obtain minimum pass marks (which will include both the internal and end-semester marks) stipulated by the University separately both in the theory (Part A) and practical components (Part B) to clear the course.

(ii) The marks allotted to each component of different units should be strictly adhered to in making the question paper.

## CHE-150: INTRODUCTORY CHEMISTRY – II

(Contact Hours: 75, Credits: 4)

***Objective:** The primary objective of this course is to provide a broad foundation in chemistry that stresses scientific understanding and reasoning along with problem solving aptitude. It would also provide the students with the skills required to analyze and comprehend the chemical composition of organic compounds.*

***Learning outcomes:** Upon successful completion of this course, the students will have an understanding in the principles and applications of various theories in inorganic, organic, and physical chemistries. Also, they will learn the techniques to identify the functional groups and analyze the organic samples to know their properties.*

### PART-A (Theory)

**Unit I: Inorganic Chemistry-II      Marks: 6 (Internal); 19 (End Sem.)      15 hours**

**(a) Nucleus and Radioactivity-I:** Nuclear particles (neutrons and protons) and concept of mesons and pions, Mass defect and nuclear binding energy (including numerical), Packing fraction, Natural and artificial radioactivity, Radioactive disintegration series, First order rate equation of radioactive disintegration, Half-life and average life period, Group displacement law, Neutron-proton ratio and its implications, Elementary concepts of fusion and fission.

*(5 marks, 4 hours)*

**(b) Redox reactions:** Electronic concepts of oxidation and reduction, Oxidation number, Common oxidants and reductants, Calculation of equivalent weights of oxidants and reductants, Balancing of redox reactions by ion electron method. *(4 marks, 3 hours)*

**(c) Principles of qualitative and quantitative analysis:** Solubility product and its application in group separation of cations, Standard solutions: primary and secondary solutions, Concentrations of standard solutions: molarity, molality and normality, Volumetric analysis: redox titrations

(permanganometry, dichromometry and sodium thiosulphate with iodide), iodometric and iodimetric titrations. (5 marks, 4 hours)

**(d) Acid-base Concept:** Arrhenius and Bronsted-Lowry concept, Lewis concept, Solvent system (Franklin) concept and its limitation, Effect of solvent in relative strengths of acids and bases, Levelling and differentiating effect, Relative strengths of acids and bases (pKa and pH concept), HSAB principle.

(5 marks, 4 hours)

**Unit II: Organic Chemistry-II      Marks: 7 (Internal); 18 (End Sem.)      15 hours**

**(a) Organic Stereochemistry-I:** Concept of isomerism, Types of isomerism, Configurational and conformational isomerism (ethane and butane), Fischer, Newman and Sawhorse projections with suitable examples, Geometrical isomerism, Configuration of geometrical isomers, E and Z nomenclature (including oximes), Optical isomerism: optical activity, chiral carbon atom, enantiomers, diastereomers, R/S nomenclature (with one chiral carbon atom only)

(6 marks, 5 hours)

**(b) Aromatic Hydrocarbons and Aromaticity:** Molecular orbital picture of benzene, Resonance energy, Aromaticity, Hückel's (4n+2) rule and its application to simple molecules and ions, Electrophilic substitution reactions in aromatic hydrocarbons and general pattern of the mechanism, Effect of substituent groups (activating and deactivating groups, directive influence): mechanism of nitration, sulphonation, halogenation (nuclear and side-chain), formylation (Gattermann and Gattermann – Koch), Friedel – Craft's alkylation and acylation.

(5 marks, 4 hours)

**(c) Nucleophilic Substitution Reactions:** Nucleophile, Ambident nucleophile (KCN, AgCN, KNO<sub>2</sub>, AgNO<sub>2</sub>), Difference between nucleophiles and bases, S<sub>N</sub><sup>1</sup>, S<sub>N</sub><sup>2</sup>, NGP, S<sub>N</sub><sup>i</sup>, Factors affecting substitution reactions (structure of substrate, nature of nucleophile, solvent and role of leaving group), Mechanism and stereochemistry of substitution reactions.

(5 marks, 4 hours)

**(d) Elimination reactions:** E<sup>1</sup>, E<sup>2</sup>, E<sup>1</sup>cB mechanism, Orientation in elimination reactions (Saytzeff's and Hoffmann rules). (3 marks, 2 hours)

**Unit III: Physical Chemistry-II      Marks: 6 (Internal); 19 (End Sem.)      15 hours**

**(a) Thermodynamics-I:** Concept of system and surrounding, types of systems, Intensive and extensive properties, Types of processes: isothermal, adiabatic, isobaric, reversible, irreversible and cyclic processes; Thermodynamic functions: state variables and exact differentials, Path functions and inexact differentials, Zeroth law of thermodynamics, Reversibility and maximum work in ideal gas expansion. First law of thermodynamics: Statement, internal energy, enthalpy,

Heat capacity at constant pressure ( $C_p$ ) and volume ( $C_v$ ), Concept of heat, Relation between  $C_p$  and  $C_v$ , Spontaneous processes, Entropy, Second law of thermodynamics, Joule-Thomson coefficient and inversion temperature. (10 marks, 8 hours)

(b) **Thermochemistry:** Exothermic and endothermic reactions, Hess's law of constant heat summation, Enthalpy of formation, Standard state, Enthalpy of combustion, Enthalpy of neutralization, Enthalpy of solution, Enthalpy of dilution, Kirchhoff's equations: influence of temperature on  $\Delta H$  and  $\Delta U$  of a reaction. (5 marks, 4 hours)

(c) **Adsorption and Surface Phenomena:** Physisorption and chemisorption, Adsorption isotherms: derivation and application of Gibbs and Langmuir adsorption isotherm. (4 marks, 3 hours)

### PART-B (Practical)

**Unit IV: Organic Laboratory-I**                      **Marks: 6 (Internal); 19 (End Sem.)**                      **30 hours**

**Experiment:** Systematic qualitative analysis of organic compounds containing one functional group.

- Detection of elements (N, Cl, Br and I)
- Determination of one of the following functional groups present in a single organic compound (with systematic reporting)  
-COOH, -OH (phenolic), -CHO,  $>C=O$ , -NH<sub>2</sub> and -NO<sub>2</sub>
- Preparation of the derivative.

<b>End-semester External Evaluation Distribution (Duration: 6 hours)</b>		
1	Qualitative Analysis	12 Marks
2	Viva voce	5 Marks
3	Laboratory record	2 Marks
<b>In-semester Internal Evaluation Distribution</b>		
1	Laboratory attendance and performance	2 Marks
2	Test and Viva voce	4 Marks

### Suggested Books:

- Inorganic Chemistry, R. L. Dutta, 3<sup>rd</sup> Ed., The New Book Stall, India (1973).



2. Principles of Inorganic Chemistry, B. R. Puri, L.R. Sharma and K.C. Kalia, 33<sup>rd</sup> Ed., Vishal Publishing Co. (2019-20).
3. Organic Chemistry, S. N. Mukherjee, S. P. Singh and R. P. Kapoor, Vol I (2017), II (2018) & III (2018), New Age Publishers, India.
4. Basic Stereochemistry of organic molecules, S. Sengupta, 2<sup>nd</sup> Ed., Oxford University Press, London (2018).
5. Physical Chemistry, P. C. Rakshit (revised by S. C. Rakshit), 6<sup>th</sup> Ed., Sarat Book House, Kolkata (2014).
6. A Textbook of Physical Chemistry, Vol 1 & 2, K. L Kapoor, 4<sup>th</sup> Ed. Macmillan Publishers India Ltd. (2011).
7. Vogels Textbook of Practical Organic Chemistry, B. S. Furniss, A. J. Hanaford, P. W. G. Smith and A. R. Tatchell, 5<sup>th</sup> Ed., John Wiley, New York (1989).

**Notes:**

- (i) A candidate must obtain minimum pass marks (which will include both the internal and end-semester marks) stipulated by the University **separately** both in the theory (Part A) and practical components (Part B) to clear the course.
- (ii) The marks allotted to each component of different units should be strictly adhered to in making the question paper.

## 8. CLINICAL NUTRITION AND DIETETICS

**Programme in Clinical Nutrition and Dietetics:** The under graduate programme in Clinical Nutrition and Dietetics aims to inculcate knowledge in the field of nutrition and dietetics. A student will learn in-depth about the physiological changes and nutrition during each stage of the life cycle, therapeutic nutrition, community nutrition, the science of food, food service management and recent advances and developments in the field of nutrition.

### **Programme Outcome**

On completion of the BSc Clinical Nutrition & Dietetics Programme the graduate will be able to:

PO1: Acquire knowledge in nutrition and health.

PO2: Understand the nutritional problems and how to combat malnutrition.

PO3: To develop understanding in various physiological changes during the life cycle.

PO4: To apply the knowledge of nutrition and dietetics for prevention and management of diet related diseases.

PO5: To understand the concept of community nutrition and how various national and international agencies contribute to the upliftment of women and children.

PO6: Understand the role of macro and micro nutrients in human nutrition.

PO7: To understand commercial and non-commercial food service management and its application.

PO8: To acquire knowledge of human metabolism and biochemistry with special reference to energy and nutrients requirement.

PO9: To gain expertise in diet planning in health and disease.

PO10: To understand the science and microbial spoilage of different food groups.

### **CND-100: BASIC NUTRITION**

**(Contact Hours: 60, Credits: 4)**

**Course Objective (COs):** To learn, gain knowledge and understanding of foods, nutrients, their recommended allowances, health and the relationship between health and nutrition as well as the cooking methods adopted and its impact on health.

### **Learning Outcome (LOs):**

1. Students will understand the different functions of food and sources of nutrients

2. Students will learn the cooking method and effect of different methods on food and nutrients.
3. Students will understand the recommended dietary allowances (RDA) of nutrients,
4. Students will gain understanding on health and the relationship between health and nutrition.

### **UNIT –I: Introduction to Nutrition**

Definition and types of Nutrition (adequate, optimum and malnutrition) functions of foods. Food as a source of nutrients, food as a source of energy, unit of energy, energy value of food.

### **UNIT- II: Health**

Definition (physical, mental, social and reproductive). Inter-relationship between nutrition and health; visible symptoms of good health. Food guide: Basic food groups, how to use food guide, Balanced diet: Basic principles of meal planning- objectives – steps in meal planning.

### **UNIT- III: Macro-nutrients**

Carbohydrates: Classification, composition, functions, sources, recommended Daily Allowances (RDA) and deficiencies. Protein: Classification, composition, functions, sources, Recommended Daily Allowances (RDA) and deficiencies. Fats: Classification, composition, functions, sources, Recommended Daily Allowances (RDA) and deficiencies.

### **UNIT- IV: Methods of Food preparation and its Impact on Nutrients**

Principle of cooking, cooking methods (dry heat method, moist heat method, conventional method); Nutrient enhancing methods, advantages and disadvantages of cooking methods, effect of cooking methods on nutrients

### **Suggested Readings:**

1. Agarwal. Anjana, Udipi. A. Shobha. (2014). Textbook of Human Nutrition, 1<sup>st</sup> edition.
2. Chadha, R. (2015). Nutrition: A Life Cycle Approach, Orient Black swan Publication.
3. Katz. L. David, Friedman. S. C. Racheal, Lucan. C. Sean. Nutrition in clinical Practice, 3rd Edition. Walters Kluwer Publication.
4. Mahan, L. K. & Raymond J.L. (2003), Krause’s Food & the Nutrition Case Process, 9<sup>th</sup> edition, and 12<sup>th</sup> edition, Elsevier.
5. Medeiros. M. Denis and Wildman. E. C. Robert. (2000). Advance Human Nutrition, 4th Edition, Jones and Bartlett Publishers, Inc.
6. Sharma, A. (2020). Principles of Therapeutics Nutrition & Dietetics, 1<sup>st</sup> Edition, CBS Publishers and distributor.
7. Shrilakshmi. B. (2021). B. Dietetics, 8<sup>th</sup> Edition, New Age International Reprint
8. Srilakshmi. B. (2010). Nutrition Science, 8<sup>th</sup> Edition, New Age International reprint.
9. William, S. R. (2017). Basic Nutrition and Diet Therapy, Staci Nix, 15<sup>th</sup> Edition, Elsevier Publication.

## **CND-150: HUMAN PHYSIOLOGY**

**(Contact Hours: 60, Credits: 4)**

**Course Objective (COs):** To learn and gain knowledge and understanding of the structure, function and role of different organs and secretions of the human body.

### **Learning Outcome (LOs)**

1. Students will understand the structure and functions of different organs of the human body.
2. Students will learn the role and mechanism of different secretions in various organ system, Example (Lymphatic system, digestive system, menstruation, urine formation, Blood etc.)
3. Students will gain knowledge on different enzymes and hormones along with their mode of action.

### **Unit I: Circulatory and Respiratory Systems:**

Blood and blood circulation: blood composition, function, clotting; blood groups. Blood vessels: artery, vein, capillary, structure of the heart, cardiac cycle; Lymphatic: Lymph nodes and lymph, pulse.

Respiratory System: Organs of respiration- Structure and functions. Mechanism of respiration.

### **Unit II: Digestive, Excretory and Cutaneous System:**

Digestive System: Organs, Structure and functions, role of digestive juice. Mechanism of digestion.

Excretory System: Organs, structure and function of the Kidney, Formation of urine.

Skin: Structure and functions.

### **Unit III: Nervous System, Muscle Contraction and Vision:**

Nervous system: structure of the nerve cell, nerve fiber, classification of nervous system. Brief account of nerve impulse. Transmission of nerve impulse- reflex action, voluntary action. Meninges and Cerebral spinal fluid.

Muscle contraction; Eye: Structure and function.

### **UNIT IV: Endocrine and Reproductive Systems:**

Endocrine system: structure and functions, hormones-modes of action. Disorder of over and under secretions. Role of hypothalamus; pituitary, thyroid, pancreas and adrenal glands, prostaglandins.

Reproductive system: structure and function of reproductive organs, brief idea of menstruation, puberty and menopause.

**Suggested Readings:**

1. Agarwal, R.A. 1997. Animal Physiology and Biochemistry, Revised Edition, New Delhi Cambridge University Press.
2. Arora, Mohan P. 2003. Animal Physiology, Himalaya Publishers, Mumbai.
3. Bhaskar, Harsh Vardhan. 2008. Animal Physiology, New Delhi Campus books. ISBN8180300854 Books.
4. Craton Grey and Adams Neil (2012). The Human Body (A family reference guide), Paragon queen street house 1<sup>st</sup> Publish by Paragon.
5. Goel, K.A.1999. Animal Physiology, Meerut Rastogi Publications: ISBN:8171334539Books.
6. Moyes Christopher D. 2006. Principles of Animal Physiology, New Delhi Dorling Kindersley.
7. SK, S Prema, 2010. Essential of Medical Physiology, 5<sup>th</sup> edition, J P Publisher.
8. Waugh, A. & Grant, A. (2012) Ross & Wilson: Anatomy and Physiology, 14<sup>th</sup> Edition, Elsevier.

## 9. COMMERCE

### COM-100: ACCOUNTING FOR BUSINESS

(Contact Hours: 60, Credits: 4)

**Course Objective:** To provide general exposure to the students of the various components of business environment in Indian context.

**Learning Outcome:** Students will be able to:

- a. Understand the basic concepts of Accountancy.
- b. Understand the system of preparing financial statements of sole traders, partnership firms, Hire Purchase, Royalty and consignment accounts.

#### UNIT -I

Introduction to Financial Accounting: Meaning, Definition and scope of Accounting – Objectives of Accounting – Functions of Accounting – Branches of Accounting – Accounting Principles, Accounting Standards: Meaning and Objectives, IND AS and IFRS  
Final accounts of Sole Trading Concern: Financial statements – Preparation of Trading and Profit and loss account and Balance sheet with adjustments.

#### UNIT- II

Single Entry: Meaning, Features, Merits and Demerits. Types of Single Entry System. Difference between Single Entry System and Double Entry System. Ascertainment of profit/loss under single entry.  
Consignment Accounts: Meaning, Consignor, Consignee, Goods consigned at Cost price and Invoice price, Account Sales. Commission: Types of Commission. Normal and Abnormal loss. Valuation of Stock, Creation of Stock Reserve Account. Problems on Consignment both Cost Price and Invoice Price.

#### UNIT -III

Partnership Accounts –Nature and types of Partnership including salient feature of Partnership Act 2008. Admission of Partner, Retirement and Death of Partner.  
Dissolution of Partnership firm (Garner Versus Murray)

#### UNIT -IV

Accounting for Hire Purchase System: Meaning – Features of Hire purchase system. Differences between hire purchase and installment system. Calculation of interest. Ascertainment of cash price of an asset. Problems on hire purchase system (excluding repossession of assets)  
Royalty Accounts: Meaning and Definition. Terms used: Royalty, Minimum rent, Short workings, surplus royalty, recoupment of short workings.  
Stoppage of work due to abnormal causes. Problems on royalty including minimum rent account.

### **Suggested Readings (Latest Edition)**

- S.P. Jain and K.L. Narang, Advanced Accountancy Vol 1 Kalyani publication
- M. Hanif and A.Mukherjee, Financial Accounting, McGraw Hill Publications
- M.C. Sukhla, T.S. Grewal and S.C. Gupta, Advanced accountancy, Sultan Chand and Co.
- S. Kr. Paul, Advanced Accountancy Vol I, World Press, Kolkata
- R.N. Anthony and J.S. Reece, Accounting Principles, Richard Irwin Inc
- Compendium of Statement and Standards of Accounting: The Institute of Chartered Accountants of India, New Delhi

## **COM-150: PRINCIPLES OF MANAGEMENT**

**(Contact Hours: 60, Credits: 4)**

**Course Objective:** To acquaint the students with the basic process and principles of management and to make them aware of the important management functions and practices.

**Learning outcome:** Students will:

- a. Be familiarize with extant management concepts, theories and practices
- b. Develop a theoretical and applied understanding of managing organizations.

### **Unit – I: Introduction**

Meaning, characteristics and significance of Management

Functions of Management

Theory base of Management – Classical (Taylor and Fayol); Neo Classical (Mayo and Barnard); Modern (Systems and Contingency theory); Contemporary (Drucker and Porter)

### **Unit – II: Planning and Organizing**

Planning – Meaning and characteristics; Planning premises and planning process; Need for planning; Barriers to effective planning; Decision making in planning

Organizing – Meaning, characteristics and significance; Principles of organising; Formal and Informal organization; Organizational structure and types (Departmentation, Project, Matrix and Network); Delegation v/s Decentralization

### **Unit – III: Staffing and Directing**

Staffing – Meaning, characteristics and significance; Factors affecting staffing decisions

Directing – Meaning, characteristics and significance; Motivation concept and theories (Maslow, Herzberg and McGregor); Leadership concept and styles (Likert and Blake & Mouton); Communication concept, types, process, barriers and remedies

#### **Unit – IV: Controlling**

Controlling – Meaning, characteristics and significance; Process of Controlling; Traditional techniques (Financial statements, Budgetary control and Break even analysis) and Modern techniques (Management Audit, PERT & CPM and MIS); Planning and Controlling linkage

#### **Suggested Readings (latest editions)**

- Bose, Chandra, Principles of Management and Administration, PHI, New Delhi.
- Chandan, JS, Management Concepts and Strategies, Vikas, New Delhi.
- Drucker, Peter, The Practice of Management, Allied Publishers, New Delhi.
- Koontz & O'Donnell, Principles of Management, Tata McGraw Hill, New Delhi.
- Prasad & Gulshan, Principles & Practice of Management, Sultan Chand & Sons, New Delhi
- Robbins, Organizational Behavior, PHI, New Delhi.
- Mahajan & Mahajan, Management Principles and applications. Vikas Publications
- Gupta & Sharma, Principles and Practice of Management, Kalyani Publications



## 10. COMPUTER APPLICATION

### Preface

Bachelor of Computer Application (BCA) is an undergraduate degree program that focuses on computer applications and information technology. The BCA curriculum is designed to provide students with a strong foundation in computer science and its applications. The programme covers different courses such as programming languages, database management, algorithms, data structures, computer networks, software engineering, web development, mathematics/statistics etc. The programme includes practical training in the form of internships or projects. This practical exposure helps students gain hands-on experience and apply the theoretical knowledge they have acquired.

After completing the BCA course, graduates can explore various career opportunities. They can work as software developers, web developers, database administrators, system analysts, IT consultants, network administrators, and more. BCA graduates are in demand in industries such as IT companies, software development firms, e-commerce companies, banking and finance, healthcare, and government organizations.

### Program Outcome (POs):

#### The expected outcome of the programme are-

1. Students will be able to understand the fundamental concepts of Computer Science (applications) and programming.
2. Students will be able to create and implement effective algorithms and data structures.
3. Students will be able to develop software applications using different programming languages like C, java, C++, and Python.
4. Students will be able to write code that is easily maintainable, reusable, and extensible.
5. Students will be able to understand and apply various software development methodologies.
6. Students will be able to identify and apply appropriate software testing techniques and tools to improve performance and reliability.
7. Students will be able to develop mobile applications, web applications using HTML, CSS, JavaScript, and databases.

8. Students will be able to understand and utilize various software development tools and technologies like Integrated Development Environments (IDEs) and version control systems (VCS) like Git etc.

9. Students will be able to stay updated with the latest trends and advancements in the IT industry and continuously improve skills and knowledge through self-learning.

## **BCA-100: PROBLEM SOLVING AND PROGRAMMING IN C**

**(Contact Hours: 75, Credits: 4)**

### **Course Objectives (COs):**

The objective of the course is to introduce the fundamentals of C programming language and develop the skills for solving problems using this language.

### **Learning Outcome (LOs):**

After completion of this course, a student will be able to

- Understand Problem solving techniques through flowcharts and algorithm along with IDE and Compilers for C.
- Step-by-step analyses and develop a program to solve real world problems. Understand and Apply Variable, Conditional Statements, Loops, Functions, pointers, structures in C.

### **Outline of the Paper**

<b>UNIT</b>	<b>Topic</b>	<b>Hours</b>	<b>External Marks</b>	<b>Internal Marks</b>
<b>I</b>	C Basic Concepts	15	18	19
<b>II</b>	Functions, Arrays	15	19	
<b>III</b>	Pointers, Structure and Union	15	19	
<b>IV</b>	Practical	30	19	6
<b>Total</b>		<b>75</b>	<b>75</b>	<b>25</b>

**UNIT-I: C Basic Concepts (Theory)****15 Hours**

C Fundamentals: Algorithms, Flow charts, Development of algorithms, The C character set, identifiers and keywords, Data types, constants, variables and arrays, declarations, symbolic constants, Operators (Arithmetic, unary, relational, logical, bitwise, assignment, conditional operator)

I/O functions: Header files (Stdio.h, Conio.h) getch(), getche(), getchar(), putch(), putchar(), scanf(), printf(), gets(), puts(), clrscr()

Control statements: Decision making and branching (if..else, switch); looping (while, do .. while, for), Jumping (break, continue, goto), Nested loops.

**UNIT-II: Functions, Arrays (Theory)****15 Hours**

*Functions*: Overview (definition, declaration), defining and accessing a function, function prototypes, call by value, call by reference, recursion, Advantages and disadvantages of recursion over iteration, Storage classes (Automatic, Register, External, Static), String functions (strcmp (), strlen (), strrev (), strcat (), strcpy(), toupper (), tolower ()), Math functions (sqrt (), abs (), sin (), cos ()), Standard function- exit ().

*Arrays (1D and 2D)*: Declaration of array, accessing elements of the array, Array for inter function communication (1D and 2D), passing elements to (function, data values, address, array), processing an array, passing array to a function, arrays and strings, searching for a value in an array (Linear search, Binary search).

**UNIT-III: Pointers, Structure and Union (Theory)****15 Hours**

*Pointers*: Pointer declarations, passing pointer to a function, arrays of pointers, pointer and 1D and 2D arrays, function pointers (calling a function using a function pointer, passing functions to other functions, pointer to function, functions returning pointers), Memory allocation in C, dynamic memory allocation.

*Structure and Unions*: Defining a structure, processing a structure, users defined data types, structure and arrays, structures and pointers, passing structures to a function, self-referential structures, bit fields in structures, union, Union of structures, Enumerations, typedef.

**UNIT-IV: Practical involved the concepts from UNIT-I to UNIT-III. 30 Hours****Suggested Practical Assignments** (Questions may not be restricted to this list)**BASICPracticals:**

1. Write a program to display a text message on the Display Screen.
2. Write a program to find out the sum of two integer values and display the result on the screen. Input the two values from the keyboard.

3. Write a program to find out the greatest of three numbers.
4. Write a program for swapping the two numbers with / without using another variable.
5. Write a program to find whether the given year is a leap year or not (use % modulus operator)
6. Write a program to find out the real roots of quadratic equation,  $Ax^2+Bx+C=0$ .
7. Write a program to convert the given temperature in Fahrenheit to Celsius using the following conversion formula,  $C=(F-32)/1.8$ .
8. Write a program to find out the average of any ten numbers. (Use (a) while loop, and (b) forloop).
9. Write a program to generate Fibonacci sequence. (1,1,2,3,5,8,13, ...)
10. An employee is paid 1.5 times the normal rate for every hour beyond 40 hours worked in a week. Write a program to calculate the weekly wage of an employee.
11. Write a program to check whether the given string is palindrome or not.
12. Write a program to read the text and convert the case of the text.
13. Admission to a professional course is subject to the following conditions:
  - (a) Marks in mathematics  $\geq 60$
  - (b) Marks in physics  $\geq 50$
  - (c) Marks in chemistry  $\geq 40$
  - (d) Total in all three subjects  $\geq 200$

Write a program to search of admission of students. The user has to enter the marks from the keyboard of the corresponding subjects.

14. Write a program to sum the following series:
  - a) The first n natural numbers
  - b) The first n odd natural numbers
  - c) The first n even natural numbers
15. Write a program to sum the series :  $2 * 3 - 3 * 5 + 4 * 7 + \dots$  to n terms

### Advance Practicals:

1. Write a program to read the following numbers, round them off to the nearest integers and print out the results in integer form:  
35.7 50.21 -23.73 -46.45
2. Given the string “WORDPROCESSING “, write a program to read the string from the terminal and display the same in the following formats:  
(a) WORD PROCESSING (b) WORD (c) W. P. PROCESSING
3. Write a program that will read the value of x and evaluate the following function

$$\begin{aligned}
 &1 \text{ for } x > 0 \\
 &Y = 0 \text{ for } x = 0 \\
 &-1 \text{ for } x < 0
 \end{aligned}$$

Using

- (a) nested **if** statements,

- (b) **else if** statements, and  
(c) Conditional operator
4. Write a program to calculate the monthly telephone bill according to the following rules:
- (a) Rural subscribers:
- Upto 250 calls Free  
251 calls to 450 calls 0.60  
451 calls to 500 calls 0.80  
501 calls to 1000 calls 1.00  
above 1000 calls 1.20
- (b) Urban subscribers:
- Upto 150 calls Free  
151 calls to 400 calls 0.80  
401 calls to 1000 calls 1.00  
Above 1000 calls 1.20
- (c) The rental for urban subscribers depends on the number of calls upto 400 calls the rental will be 200/- and above 400 calls the rental will be 240/-. For rural subscribers the rental is always 200/-.
5. Write a C program to input the Name, City Type (whether Metro or Non-Metro) and Basic Pay of an employee and calculate the salary according to the following rules:
- (a) Dearness allowance (DA)
- (i) Upto Rs. 3500 110% of basic pay  
(ii) Above Rs.3500 90% of the basic pay subject to a maximum of Rs. 3850  
(i.e. DA should be at least Rs. 3850.
- (b) House Rent Allowance (HRA) is 15% of the basic pay subject to a maximum of Rs. 800 (i.e. never more than Rs. 800)
- (c) If City is Metro, City Compensatory Allowance (CCA)=800 else if it is Non-Metro, CCA=600.
- (d) Provident Fund (PF) is 12% of the basic pay.  
**(Total Salary=Basic Pay +DA+HRA+CCA-PF)**  
The **output** should be in the following format (Example only)  
Example Name ABCDEF  
Basic Salary 5000  
Dearness Allowance 4500  
HRA 750  
CCA: Non-Metro 600  
PF 600  
Total Salary 10250
6. Write a program to display the multiplication table of a given number from 1 to 20.
7. Write a program to find the biggest and smallest number and its position in the given array.

8. Write a program to find addition, subtraction and multiplication of matrices using function.
9. The factorial of an integer m is the product of consecutive integers from 1 to m. That is,  
Factorial m = m! = m\*(m-1)\*(m-2)\*...\*1.
10. Write a program to find the sum of row, column, and diagonals of the given matrix.
11. Write a program to input a string and perform the following tasks without using library functions: (a) to find its length, (b) to change it to upper case / lower case (c) to extract the left most n characters, (d) to extract the right most n characters (e) to extract n characters from it starting from position p, (f) to insert another string in it at position p (g) to replace n characters in it starting at position p with a given string
12. Write a program to search a pattern in a given text.
13. Write a program to read and display the information of all the students in the class.
14. Write a program that passes a pointer to a structure to a function.
15. Write a program to illustrate the use of arrays within a structure.

### Instructions to Paper Setter

- Questions should be set according to the following scheme.

UNIT	Questions	
	To be Set	To be Answered
I	2	1
II	2	1
III	2	1

**For Practical a total of 10 questions, each carrying 19 marks, shall be set. For each question, there shall be two sub-questions, one carrying 9 marks and the other carrying 10 marks. A student shall be allotted any one of the questions on a LOTTERY basis.**

#### Exam Duration:

Theory	Practical
2 Hours	2 Hours

Distribution of marks for practical

- 10% :Syntaxandinput/outputscreens
- 30% :Logicandefficiency(sourcecode,pseudocode,andalgorithm)
- 20% :Errortrapping(illegalorinvalidinput,stackoverflow,underflow,insufficientphysicalmemoryetc.)
- 20% :Completion
- 20% : Result

### **Suggested Readings:**

#### **Text Books:**

1. TharejaReema, ProgramminginC, OxfordUniversityPress,NewDelhi, 2<sup>nd</sup> Edition,2016.
2. Byron Gottfried,ProgrammingwithC,Schaum'sOutlineSeries,McGraw Hill Education,4<sup>th</sup>Edition,2018.
3. Brian W. Kernighan, Dennis Ritchie, ANSI C: The C Programming Language, Pearson Education India, 2<sup>nd</sup> Edition, 2015.
4. Jery R Hanly, Elliot BKoffman,ProblemSolvingandProgramDesignInC,Pearson, 2<sup>nd</sup> Edition, 2016.

#### **ReferenceBooks:**

1. YeshawanKanetkar, LetUs C: Authentic Guide To C Programming Language,BPBPublications,NewDelhi, 18<sup>th</sup> Edition, 2021.
2. E. Balagurusamy,ProgramminginANSIC,McGraw Hill Education,NewDelhi, 8<sup>th</sup> Edition,2019.

## **BCA-150: Internet Technology with PHP and MySQL**

**(Contact Hours: 75, Credits: 4)**

### **Course Objectives (COs):**

This course is designed to equip students with the basic skills and knowledge to start building dynamic and interactive websites using HTML, CSS, JavaScript, PHP and MySQL.

### **Learning Outcomes (LOs):**

Students shall be able to list the various HTML tags and use them to develop user-friendly web pages. Define the Javascript functions, CSS with its types and use them to provide the styles to the web pages at various levels. The course also lays a good foundation for students to acquire full-stack development skills which are much in demand in today's marketplace.

### *Outline of the Paper*

<b>UNIT</b>	<b>Topic</b>	<b>Hours</b>	<b>External Marks</b>	<b>Internal Marks</b>
<b>I</b>	HTML, JavaScript and CSS	15	18	15
<b>II</b>	Server Side Programming Using PHP	15	19	
<b>III</b>	MySQL and PHP	15	19	
<b>IV</b>	Practical	30	19	6
<b>Total</b>		<b>75</b>	<b>75</b>	<b>25</b>

## CONTENTS

### **UNIT-I : HTML, JavaScript and CSS (Theory)**

**15**

#### **Hours**

**HTTP and Web Servers:** HTTP; System Architecture of a Web server; Client-side Scripting versus Server-side Scripting; Apache Web Server

**HTML:**Elements of HTML (Headers, Linking, Images, Special Characters, Lists, Tables, Forms, Frames, Dropdowns, Divs)

**JavaScript:** JavaScript syntax and basic data types, Variables, constants, and data manipulation. Working with operators and control structures. Arrays, String Manipulation

*JavaScript Fundamentals:* DOM (Document Object Model) manipulation, Handling events and event-driven programming, Working with arrays and objects, Conditional statements and loops, Error handling and debugging techniques.

*JavaScript Functions and Scope:* Creating and invoking functions, Function parameters and return values, Function scope and closures, Higher-order functions and callback functions.

*Working with the DOM:* Manipulating HTML elements with JavaScript, Accessing and modifying element attributes, Creating, appending, and removing elements dynamically, Traversing and manipulating the DOM tree, Handling form input and form validation.

**Cascading Style Sheets:** CSS syntax and structure, Inline, internal, and external CSS, CSS rule precedence, CSS Class and Id selectors, Attribute selectors and pseudo classes.



CSS Box Model (Introduction, Border properties, Padding-Properties, Margin properties). CSS Positioning, Changing font families, sizes and weights. Text color, background, shadows, text formatting- alignment, decoration, spacing. CSS Color- RGB, HEX, HSL. Applying colors to text, backgrounds, and borders, Working with gradients and background images, Creating transparent elements and overlays, CSS background properties: size, position, and repeat. Creating page Layout and Site Designs.

## **UNIT-II : Server Side Programming with PHP**

**15 Hours**

**Introduction to PHP:** Introducing PHP, Conditions and Branches, Loops, Functions, Working with types, User-defined Functions Arrays, Strings and Advanced Data Manipulation in PHP: Arrays, Strings, Regular Expressions, Dates and Times, Integers and Floats.

Validation with PHP: Validation and Error Reporting Principles, Server-Side Validation with PHP

Sessions: Introducing Session Management, PHP Session Management, Using Sessions in Validation

## **UNIT-III: MySql and PHP**

**15 Hours**

**Introduction to MySQL with PHP:** Database Basics, MySQL Command Interpreter, Managing Databases and Tables. Inserting, Updating and Deleting Data, Querying with SQL SELECT, Join Queries Querying Web Databases: Querying a MySQL Database using PHP, Processing User Input Writing to Web Databases: Database Inserts, Updates and Deletes, Issues in Writing Data to Database.

## **UNIT-IV: PRACTICAL**

**30 Hours**

Practical involving HTML, CSS, JavaScript, PHP and MySQL

**Suggested Practical Assignments** (Questions need not be restricted to this list)

### **Basic Practicals**

1. Create an HTML document that defines a table with columns for state, state bird/animal, state flower and state food. There must be at least five states as rows in the table.
2. Create a HTML document showing all the headings in a page.
3. Create a simple table with three rows and four columns.
4. Create a HTML document to display all the different form of lists.
5. Using HTML, CSS create a paragraph.
6. Using HTML, CSS create a list of fruits and vegetables.
7. Using HTML, CSS create a striped table.

8. Write Javascript code to display a table of the numbers from 1 to n through an HTML document. Use for loop or do loop.
9. Write Javascript code to display the first 50 Fibonacci Numbers through an HTML document. [Hint: Use document.write to display output in a tabular form, using the assistance of table HTML tags]. Use for loop or do loop.
10. Write Javascript code to check for Armstrong numbers
11. Write Javascript code to find the sum of n numbers.
12. Write a PHP function to add two numbers
13. Write a PHP program to swap 2 numbers using a third variable.
14. Write a PHP program to swap 2 numbers without using a third variable.
15. Write a PHP program to solve the following equation

$$s = ut + \frac{1}{2} at^2 \text{ where } s = \text{distance, } u = \text{initial velocity, } t = \text{time, } a = \text{acceleration}$$

$$A = \frac{1}{2} * b * h \text{ where } A = \text{Area, } b = \text{base, } h = \text{height}$$

### Advanced Practicals

1. Create an HTML document for yourself, including your name, address, e-mail address, phone number, date of birth and age. If you are a student, you must include the course you have undertaken and give a little description about the course. If you are employed, you must include your employer, your employer's address and your job title. This document must use several headings and <em>, <strong>, <hr/>, <p> and <br/> tags.
2. Create an HTML document that defines a table with columns for state, state bird/animal, state flower and state food. There must be at least five states as rows in the table.
3. Create an HTML document that has a form with the following controls:

A text box to collect users' names.

Four checkboxes, one each for the following items:

Four 100-watt light bulbs for Rs70.

Eight 100-watt light bulbs for Rs140.

Four 100-watt long-life light bulbs for Rs90.

Eight 100-watt long-life light bulbs for rs210

4. A collection of three radio buttons that are labeled as follows:
  - i. Visa
  - ii. Mastercard
  - iii. Maestro.

5. Using HTML, CSS create a styled checkbox with animation on state change.
6. Using HTML, CSS create a list with floating headings for each section
7. Create a Navigation bar (with dropdown) and grid with CSS
8. Write Javascript code to display a table of the numbers from 5 to 15 and their squares and cubes through an HTML document. [Hint: Use document.write to display output in a tabular form, using the assistance of table HTML tags]. Use for loop or do loop.
9. Write Javascript code to display the first 50 Fibonacci Numbers through an HTML document. [Hint: Use document.write to display output in a tabular form, using the assistance of table HTML tags]. Use for loop or do loop.
10. Write Javascript code to display a list of Armstrong numbers between 100 and 1000 through an HTML document. [Hint: Use document.write to display output in a tabular form, using the assistance of table HTML tags]. Use for loop or do loop.
11. Write Javascript code to display a table of Palindrome numbers between 100 and 500 through an HTML document. [Hint: Use document.write to display output in a tabular form, using the assistance of table HTML tags]. Use for loop or do loop.
12. Write Javascript code to generate a list of numbers between 100 and 1000 where the result of the current number is the sum of the previous four numbers in the series. Example initial four numbers are 0,1,1,2. The next number in the series should be 4.
18. Write a PHP script to display the contents of a database table containing information about books. The table has three fields specifying the book ID, book name and the number of pages in the book. Display the results in an HTML table.
19. Using the previous question's database table, create HTML forms for inserting, editing and deleting records. Use regular expressions to check the correct format for bookID which is given as, first three characters have to be digits followed by an underscore and then a five character string.
20. Create a PHP program that validates whether an inputted email address is in the correct format using regular expressions. The program should check for the presence of an "@" symbol, a domain name, and a valid top-level domain.

### Instructions to Paper Setter

- Questions should be set according to the following scheme.

UNIT	Questions	
	To be set	To be Answered
I	2	1
II	2	1

III	2	1
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**For Practical a total of 10 questions, each carrying 19 marks, shall be set. There shall be two sub-questions in each question, one carrying 9 marks and the other carrying 10 marks. A student shall be allotted any one of the questions on a LOTTERY basis.**

**Exam Duration:**

<b>Theory</b>	<b>Practical</b>
2 Hours	2 Hours

**Evaluation of marks for practical Exam:**

- 10% :Syntax and input/output screens
- 30% :Logic and efficiency (source code, pseudocode, and algorithm)
- 20% :Error trapping (illegal or invalid input, stack overflow, underflow, insufficient physical memory etc.)
- 20% :Completion
- 20% : Result

**Suggested Readings:**

**Text Books:**

1. Hugh E Williams and David Lane, *Web Database Applications with PHP and MySQL*, O’Reilly, 2<sup>nd</sup> Edition, 2004.
2. Luke Welling and Laura Thomson, *PHP and MySQL Web development*, SAMS Publishing, 2<sup>nd</sup> Edition.
3. Marijn Haverbeke, *Eloquent JavaScript: A Modern Introduction to Programming*. Available online: <https://eloquentjavascript.net>
4. James H. (Jim) Pence, Thomas A. Powell, *HTML & CSS: The Complete Reference*, McGraw-Hill Education, 5<sup>th</sup> Edition, 2010.
5. Eric Meyer, Estelle Weyl, *CSS: The Definitive Guide*, Shroff/O’Reilly, 4<sup>th</sup> Edition, 2017.

**Reference Books:**

1. Rasmus Lerdorf, Peter MacIntyre, Kevin Tatroe, *Programming PHP*, 2<sup>nd</sup> Edition, O’Reilly Publishing.
2. W. Jason Gilmore, *Beginning PHP 5 and MySQL 5: From Novice to Professional*, 2<sup>nd</sup> Edition, APress.

## 11. COMPUTER SCIENCE

### Preface

The 4-year BSc program in Computer Science is a comprehensive course of study that provides students with a solid foundation in the principles and practices of computer science. This program is typically designed to equip students with the knowledge and skills necessary to pursue careers in various computing fields or to continue their education at the graduate level.

The course consists of the following components:

**Foundational Courses:** The program usually starts with foundational courses that cover essential concepts such as programming, algorithms, data structures, computer organization, and discrete mathematics. These courses establish the fundamental building blocks of computer science.

**Core Computer Science Courses and Specializations:** As students progress through the program, they delve deeper into core computer science areas. These courses include topics such as software engineering, databases, operating systems, computer networks, theory of computation, and artificial intelligence. Students gain a comprehensive understanding of these areas and develop proficiency in problem-solving, programming languages, and software development methodologies. Specializations allow students to gain in-depth knowledge and expertise in their chosen fields.

**Project Work and Practical Experience:** Many programs incorporate project-based learning or capstone projects, where students work on real-world problems or create software applications under the guidance of faculty members. This hands-on experience helps students apply their knowledge, develop problem-solving skills, and gain practical exposure to the field of computer science.

**Internships Programs:** The students are provided with the opportunity to acquire valuable industry experience by working in tech companies, research labs, or other relevant organizations through internship programs. This helps students apply theoretical knowledge in real-world settings, develop professional skills, and make industry connections.

**Professional Development:** Alongside technical skills, the program also focuses on developing professional skills such as communication, teamwork, critical thinking, and ethical considerations in computing. These skills are essential for successful collaboration, effective problem-solving, and ethical decision-making in the field of computer science.

Overall, the 4-year BSc program in Computer Science provides students with a comprehensive education in computer science principles, theories, and practical skills. It prepares them for a wide range of career opportunities in software development, data analysis, system administration, cyber security, research, and more.

## **Programme Outcomes (POs):**

### **The expected outcome of the programme are-**

1. Students will be able to design, develop, and implement software solutions using appropriate algorithms, programming languages, and software engineering principles.
2. Students will have a strong foundation in computer science theory, including data structures, algorithms, automata theory, and computer organization.
3. Students will be able to analyze and evaluate complex computer systems, identifying strengths, weaknesses, and potential improvements.
4. Students will have experience working in teams on software projects, including collaboration, project planning, and communication.
5. Students will be able to apply ethical principles to their work in computer science, including issues related to privacy, security, and intellectual property.
6. Students will be able to effectively communicate technical information to both technical and non-technical audiences, including through technical reports and presentations.
7. Students will be able to adapt to new technologies and programming languages as they emerge, and continue to learn and develop professionally throughout their careers.

## **CSC-100: PROGRAMMING IN C AND INTRODUCTION TO DATA STRUCTURES**

**(Contact Hours: 75, Credits: 4)**

### **Course Objectives**

The course is designed to introduce programming concepts using C language to students and to introduce basic data structures and their uses. The aim of this course is to prepare the students to be able to write C programs using suitable data structures to solve real-world problems.

### **Learning Outcome**

On successful completion of the course, students will be able to:

- Solve real-life problems of reasonable complexity using suitable and efficient programming constructs in C
- Understand and apply the concepts of arrays, pointers, structures to implement efficient algorithms
- Understand the fundamentals of data structures such as linked lists, stacks, and queues, and be able to implement them in C.
- Use pointers in C to manipulate memory and pass parameters to functions.
- Implement sorting and searching algorithms in C

### ***Outline of the Course***

<b>Unit</b>	<b>Topic</b>	<b>Hours</b>	<b>Ext. Marks</b>	<b>Int. Marks</b>
I	C: Basic Concepts	15	18	19
II	Functions, Arrays, Pointers, Structures and Union	15	19	
III	Introductory Data Structures	15	19	
IV	Practical	30	19	6
<i>Total</i>		<b>75</b>	<b>75</b>	<b>25</b>

#### **UNIT – I: C Basic Concepts (Theory) Hours**

**15**

C Fundamentals: Algorithms, Flow charts, Development of algorithms, The C character set, identifiers and keywords, Data types, constants, variables and arrays, declarations, symbolic constants, Operators (Arithmetic, unary, relational, logical, bitwise, assignment, conditional operator)

I/O functions: Header files (stdio.h, conio.h) getch(), getche(), getchar(), putchar(), scanf(), printf(), gets(), puts(), clrscr()

Control statements: Decision making and branching (if..else, switch); looping (while, do .. while, for), Jumping (break, continue, goto), Nested loops.

#### **UNIT – II: Functions, Arrays, Pointers, Structures and Union(Theory) Hours**

**15**

*Functions:* Overview (definition, declaration), defining and accessing a function, function prototypes, call by value, call by reference, recursion, Advantages and disadvantages of recursion over iteration, Storage classes (Automatic, Register, External, Static), , String functions (strcmp (), strlen (), strrev (), strcat (), strcpy(), toupper (), tolower ()), Math functions (sqrt (), abs (), sin (), cos ()), Standard function- exit ().

*Arrays and Pointers:* Defining an array, array initialization, processing an array, passing array to a function, multidimensional arrays, pointer declarations, passing pointer to a function, pointer and one dimensional arrays, Operation on pointers, Memory allocation functions (malloc(), calloc(), free()).

*Structures and Unions:* Defining a structure, processing a structure, user defined data types, array of structures, structures and pointers, passing structures to a function, self-referential structures, Union, Union of structures, Enumeration, typedef

**UNIT – III: Introductory Data Structures (Theory)  
Hours**

**15**

*Data structure fundamentals:* Data Type, Abstract Data Type, Data Structure. Linked List as a data structure (characteristics, advantages, disadvantages); operations on lists (creation, insertion, deletion, traversal); types of linked list - singly linked list, doubly linked list, circular list.

*Stacks and Queues:* Introduction to stacks and queues, Operations on stacks and queues, Implementation of stacks and queues using static arrays and linked lists; Definitions of Circular Queue, Priority Queue (definition only) , D-Queue (definition only) ; Application of stacks: Conversion of infix(containing arithmetic operators including exponential operator, and parenthesis) to postfix, evaluation of postfix expression.

*Searching and Sorting:* Linear search and Binary search algorithms, Bubble sort and Insertion sort algorithms

**UNIT – IV: Practical  
Hours**

**30**

**Practical Assignments** (Questions may not be restricted to this list)

**BASIC Practical:**

1. Write a program to display the message “Welcome to the C programming world” on the screen.
2. Write a program to find out the sum of two integer values and display the result on the screen. Input the two values from the keyboard.
3. Write a program to find out the greatest of three numbers.
4. Write a program for swapping the two numbers with / without using another variable.
5. Write a program to find whether the given year is a leap year or not ( use % modulus operator)
6. Write a program to find out the real roots of quadratic equation,  $Ax+Bx+C=0$ .
7. Write a program to convert the given temperature in Fahrenheit to Celsius using the following conversion formula,  $C=(F-32)/1.8$ .
8. An employee is paid 1.5 times the normal rate for every hour beyond 40 hours worked in a week. Write a program to calculate the weekly wage of an employee.
9. Write a program to check whether the given string is palindrome or not.
10. The total distance traveled by a vehicle in t seconds is given by
11.  $Distance = ut + (at^2)/2$



12. Where  $u$  is the initial velocity (meters per second),  $a$  is the acceleration (meters per second<sup>2</sup>). Write a program to evaluate the distance traveled at regular intervals of time, given the values of  $u$  and  $a$ . The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of  $u$  and  $a$ .
13. Write a program to read the following numbers, round them off to the nearest integers and print out the results in integer form:  
35.7 50.21 -23.73 -46.45

3. Admission to a professional course is subject to the following conditions:

- (a) Marks in mathematics  $\geq 60$
- (b) Marks in physics  $\geq 50$
- (c) Marks in chemistry  $\geq 40$
- (d) Total in all three subjects  $\geq 200$

Or

Total in mathematics and physics  $\geq 150$

Write a program to search of admission of students. The user has to enter the marks from the keyboard of the corresponding subjects.

4. Write a program that will read the value of  $x$  and evaluate the following function

$$\begin{aligned}
 &1 \text{ for } x > 0 \\
 &Y = 0 \text{ for } x = 0 \\
 &-1 \text{ for } x < 0
 \end{aligned}$$

Using

- (a) nested **if** statements,
- (b) **else if** statements, and
- (c) Conditional operator?:

5. Write a program to calculate the monthly telephone bill according to the following rules:

(a) Rural subscribers:

Upto 250 calls Free  
 251 calls to 450 calls 0.60  
 451 calls to 500 calls 0.80  
 501 calls to 1000 calls 1.00  
 above 1000 calls 1.20

(b) Urban subscribers:

Upto 150 calls Free  
 151 calls to 400 calls 0.80  
 401 calls to 1000 calls 1.00  
 Above 1000 calls 1.20

- (c) The rental for urban subscribers depends on the number of calls upto 400 calls the rental will be 200/- and above 400 calls the rental will be 240/-. For rural subscribers the rental is always 200/-.
6. Write a C program to input the Name, City Type (whether Metro or Non-Metro) and Basic Pay of an employee and calculate the salary according to the following rules:
- Dearness allowance (DA)
    - Upto Rs. 3500 110% of basic pay
    - Above Rs.3500 90% of the basic pay subject to a maximum of Rs. 3850  
(i.e. DA should be at least Rs. 3850).
  - House Rent Allowance (HRA) is 15% of the basic pay subject to a maximum of Rs. 800 (i.e. never more than Rs. 800)
  - If City is Metro, City Compensatory Allowance (CCA)=800 else if it is Non-Metro, CCA=600.

(d) Provident Fund (PF) is 12% of the basic pay.  
**(Total Salary=Basic Pay +DA+HRA+CCA-PF)**  
 The **output** should be in the following format (Example only)  
 Example Name ABCDEF  
 Basic Salary 5000  
 Dearness Allowance 4500  
 HRA 750  
 CCA: Non-Metro 600  
 PF 600  
 Total Salary 10250

### ADVANCED Practical:

- Given the string “WORDPROCESSING “, write a program to read the string from the terminal and display the same in the following formats:  
 (a) WORD PROCESSING (b) WORD (c) W. P. PROCESSING
- Write a program to sum the following series:  
 a) The first n natural numbers  
 b) The first n odd natural numbers  
 c) The first n even natural numbers
- Write a program to find out the average of any ten numbers. (Use (a) **while** loop, and (b) **for** loop).
- Write a program to generate Fibonacci sequence. (1,1,2,3,5,8,13, ...)
- Write a program to sum the series :  $2 * 3 - 3 * 5 + 4 * 7 + \dots$  to n terms
- Given a number, write a program using while loop to reverse the digits of the number. For example, the number 12345 should be written as 54321. (**Hint:** Use modulus operator to extract the last digit and the integer division by 10 to get the n-1 digit number from the n digit number.)
- Write a program to generate positive prime numbers.

8. Write a program to display the multiplication table of a given number from 1 to 20.
9. Write a program to display the multiplication table of a given number for a given range.
10. Write a program to display the multiplication table of a given group of numbers (maximum five numbers) for a given range.
11. Write a program to find the biggest and smallest number and its position in the given array.
12. Write a program to find addition, subtraction and multiplication of matrices using function.
13. The factorial of an integer m is the product of consecutive integers from 1 to m. That is,  
Factorial m = m! = m\*(m-1)\*(m-2)\*...\*1.
14. Write a program to find the sum of row, column, and diagonals of the given matrix.
15. Write a program to find the largest number of the given matrix using function.
16. Write a program to sort all the elements of a matrix using function.
17. Write a program to input a string and perform the following tasks without using library functions: (a) to find its length, (b) to change it to upper case / lower case (c) to extract the left most n characters, (d) to extract the right most n characters (e) to extract n characters from it starting from position p, (f) to insert another string in it at position p (g) to replace n characters in it starting at position p with a given string
18. Write a program to search a pattern in a given text.
19. Write a program to search a pattern in a given text and replace every occurrence of it with another given string.
20. Write a program to write a given number in words using function.
21. Write a program to implement a Linked List, and create functions for the following operations on lists - creation, insertion, deletion, traversal
22. Write a program to implement a stack **using arrays**.
23. Write a program to implement a stack **using linked lists**.
24. Write a program to implement a queue **using arrays**.
25. Write a program to implement a queue **using linked lists**.
26. Write a program for sorting the elements of an array by using Bubble sort, Insertion sort.
27. Write a program to implement linear search and binary search.

*Instructions to Paper Setter*

Questions should be set according to the following scheme.

Unit	Questions	
	To be set	To be answered
I	2	1

II	2	1
III	2	1
IV (Practical)	5	3

Exam Duration :

<b>Theory</b>	<b>Practical</b>
2 Hours	3 Hours

### Suggested Readings

#### Text :

1. **E. Balaguruswamy**, *Programming in ANSI C*, Tata McGraw Hill publication
2. **Yashavant Kanetkar**, *Let us C*, 17<sup>th</sup> Edition, BPB Publication
3. **S. Chattopadhyay, D. Ghosh Dastidar, M Chattopdhyay**, *Data Structures Through C Language*, BPB Publications, 2001

#### References :

1. **Byron S. Gottfried**, *Theory and Problems of Programming with C*, Tata McGraw Hill Publication
2. **Brian Kernighan and Dennis M. Ritchie**, *C Programming Language*, 2nd Edition, PHI
3. **Y. Langsam, M.J. Augenstein, A.M. Tenenbaum**, *Data Structures Using C and C++*, Second Edition, Prentice Hall of India, 2000
4. **Reema Thareja**, *Data Structures Using C*, 2<sup>nd</sup> Edition, Oxford University Press, India

## CSC-150: DATABASE MANAGEMENT SYSTEM

(Contact Hours: 75 Hours, Credits: 4)

### Course objectives

The objective of this paper is to introduce to the students the fundamental concepts necessary for designing, using and implementing database systems. The paper stresses on database modeling and design, physical file storage techniques and language facilities provided by database management systems.

### Learning Outcome

1. The student will be able to understand the requirement for a database management system.
2. The student will be able to design a relational database for an organization.
3. The student will be able to implement a database using any RDBMS software.
4. The student will be able to normalize databases and understand how files are physically stored on disk.
5. The student will be able to understand the concept of transactions and schedules.

### Outline of the Course

Unit	Topic	Hours	External Marks	Internal Marks
I	Introduction and Conceptual Data Modeling	15	18	19
II	Relational Model and Database Normalization	15	19	
III	File Organization and Transaction Processing	15	19	
IV	Structured Query Language (Practical Only)	30	19	6
<i>Total</i>		<b>75</b>	<b>75</b>	<b>25</b>

## **Unit I: Introduction and Conceptual Data modeling**

**15 hours**

*Introduction:* Introduction to databases, characteristics of the database approach, database users and designers, role of a DBA, advantages of using a DBMS, data models, schemas, instances, DBMS architecture (Three-Schema Architecture), Data Independence.

*Conceptual Data Modeling:* Phases of database design, entity type, entity set, attributes, keys, value sets, relationships, relationship types, relationship sets, relationship instances, relationship degree, role names, recursive relationships, constraints on relationship types, attributes of relationship types, weak entity types, ER Diagram, naming conventions and design issues.

## **Unit II: Relational Model and Database Normalization**

**15**

**hours**

*Relational model concepts:* Domain, attribute, tuple, relation, characteristics of relations, relational databases, relational database schemas, relational constraints (Domain constraint, constraints on null), entity integrity, referential integrity, foreign keys.

Functional Dependencies, First Normal Form, Second Normal Form, Third Normal Form, Boyce-Codd Normal Form.

## **Unit III: File Organization and Transaction Processing**

**15**

**hours**

*File Organization:* Introduction to storage hierarchies, hardware descriptions of disk devices, Organization of file records on disk (record and record types, Fixed-length records, variable-length records, record blocking, spanned and unspanned records, allocating file blocks on disk, file headers), Primary methods of file organization -Heap Files, Sorted Files, Hashed Files. Types of Single-level Ordered Indexes (Primary Indexes, Clustering Indexes, Secondary Indexes).

*Transaction Processing:* Transaction, ACID properties of transaction, transaction states, schedules, serializability, tests for serializability, recoverability.

## **Unit IV: Structured Query Language (Practical Only)**

**30**

**hours**

*SQL:* Characteristics of SQL, Data types in SQL, Types of SQL commands

*Data Definition Commands:* CREATE SCHEMA, CREATE TABLE, DROP TABLE, ALTER TABLE

*Single table query commands:* SELECT, SELECT with WHERE, SELECT with ORDER BY, SELECT with GROUP BY, SELECT with GROUP BY and HAVING, SQL built-in functions - SUM, MIN, MAX, COUNT, AVG

*Multi-table query commands:* Retrieval using sub-query, JOIN, EXIST and NOT EXIST

*Special operators:* IS NULL, IS NOT NULL, BETWEEN..AND, IN, LIKE, ANY, ALL

*Data changing commands:* INSERT, DELETE, UPDATE

**List of possible problems for Practical (May not be restricted to this list)**

1. Create a table named DEPARTMENT with the following columns.

<b>Column name</b>	<b>Datatype</b>	<b>Size</b>
Department_No	Number	2
Department_name	Varchar2	20
Location	Varchar2	10

2. Create a table named EMPLOYEE with the following columns.

<b>Column name</b>	<b>Datatype</b>	<b>Size</b>
Employee_No	Number	4
First_Name	Varchar2	30
Last_Name	Varchar2	50
DOJ	Date	
Gender	Char	1
Salary	Number	10,2
Commission	Number	10,2
Dno	Number	2

3. Add the following records in Department

<b>Department_No</b>	<b>Department_name</b>	<b>Location</b>
10	Finance	Shillong
20	Accounts	Jowai
30	Manufacturing	Guwahati
40	Engineering	Kohima

4. Add the following records in Employee

<b>Employee_No</b>	<b>First_Name</b>	<b>Last_Name</b>	<b>DOJ</b>	<b>Gender</b>	<b>Salary</b>	<b>Commission</b>	<b>Dno</b>
1111	Jane	Doe	19-dec-	F	20000	1000	10

			2008				
2222	Homer	Simpson	01- jan- 2015	M	10000		20
3333	Jack	Reacher	05- jun- 2012	M	12000		10
4444	Sponge	Bob	16- apr- 2012	M	8000	400	10

5. List details of all departments
6. Display employee\_no as “Staff no”, employee first and last name as “Name”, dno as “Department No”
7. Display the name of employee along with their total salary i.e. salary + commission
8. If each employee were to get a raise, display their no, name, old salary and new salary, where new\_salary is 10% raise from their old salary
9. Display employees who did not earn a commission
10. Display all female employees
11. Display employees information in ascending order of their date of joining
12. Display employees information in descending order of their salary.
13. Display employees whose name starts with the letter J
14. Display employees whose first name or last name have the letter O



**EMPLOYEE**

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno
John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000	333445555	5
Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000	888665555	5
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000	987654321	4
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000	888665555	4
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000	333445555	5
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000	987654321	4
James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000	NULL	1

**DEPARTMENT**

Dname	Dnumber	Mgr_ssn	Mgr_start_date
Research	5	333445555	1988-05-22
Administration	4	987654321	1995-01-01
Headquarters	1	888665555	1981-06-19

**DEPT\_LOCATIONS**

Dnumber	Dlocation
1	Houston
4	Stafford
5	Bellaire
5	Sugarland
5	Houston

**WORKS\_ON**

Essn	Pno	Hours
123456789	1	32.5
123456789	2	7.5
666884444	3	40.0
453453453	1	20.0
453453453	2	20.0
333445555	2	10.0
333445555	3	10.0
333445555	10	10.0
333445555	20	10.0
999887777	30	30.0
999887777	10	10.0
987987987	10	35.0
987987987	30	5.0
987654321	30	20.0
987654321	20	15.0
888665555	20	NULL

**PROJECT**

Pname	Pnumber	Plocation	Dnum
ProductX	1	Bellaire	5
ProductY	2	Sugarland	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganization	20	Houston	1
Newbenefits	30	Stafford	4

**DEPENDENT**

Essn	Dependent_name	Sex	Bdate	Relationship
333445555	Alice	F	1986-04-05	Daughter
333445555	Theodore	M	1983-10-25	Son
333445555	Joy	F	1958-05-03	Spouse
987654321	Abner	M	1942-02-28	Spouse
123456789	Michael	M	1988-01-04	Son
123456789	Alice	F	1988-12-30	Daughter
123456789	Elizabeth	F	1967-05-05	Spouse

15. Create tables for the above-mentioned tables and fill in the data as shown above in the tables created by you earlier.

Write SQL queries for the following:

16. List the names and addresses of all Male employees.
17. Retrieve the full name of the employee, full name of the direct supervisor and the name of the department where the employee works.
18. Find the name of the Manager of the 'Administration' department.
19. Find the names of all employees and the projects they work in.
20. Find the names of all employees who has daughters.
21. Find the names of all departments that are in "Houston".

22. Retrieve the names of all employees in department 5 who work more than 10 hours per week on the ProductX project.
23. List the names of all employees who have a dependent with the same first name as themselves.
24. Find the names of all employees who are directly supervised by ‘Franklin Wong’.
25. Find the names of all employees who works in Project “ProductX” and earns more than 28000 as salary.

*Instructions to Paper Setter*

Questions should be set according to the following scheme.

Unit	Questions	
	To be set	To be answered
I	2	1
II	2	1
III	2	1
IV (Practical)	4	2

Exam Duration :

Theory	Practical
2 Hours	3 Hours

Suggested Readings

**Text:**

1. **R.Elmasri, S.B Navathe**, *Fundamentals of Database Systems*, Pearson Eductaion, 7<sup>th</sup> Edition, 2017
2. **Thomas Nield**, *Getting Started with SQL: A Hands-On Approach for Beginners*, O’Reilly Publication, 2016

**Reference:**

1. **C. J. Date**, *An Introduction to Database Systems*, Eighth Edition, Pearson, 2003
2. **A. Silberschatz, H.F Korth, S Sudarshan**, *Database System Concepts*, Tata- McGraw Hill, 7<sup>th</sup> Edition, 2019.
3. **Bipin Desai**, *An Introduction to Database Systems*, Galgotia Publications (West Publishing), 2010.
4. **D.M Kroenke**, *Database Processing: Fundamentals, Design and Implementation*, Pearson Education, 15<sup>th</sup> Edition, 2018.
5. **G.W Hansen, J.V Hansen**, *Database Management and Design*, Pearson Education, (2nd Edition) 2001.
6. **Thomas M Connolly, Carolyn E Begg**, *Database Systems, A Practical Approach to Design, Implementation and Management*, Pearson Education, 6<sup>th</sup> Edition 2019.

## 12. ECONOMICS

### **Preface**

Economics has emerged as one of the most 'sought-after' subjects of study in Social Sciences as it immediately communicates with the changing societal priorities and needs. The curriculum under the NEP, 2020 has been structured so as to make it practically more useful and job-oriented in the multifaceted environment ranging from trade, industry, infrastructure, etc. to information technology. At the same time, the syllabus gives sufficient impetus for academic inputs to prepare students for a research/teaching career in Economics. The programme emphasises both on theory and applied nature of the subject that has registered rapid changes during the recent times.

There are a total of fifteen compulsory core courses that students are required to take across six semesters in the first three years of the programme. The question paper shall be prepared as per University guidelines. Out of 100 marks in each course, 75 marks will be assessed in the end semester examination and 25 marks will be carried from the sessional assessments. In the end semester examination, there will be two questions from each unit and the students have to answer at least one question from each unit.

### **Programme Outcomes**

The Undergraduate programme in Economics aims to develop a comprehensive understanding and critical thinking among students. It seeks to impart knowledge of key economic theories and policies and to develop an ability to utilise this knowledge to examine and analyse past and present economic situations and issues. The syllabus facilitates development of a deeper insight in each individual so as to enable him/her to opt for challenges of selfemployment in the face of broadening gap between the demographic needs and the number of jobs becoming available. Overall, the programme provides necessary training to the students of economics and equips them to deal with contemporary public policy issues.

## ECO-100: MICROECONOMICS I

( Contact Hours: 60, Credits:4)

### Course Objectives:

This course is designed to expose the students to the basic principles of microeconomic theory. The emphasis will be on thinking like an economist and the course will illustrate how microeconomic concepts can be applied to analyze real life situations.

### Learning Outcomes:

As a foundation course, in this Paper, the student will understand the behaviour of an economic agent, namely, a consumer, a producer, a factor owner and the price fluctuations in a market. In addition, the student will learn principles of factor pricing and welfare economics.

### Unit – I

**Consumer Behaviour:** nature and scope of Economics. Concepts of demand and supply, price mechanism and market equilibrium. Individual and market demand curve; shifts in demand curve; elasticity of demand: types, determinants and methods of measurement (point, arc and total outlay methods); relationship between the price elasticity of demand and the slope of the demand curve. Indifference curve analysis of demand: basic assumptions, properties, consumer's equilibrium.

### Unit – II

**Production, Cost and Supply:** Concepts of production function, isoquants and their properties; returns to a factor, returns to scale, law of variable proportions; cost curves – short run and long run; total, average and marginal revenue curves, relationship between AR, MR and price elasticity. Concept of supply, derivation and shifts of supply curve, elasticity of supply.

### Unit – III

**Market Structure:** perfect and imperfect competition; equilibrium of the firm and industry under perfect competition in the short run and long run; equilibrium of the firm under monopoly and monopolistic competition in the short run and long run; Chamberlin's group equilibrium; meaning and features of oligopoly.

### Unit - IV

**Factor Pricing and Welfare Economics:** marginal productivity theory of distribution; Ricardian and modern theories of rent; Subsistence and wage fund theories of wages; liquidity preference theory of interest; Knight's theory of profit. Concepts of welfare; value judgements; problems in measuring welfare; Classical welfare economics; Pareto optimality; social welfare function.

### Suggested Readings:

Koutsoyiannis, A. *Modern Microeconomics*. Macmillan, London (latest edition).

Mankiw, N. G., *Principles of Economics*, Cengage Learning, New Delhi (latest edition).

Samuelson, P.A. and W.D. Nordhaus (1998), *Economics*, Tata McGraw Hill, New Delhi.

Stonier, A.W. and D.C. Hague (1999), *A Textbook of Economic Theory*, Pearson Education, New Delhi.

Ahuja, H. L. *Advanced Economic Theory*, S. Chand Publishing, New Delhi, (latest edition).

## ECO-150: MACROECONOMICS I

(Contact Hours: 60, Credits:4)

### Course Objectives:

Macroeconomics deals with the functioning of the economy as a whole, including how the economy's total output of goods and services and employment of resources is determined and what causes these totals to fluctuate. This paper has an extensive, substantive as well as methodological content.

### Learning Outcomes:

This course discusses the preliminary concepts associated with the determination and measurement of aggregate macroeconomic variables like saving, investment, GDP, money, inflation and the balance of payments. The student will learn about the basic theoretical framework underlying the field of macroeconomics. He/ she will be able to undertake economic analyses in terms of theoretical, empirical as well as policy issues.

### Unit – I

**National Income:** meaning, concepts and their inter-relationship; methods of measuring national income and their limitations; national income identity in a closed economy; circular flow of income – two, three and four sector models; green accounting.

### Unit – II

**Output and Employment:** Classical theory of employment; Keynesian theory of income and employment; the principle of effective demand; consumption and saving function; investment multiplier; marginal efficiency of capital; saving and investment: ex post and ex ante (concepts only); concept of accelerator.

### Unit – III

**Money, Banking, Inflation and Unemployment:** Functions of money; Fisher's quantity theory of money; determination of money supply and demand; credit creation and credit control. Inflation: meaning, types, causes, effects and control. Unemployment: meaning and types; Phillip's curve.

### Unit – IV

**Trade Cycles and Balance of Payments:** Concept, nature and characteristics of trade cycles; Hawtrey's monetary theory, Hayek's over-investment theory, Schumpeter's innovation theory; control of trade cycles. Balance of Trade and Balance of Payments: concepts and components; equilibrium and disequilibrium in the BoP; consequences of disequilibrium and measures to correct the deficit in the BoP.

### Suggested Readings:

- Ackley, G. (1976), *Macroeconomics: Theory and Policy*, Macmillan Publishing Co., New York.  
Mankiw, N.G. (2007), *Principles of Macroeconomics*, Thomson Learning Inc., New Delhi.  
Shapiro, E. (1996), *Macroeconomic Analysis*, Galgoti Publications, New Delhi.  
Branson, W.H. (2005), *Macroeconomic Theory and Policy*, East West Press.  
Ahuja, H. L. *Advanced Economic Theory*, S. Chand Publishing, New Delhi, (latest edition).

## 13. EDUCATION

### Preface

The Under graduate Course in Education as per the NEP-2020 guidelines is meant for the 3-year UG Major, Multidisciplinary and Skill Enhancement course program, 4-year UG Honours, and Honours with the Research program of the University at the beginning of their careers .

The course in Education consists of:-

Three papers in the 1<sup>st</sup> semester

EDN-100: Introduction to Education (Major)

MDC- 116: Introduction to Psychology

SEC- 131: Motivation

Three papers in 2<sup>nd</sup> semester

EDN-150: Foundation of Education (Major)

MDC- 166: Introduction to Educational Psychology

SEC-182: Confidence Building

These papers will enable the learners to demonstrate their understanding of the subject and deliver meaningful learning experiences by integrating their knowledge of content, pedagogy, the learner and the learning environment; engaging in the reflective instructional cycle of planning, instructing, assessing, and adjusting based on data; and applying a variety of communication, instructional, and assessment strategies.

It will facilitate learning through joint productive activity among teachers and students, developing students' competence in communication throughout all instructional activities, connecting curriculum to experience and skills of students' home and community, challenging students toward cognitive complexity, and engaging students through dialogue, especially instructional conversation.

### Programme Outcomes

At the end of the programme, the students are expected to have sound knowledge of fundamental concepts of Education. The acquired knowledge will enrich the skills for professional collaboration, and interactions with peer mates, teachers, parents, and the community.

## **EDN-100: INTRODUCTION TO EDUCATION**

**(Contact Hours: 60, Credits: 4)**

**Objectives:** This course will help the learners to develop a positive attitude towards Education. It will sensitize the students on the importance of Education as a discipline. It will also help learners to identify future job opportunities relating to Education as a discipline.

### **Learning Outcomes**

At the end of the course students are able to:

1. demonstrate comprehensive knowledge and understanding in the academic field of study
2. assess learning experiences that will help instil deep interest in learning about the effects of mass media in Education
3. discover and contextualise knowledge and can engage themselves in developing a curriculum
4. adapt skills that are necessary for planning, organising and present a report on an activity

### **UNIT I      Concept of Education**

- Meaning; Aims; Functions; Importance
- Principles of Education
- Types of Education
- Scope of Education

### **UNIT II      Mass Media in Education**

- Meaning; Functions of Mass Media
- Structure of Mass Media
- Multi Media in Education
- Effects of Mass Media in Education

### **UNIT III      Concept of Curriculum**

- Meaning; Characteristics; Need and Importance
- Principles of Curriculum Construction
- Types of Curriculum
- Factors Influencing Curriculum

### **UNIT IV      Co-curricular Activities**

- Meaning and Importance of Co-Curricular
- Scope of Co-curricular Activities
- Types of Co-curricular Activities
- Benefits of Co-curricular Activities

### Assignments (Choose any one)

1. Prepare a plan for any one non-academic activity: Examples: Science quizzes; poetry competition; story writing competition; mathematics Olympiads; extempore; project exhibition, Essay competitions or Debate competition; poster drawing; folk art work; etc.
2. Prepare any one plan from the following, for organising: a Cultural event; scouting and guiding; celebrating cleanliness day; taking part in college councils; volunteering for social work; etc
3. Prepare, organise and report on any one recreational activity that you have performed: Example: Picnic; Mountain Hike; workshops; group games; industrial or factory visits; field visits; etc

### References

- Aggarwal, J.C.(2018). *Curriculum Development Planning & Instruction*. Doaba House: India
- Aggarwal, J.C.(2020). *Philosophical Foundations of Education*. Shri Vinod Pustak Mandir: India
- Chawla,A.(2021). *Introduction to Mass Communication* | First Edition | By Pearson Education: India
- Dutta, K. B. *Mass Media in India*. (2005). Akansha Publishing: India.
- Ferguson. (2001). *Co-curricular Activities: A Pathway to Careers*. Facts On File Inc.
- Egyankosh. (n.d.). *Co-Curricular Activities*.  
<https://egyankosh.ac.in/bitstream/123456789/47006/1/Unit-13.pdf>
- KKHSOU. (n.d.). *Co-Curricular Activities*. [https://kkhsou.ac.in/eslm/E-SLM\\_Main/5th%20Sem/Bachelor%20Degree/Education/Education%20Major/English%20medium/Educational%20Management%20English%20Medium/Block%202/Unit%20-12.pdf](https://kkhsou.ac.in/eslm/E-SLM_Main/5th%20Sem/Bachelor%20Degree/Education/Education%20Major/English%20medium/Educational%20Management%20English%20Medium/Block%202/Unit%20-12.pdf)
- Pandey, Jyoti. (2015). *Principles Of Education and Curriculum Development*. KSK: India.
- Ravi, V. (2015). *Curriculum Development*. Lulu.com: India.
- Sudhakara Reddy, T. J. & Bhaskara, Digumarti Rao. (2016). *Co-Curricular Activities*. APH Publishing Corporation: India.
- Talla, Mrunalini. (2012).*Curriculum Development: Perspectives, Principles and Issues*. Pearson Education India.
- Venkateshwara Rao, N. (2020).*Introduction to Media and Mass Communication*. Kanishka Publishers: India.



## **EDN-150: FOUNDATION OF EDUCATION**

**(Contact Hours: 60, Credits: 4)**

**Objectives:** This course will enable the students to deep knowledge and understanding of the philosophical, sociological, political and economic foundations of education. It will also develop in them the ability and commitment to engage in a critical analysis of educational issues and to apply the results of that analysis to educational reconstruction.

### **Learning Outcomes**

At the end of the course, students are able to:

1. explain the concept and the need of Education
2. summarize the types of democracy related to education
3. examine the aims of education.

### **Unit I Concept of Education**

- Meaning, Nature and Scope of Education
- Forms of Education:-Formal, Informal and Non-formal
- Distinction between Education and Literacy
- Role of Education in National Development

### **Unit II Aims of Education**

- Need and Significance of Aims of Education
- Determinants of Educational Aims
- Type of Aims of Education
  - i) Ultimate Proximate Aims of Education
  - ii) Liberal and Vocational Aims of Education
- Democratic Citizenship as an Aims of Education

### **Unit III Freedom and Discipline in Education**

- Meaning, Need and Importance of Freedom
- Meaning, Need and Importance of Discipline
- Relationship between Freedom and Discipline
- Role of Teachers in maintaining Discipline

### **Unit IV Democracy and Education**

- Meaning, Types and Characteristics of Democracy
- Principles of Democracy

- Democracy in Education
- Role of Teachers in a Democracy

**Assignments (Choose any one)**

1. Challenges of the NEP-2020 in Higher Education
2. Rights and duties of a democratic citizen( Give a detailed report by consulting primary or secondary sources)
3. Multi Cultural Education: Issues and Challenges( Give a detailed report by consulting primary or secondary sources)

**References**

- Dewey, J. (2009). *Democracy and Education*. Merchant Books Publication.
- Gingell, J. & Winch, C. . (1999). *Key Concepts in the Philosophy of Education*. Taylor & Francis Ltd.
- Latchanna, G. et al. (2016). *Foundations of Education*. Hyderabad: Neelkamal Publication.
- Mishra, S. (2022). *Philosophy of Education*. Notion Press.
- Mrunalini, T. et al. (2016). *Philosophical Perspectives of Education*. Hyderabad: Neelkamal Publication.
- Pathak, R.P. (2019). *Philosophical and Sociological Foundations of Education*. Kanishka Publishers.
- Ravi, S.S. (2015). *Philosophical and Sociological Bases of Education*. PHI Learning.
- Saikia, P. (2019). *Sociological Foundations of Education*. DVS Publishers.
- Singh, M. & Singh, U. (2011). *Sociological Foundations of Education*. Laxmi Publications.
- Whitehead, A.N. (2022). *The Aims of Education*. Nation Press.

## 14. ELECTRONICS

### About the Programme:

The 4-year BSc program in Electronics is a comprehensive course which starts from basics and goes up to advance level electronics. The curriculum has been designed to provide students with strong foundation in Electronics and its application. The programme covers different courses like Network analysis, Semiconductor devices, Applied Physics, Electronic Circuits, Operational Amplifier, Digital Electronics, Signal and systems, Microprocessor and Microcontroller, Electronics Instrumentation, Electrodynamics, Control System, Antenna etc. The syllabus also includes programming in C and also hardware description languages (verilog). The programme also includes practicals, project and internship to help the students gain hands-on experience and apply the theoretical knowledge along with exposure in applications of the subject.

After completing the Degree with Electronics Major, the students will have the expertise to explore various career opportunities. They can work in the field of Hardware and software Electronics as a designer, fabrication and testing. Students interested can also opt for further studies and enter different Universities offering Masters in Electronics/Applied Physics/Instrumentation, MCA, Post graduate degree diploma in Biomedical Instruments etc and also continue further as a Research Scientist.

### PROGRAM OUTCOME (POS):

1. Students will be able to develop broad knowledge and understanding of key concepts about electronic science.
2. Students will be equipped with advanced scientific and technological capabilities for analyzing and tackling the issues and problems in the field of electronics
3. Students will develop an ability to apply knowledge and skills to acquire solutions of specific theoretical and applied problems in electronics.
4. Students will develop abilities to design and develop innovative solutions for benefits of society, by diligence, leadership, teamwork and lifelong learning.
5. Students will be provided with the knowledge of programming which will help them to design microcontroller circuit and advance to the field of Robotics, etc.
6. Students will be trained to use simulator for circuit designing and fault detection so as to work in any environment without the availability of a fully equipped lab.

## ELE-100: BASIC NETWORK ANALYSIS

(Contact Hours: 75, Credits: 4)

### COURSE OBJECTIVES :

The objective of the course is to impart knowledge of various basic circuit components and to understand the basic circuit laws which form the base of understanding electronic circuits. Problems solving using these basic laws and theorems will help students to understand the response of such circuits to DC and AC supplies. Practical will help them to gain the skills necessary to see the importance of these laws/theorems circuits in various applications.

### LEARNING OUTCOME (LOS):

After completion of this course.

1. Students will be able to understand the passive components (resistance, inductor and capacitor) and will be able to use these components in designing and analyzing the circuits under DC and AC conditions.
2. Students will be able to use different theorems in solving complex circuit problems while designing circuits.
3. Students will gain Practical skills in various experiments to further enhance their understanding about circuits.

### OUTLINE OF THE PAPER

UNIT	Topic	Hours	External Marks	Internal Marks
I	Basic Circuit Concept and DC Circuit analysis:	15	18	19
II	AC Circuit Analysis:	15	19	
III	Network Theorems:	15	19	
IV	Practical	30	19	6
<i>Total</i>		75	75	25

**UNIT-I: BASIC CIRCUIT CONCEPT AND DC CIRCUIT ANALYSIS (THEORY) (15 hours)**

**Resistors:** Fixed and variable resistors, Construction and characteristics, Color coding of resistors, resistors in series and parallel.

**Inductors:** Fixed and variable inductors, Self and mutual inductance, Faraday's law and Lenz's law of electromagnetic induction, Energy stored in an inductor, Inductance in series and parallel, Testing of resistance and inductance using multimeter.

**Capacitors:** Principles of capacitance, Parallel plate capacitor, Permittivity, Definition of dielectric constant, Dielectric strength, Energy stored in a capacitor, Air, Paper, Mica, Teflon, Ceramic, Plastic and Electrolytic capacitor, Construction and application, capacitors in series and parallel, factors governing the value of capacitors, testing of capacitors using multimeter.

**DC Circuit Analysis:** Kirchhoff's current law (KCL), Kirchhoff's voltage law (KVL), Node analysis, Mesh analysis, Star-delta conversion. RC circuit- charging and discharging with initial charge, RL circuit with initial current, Time constant, RL and RC circuits with DC source, DC response of series RLC circuits.

**UNIT-II: AC CIRCUIT ANALYSIS (THEORY) (15 hours)**

Sinusoidal voltage and current, Definition of instantaneous, Peak, Peak to Peak, root-mean square and average values. Voltage-current relationship in resistor, Inductor and capacitor, Phasor, Complex impedance, Power in AC circuits: Instantaneous power, Average power, Reactive power, Power factor. Sinusoidal circuit analysis for RL, RC and RLC circuits. Resonance in series and parallel RLC circuits, Frequency response of series and parallel RLC circuits, Quality (Q) factor and bandwidth. Passive filters: Low pass, High pass, Band pass and Band Stop.

**UNIT-III: NETWORK THEOREMS (THEORY) (15 hours)**

Principal of duality, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Reciprocity Theorem, Millman's Theorem, Maximum power transfer Theorem. AC circuit analysis using Network Theorems.

Two port networks: Impedance (Z) parameters, Admittance (Y) parameters, Transmission (ABCD) parameters.

**UNIT-IV: PRACTICAL (30 hours)**

1. (a) Resistance in series, parallel and series-parallel combination  
(b) Capacitors and Inductors in series and parallel.  
(c) Multimeter- Checking of components.
2. Measurement of Amplitude, Frequency and Phase difference using CRO.
3. Verification of Norton's Theorem.

4. Verification of Thevenin's Theorem.
5. Verification of the Maximum Power Transfer Theorem.
6. Study of RC Charging and Discharging.
7. Study of RC Circuits: Time-constant, Differentiator, and Integrator.
8. Study of the frequency of a Low Pass Passive
9. Study of the frequency response of High pass passive filter
10. Study of the frequency response of a series LCR circuit and determination of its  
(a)Resonant-frequency (b)Impedance at resonance (c)Quality factor Q (d)Bandwidth.

### **SUGGESTED READINGS:**

1. Electric Circuits, S.A.Nasar, Schaum's out line series, Tata McGraw Hill(2004).
2. Electrical Circuits, M.Nahviand, J.Edminister, Schaum's Outline Series, Tata- McGraw Hill (2005).
3. Essentials of Circuit Analysis, Robert L.Boylestad, Pearson Education (2004).
4. Engineering Circuit Analysis, W.H.Hayt, J.E.Kemmerly, S.M.Durbin, Tata McGraw Hill(2005).
5. Fundamentals of Electric Circuits, Alexander and M.Sadiku, McGraw-Hill (2013).
6. Handbook of Electronics, S. L. Gupta and V. Kumar, Pragati Prakashan (2019).
7. Fundamentals of Electrical and Electronics Engineering, S. Ghosh, PHI, (2003).
8. Network analysis, D. Roy Choudhury, Wiley Eastern Ltd, (2013).
9. Network Analysis, G.K Mittal, Khanna Publishers, (2007).
10. Basic Electronics (Solid State), B.L. Theraja, S. Chand and Co. Ltd., (2006).
11. Electronics Practical, S. Gupta and S. Gupta, Narosa Publishing House, (2006)
12. Experiments on Electronics, S.V. Subrahmanyam, Laxmi Publications, (2011).

### **INSTRUCTIONS TO PAPER SETTER**

Theory	Practical
3 Hours	3 Hours

## THEORY:

Questions should be set according to the following scheme.

UNIT	Questions	
	To be Set	To be Answered
I	2	1
II	2	1
III	2	1

## PRACTICALS:

Evaluation of Marks for Practicals:

a.	Laboratory Note Book	3
b.	Theory	3
c.	Circuit diagram and Tabulation	4
d.	Result and Precaution	3
e.	Viva Voce	6
	<b>Total</b>	<b>19</b>
f.	Internal	6
	<b>Total</b>	<b>25</b>

## ELE-150: SEMICONDUCTOR DEVICES

(Contact Hours: 75, Credits: 4)

### COURSE OBJECTIVES :

Study of semiconductor material will impart knowledge on the fundamentals of electronics devices. The students will have a sound understanding about the different properties of semiconductor materials and devices. Students will also be able to understand the constructional details, working and applications of various active electronic components used in low and high power applications. Practical knowledge will help them to analyze the characteristics of these devices.

### LEARNING OUTCOME (LOS):

After completion of this course.

- 1.the students will be able to identify semiconductors and differentiate them from conductors and insulators.
2. They will also gain skills to understand how properties of semiconductors can be utilize to make different semiconductor devices.
3. They will be able to draw the characteristics and interpret the results of various electronic devices.

### Outline of the Paper

UNIT	Topic	Hours	External Marks	Internal Marks
I	Semiconductor Basics:	15	18	19
II	P-N Junction Diode and Bipolar Junction Transistors (BJT)	15	19	
III	Field Effect Transistors and Power Devices:	15	19	
IV	Practical	30	19	6
<i>Total</i>		75	75	25



UNIT-I:

SEMICONDUCTOR BASICS:

(15

hours)

Introduction to semiconductor materials, Crystal structure, Planes and Miller indices, Chemical bond in semiconductors like Germanium and Silicon, Band gap--- forbidden energy gap, valence band and conduction band. Drift and diffusion current, Concept of Fermi level, Intrinsic and Extrinsic semiconductor, Mobility, Drift velocity and conductivity of intrinsic semiconductor, Calculation of density of electron in conduction band and density of holes in valence band, Law of mass action, Extrinsic semiconductors –donor and acceptor impurities, Energy band diagram and Fermi level of p-type and n-type.

UNIT-II: P-N JUNCTION DIODE AND BIPOLAR JUNCTION TRANSISTORS  
(BJT) (15hours)

Formation of depletion layer, Space charge at a junction, Band structure in open circuited p-n junction diode and its modification with biasing, Calculation of barrier potential and barrier width across p-n junction, Dependence of barrier width with doping, Rectifier equation of p-n junction diode, V-I characteristic of a diode; Dynamic resistance of diode; Temperature effect, Reverse breakdown in a diode, Junction capacitance: Transition and diffusion capacitance, Concept of linearly graded junction, Derivation of diode equation and I-V characteristics.

Zener and avalanche junction breakdown mechanism. Tunnel diode, Varactor diode, Photodiode, Light-emitting diode, Solar cell: circuit symbol, characteristics, applications.

Transistor (p-n-p and n-p-n), transistor current components, leakage current, Temperature effects, Ebers- Moll model of BJT, Transistor connection in common base, common emitter and common collector.

CB and CE static characteristics, Active region, Saturation and cut off, Load line, Operating point. Emitter efficiency, Base transport factor, Current gain, Energy band diagram of transistor in thermal equilibrium, Quantitative analysis of static characteristics (Minority carrier distribution and terminal currents), Base-width modulation, Modes of operation, Metal semiconductor junctions: Ohmic and Rectifying contacts.

UNIT-III: FIELD EFFECT TRANSISTORS AND POWER DEVICES: (15hours)

JFET: Construction, Idea of channel formation, Pinch-Off and saturation voltage, Current-voltage output characteristics.

MOSFET: Types of MOSFETs, Circuit symbols, Working and characteristic curves of depletion type MOSFET (both N channel and P channel) and enhancement type MOSFET (both N channel and P channel). Complimentary MOS (CMOS).

UJT: Basic construction and working, Equivalent circuit, intrinsic Standoff ratio, characteristics.

SCR: Construction, Working and Characteristics, Triac, Diac, IGBT, MESFET, Circuit symbols, Basic constructional features, Operation and applications.

UNIT-IV:

**Practical**

**(Marks 30)**

1. Study of the I-V characteristics of a semiconductor junction diode under forward bias and reverse bias condition.
2. Study of the I-V characteristics of a Zener diode under forward bias and reverse bias condition.
3. Study of the I-V characteristics of the common emitter configuration of BJT and obtain  $r_i$ ,  $r_o$ ,  $\beta$ .
4. Study of the I-V characteristics of the common base configuration of BJT and obtain  $r_i$ ,  $r_o$ ,  $\alpha$ .
5. Study of the I-V characteristics of the UJT.
6. Study of the I-V characteristics of the SCR.
7. Study of the I-V characteristics of JFET.
8. Determination of energy gap (band gap) of a semiconductor using a P-N junction diode.

**SUGGESTED READINGS:**

1. Handbook of Electronics, S. L. Gupta and V. Kumar, Pragati Prakashan (2019).
2. Elements of Electronics, M.K. Bagde and S.P. Singh, S. Chand & Co. Ltd., (2002).
3. Principles of Electronics, V.K. Mehta and R. Mehta, S. Chand and Co. Ltd., (2014).
4. Basic Electronics (Solid State), B.L. Theraja, S. Chand and Co. Ltd. (2006).
5. Foundation of Electronics, D. Chattopadhyay, P.C. Rakshit, B. Saha, N. N. Purkait, New Age International (2015).
6. Semiconductor Devices: Physics and Technology, S.M.Sze, Wiley India edition (2002).
7. Solid State Electronic Devices, B.G. Streetman and S. Banerjee, Pearson Education (2006).
8. Semiconductor Devices: Basic Principles, J. Singh, John Wiley and Sons (2001).
9. Electronics Practical, S. Gupta and S. Gupta, Narosa Publishing House, (2006).
10. Experiments on Electronics, S.V. Subrahmanyam, Laxmi Publications, (2011).

## INSTRUCTIONS TO PAPER SETTER

Theory	Practical
3 Hours	3 Hours

### THEORY:

Questions should be set according to the following scheme.

UNIT	Questions	
	To be Set	To be Answered
I	2	1
II	2	1
III	2	1

### PRACTICALS:

Evaluation of Marks for Practicals:

a.	Laboratory Note Book	3
b.	Theory	3
c.	Circuit diagram and Tabulation	4
d.	Result and Precaution	3
e.	Viva Voce	6
	<b>Total</b>	<b>19</b>
f.	Internal	6
	<b>Total</b>	<b>25</b>

## **15. ENGLISH**

### **Preface**

The FYUG programme in English, up to the second semester, comprises two Major/ Minor Courses, two Ability Enhancement Courses (AEC) and one Multi-Disciplinary Course (MDC). There are five papers and 17 credits with a total of 425 grade points over two semesters. The Major/ Minor Courses, being subjects in a core discipline and comprising Introduction to English Literature and British Poetry: Milton to the Present, are taught in both semesters. So are the Ability Enhancement Courses, comprising Alternative English in the first semester and Communicative English in the second. The Multi-Disciplinary Course, comprising Introduction to Theatre and Performance, is taken up in the second semester.

The two Major/ Minor Courses are designed to introduce students to the origin and development of English literature and provide a comprehensive guide to English poetry, its development, forms and movements over the ages. So is the Alternative English paper under AEC. Communicative English is designed to train students to develop their communication skills in dealing with modern-day situations. The Introduction to Theatre and Performance will introduce students to the basic concepts of Theatre and Performance.

### **Programme Outcome**

Through Major/ Minor Courses and the Alternative English paper, the students will gain the aptitude to read and understand various literary texts and genres, thus enabling them to think critically and demonstrate a coherent and systematic knowledge of the different aspects of the English language and literature. In addition, Communicative English will help them develop effective communication skills, while Introduction to Theatre and Performance will help them gain the ability to translate dramatic theory into practice.

## **ENG-100: INTRODUCTION TO ENGLISH LITERATURE**

**(Contact Hours: 60, Credits: 4)**

The course is designed to introduce students to the origin and development of English literature. It will offer a broad overview of the major literary movements from the old English period to postmodernism and the present era with brief descriptions of key works. By introducing students to the broad categories of poetry, drama and fiction, the course will help them develop an understanding of major genres, literary tendencies and important socio-political movements of the various ages.

### **Course Objectives:**

1. To equip students with the ability to understand and engage with various literary and critical concepts and categories.
2. To enable students to read texts with close attention to themes, conventions, contexts and value systems.
3. To train students to situate their reading and their positions in terms of community, class, caste, religion, gender and politics and to develop their understanding of the global and local.
4. To inculcate in students the ability to communicate ideas, opinions and values and to expand their knowledge of the subject as it moves from the classroom to life and life-worlds.
5. To develop critical thinking and ethical awareness in students.

### **Learning Outcomes**

The students will gain the aptitude to read and understand various literary texts and genres, thus enabling them to think critically and demonstrate a coherent and systematic knowledge of the different aspects of English language and literature. They will also develop a keener literary judgement and a clearer understanding of literary and ethical values.

### **UNIT I: Introduction to the Literary Periods**

(This unit will focus only on the major movements, providing a brief outline—about 400 words—of each.) \*

#### Literary Periods:

1. Old English (450-1066)
2. Middle English (1066-1500)
3. The Renaissance (1500-1660)
4. The Elizabethan Age (1558-1603)
5. The Jacobean Age (1603-1625)
6. The Restoration Period (1660-1700)
7. The Romantic Period (1785-1832)

8. The Victorian Period (1832-1901)
9. Modernism (1914-1945)
10. Postmodernism (1945 to the Present)

\* Sample outlines are available. See “Christian, et al.” in Suggested Reading.

## **UNIT II: Introduction to English Poetry**

(This unit will focus on prominent genres—providing a brief outline of each—relevant literary terms and select texts.)

### Brief Outlines of Poetry Genres:

1. Lyric (Elegy, Dirge, Sonnet, Ode)
2. Narrative Poetry (Ballad, Epic, Mock Epic, Allegory)
3. Didactic Poetry (Satire)
4. Epistolary Poetry
5. Pastoral Poetry
6. Dramatic Poetry (Dramatic Monologue)

### Representative Poets and Texts (14<sup>th</sup> to 17<sup>th</sup> Century)

- a. Geoffrey Chaucer: “The Tale of the Wyf of Bathes”
- b. William Shakespeare: “Sonnet 18”
- c. John Donne: “The Sunne Rising”
- d. Abraham Cowley: “Platonic Love”

## **UNIT III: Introduction to English Drama**

(This unit will focus on prominent genres—providing a brief outline of each—relevant literary terms and a select text.)

### Brief Outlines of Drama Genres:

1. Mime Theatre
2. Morality Play
3. Tragedy
4. Comedy
5. Tragi-comedy
6. Historical Play
7. Melodrama
8. Mystery Play
9. Theatre of the Absurd
10. Street Theatre

### Representative Playwright and Text (16<sup>th</sup> Century)

William Shakespeare – *The Merchant of Venice*

## **UNIT IV: Introduction to English Fiction**

(This unit will focus on prominent genres—providing a brief outline of each—relevant literary terms and a select text.)

Brief Outlines of Fiction Genres:

1. Realistic Fiction
2. Romance
3. Picaresque Novel
4. Epistolary Novel
5. Historical Fiction
6. Science Fiction
7. Speculative Fiction
8. Crime/ Mystery
9. Magic Realism
10. Young Adult Fiction

Representative Author and Text (18<sup>th</sup> Century)

Daniel Defoe: *Robinson Crusoe*

**Suggested Reading**

Alexander, Michael. *History of English Literature*. Macmillan Press Ltd., 2000.

Allison, Alexander, et al., ed. *The Norton Anthology of Poetry*. W. W. Norton and Company, 1983.

Christian, et al., ed. "Literary Movements". 13 May 2023, StudySmarter, [www.studysmarter.co.uk/explanations/english-literature/literary-movements/](http://www.studysmarter.co.uk/explanations/english-literature/literary-movements/)

Defoe, Daniel. *Robinson Crusoe*. Fingerprint Publications. 2017.

Mangan, Michael. *A Preface to Shakespeare's Comedies*. Routledge, 1996.

Prasad, B. *A Background to the Study of English Literature*. Macmillan Ltd., 2010.

Robert Scholes, et al., ed. *Elements of Literature*. Oxford University Press, 2004.

Sampson, George. *The Concise Cambridge History of English Literature*. Cambridge University Press, 1946.

Sanders, Andrew. *Oxford History of English Literature*. Oxford University Press, 2005.

Shakespeare, William. *The Merchant of Venice*. Dover Publications Inc., 1995.

Stephen Greenblatt, et al., ed. *The Norton Anthology of English Literature. Vol. A, The Middle Ages*. W.W. Norton & Co. Ltd., 2006.

## **ENG-150: BRITISH POETRY: MILTON TO THE PRESENT**

**(Contact Hours: 60, Credits: 4)**

This course is a continuation of *Introduction to Poetry* dealt with in the first Semester. It is intended to provide a comprehensive guide to English poetry, its development, forms and movements over the ages. Beginning with Milton, it moves on to the Metaphysical Poets, represented by John Donne, and the Augustan period, represented by Alexander Pope. The Romantics are represented by Gray, Blake and Keats, the Victorians by Browning and Hardy, offering students the scope to view their poetry against the background of a clash between faith and scepticism, hope and despair.

The course is also designed to familiarise students with the “new” poetry which came into being at the beginning of the twentieth century in the UK, which embodies the crisis, disillusionment, and radical scepticism of the times. Beginning with Yeats and Eliot, the course includes English, Welsh and Irish poets, who add a “regional” flavour to the complexity and exciting diversity of Modern English Poetry.

### **Course Objectives**

1. To provide a comprehensive guide to English poetry, its development, forms and movements over the ages.
2. To familiarise students with the “new” poetry, which came into being at the beginning of the 20th Century in the UK.
3. To equip them with the ability to understand and appreciate the various elements and aspects of poetry.
4. To encourage reading and discussion of poetry as a means to explore issues of identity, culture, human relationships, nature and topics relating to life and customs.

### **Learning Outcomes**

This course will help students gain expertise in the study of poetry, its various elements, genres, techniques and devices. By engaging in close reading and analysis of literary texts, students will develop their critical thinking skills, thus inculcating the spirit of enquiry and questioning in them. Further, students will be provided with the relevant materials in their endeavour to explore culture, history, and human values.

### **UNIT I**

1. John Milton: “Paradise Lost” (Book I, lines 1-125)
2. Alexander Pope: “Ode on Solitude”
3. Thomas Gray: “Elegy Written in a Country Churchyard”

### **UNIT II**

1. William Blake: “The Lamb” and “The Tyger”



2. John Keats: "Ode to Autumn"
3. Robert Browning: "My Last Duchess"

### UNIT III

1. Thomas Hardy: "Let Me Enjoy"
2. William Butler Yeats: "The Second Coming"
3. T. S. Eliot: "Whisper of Immortality"

### UNIT

### IV

1. Ted Hughes: "A Woman Unconscious"
2. Seamus Heaney: "Digging"
3. Lynne Rees: "Never"

### Suggested Reading

Bloom, H. *The Best Poems of the English Language*. Harper Collins, 2004.

Bowra, C. M. *The Romantic Imagination*. OUP, 1999.

Bromwich, David. *Skeptical Music: Essays on Modern Poetry*. University of Chicago Press, 2001.

Corcoran, Neil. *English Poetry since 1940*. Longmans, 1993

Corns, T. N., ed. *The Cambridge Companion to English Poetry*. Cambridge University Press, 1973.

Draper, R. P. *An Introduction to Twentieth-Century Poetry in English*. St Martin's Press, 1999.

Duran, Angelica: *Concise Companion of Milton*, Blackwell, 2006.

Frye, N. *Fearful Symmetry: A Study of William Blake*. University of Toronto Press, 2004.

Neill, E. *Trial by Ordeal: Thomas Hardy and the Critics*. Columbia Camden House, 1999.

Keats, John. *Complete Poems and Selected Letters of John Keats* (with an Introduction by Edward Hirsch). Modern Library, 2001.

Howarth, Peter. *British Poetry in the Age of Modernism*. Cambridge University Press, 2005.

Keating, P. J. *Robert Browning: A Reader's Guide*. Writers & Their Background Series, 1974.

Manning, Peter. *Reading Romantics: Texts and Contexts*, Viking, 1990.

Perkins, David. *A History of Modern Poetry (2 Volumes)*. Harvard University Press, 1987.

## 16. ENVIRONMENTAL SCIENCE

### **Preface**

The objective of the programme is to expose students to the wide knowledge base of the environment, its components and the principles operating therein. The students will also gain specialized knowledge on contemporary environmental issues and problems so as to attempt in solving them, and also will disseminate the same to the society. The programme will enable the students to develop analytical skills, investigation capabilities and hone their decision-making skills in the areas of environmental Science.

Students will also take part in practical sessions which are focused on laboratory techniques that allow them to acquire lab skills. The practical skills are critical and indispensable to effective holistic learning and will enable them to engage effectively with advanced laboratory modules and prepare them for future employment.

### **Programme Outcome (POS):**

Upon completion of this programme the student will be able to

PSO1 Academic competence: Understand fundamental concepts, principles and processes underlying the field of Environmental Science, its interdisciplinary nature and create and disseminate knowledge to the students about environmental problems at local, regional and global scale and demonstrate an understanding of a wide range of Environmental techniques

Students will acquire knowledge, competent professionals with a strong foundation of Environmental Science and application to be suitable for vital positions in the academia, industry, government and non-government institutions as skilled manpower.

PSO2 Personal and Professional Competence: They will become effective scientific communications /collaborators in multidisciplinary teams providing technical leadership to engage with the challenging environmental problems of local, national and global nature. Employ skills in specific areas related to Environmental Science such as industrial pollution, Green technology development, Ecological, health, agriculture and ensure multilevel commitment to health and wellbeing of the society at large.

PSO3 Research Competence: Apply environmental data analysis methodology in order to conduct research and demonstrate appropriate skill to seek innovative solutions to problems that emerge in various fields of Environmental Science.

## **EVS-100: CONCEPTS AND COMPONENTS OF ENVIRONMENT**

**(Contact Hours: 75, Credits: 4)**

**Course Objective:** To introduce the concepts and components of environment, composition and structure of atmosphere, lithosphere.

**Learning Outcomes:** Student should be able to gain the knowledge about the environment, its components and functions.

**Unit I:** Environment: Definition, concept and importance; Scope of Environmental Science; Multidisciplinary nature of Environmental Science; Man - Environment Relationship; Need for environmental awareness; Applications of and Career in Environmental Science. **(Contact hours: 15 hrs.)**

**Unit II:** Atmosphere: Composition and structure; Heat budget; Lapse Rate; Inversion of Temperature. Weather and climate: Wind and pressure systems; Major climatic zones of the world; Tropical cyclones; Ocean currents; Western disturbances; El Nino and La Nina. Clouds: Formation and classification. **(Contact hours: 15 hrs.)**

**Unit III:** Lithosphere: Internal Structure of the earth; Earth's Crust and its composition; Plate tectonics: evidences and boundaries; Continental drift. Minerals and Rocks: Definition, types and usages; Rock Cycle. Hydrosphere: Types of water; Properties of water; Distribution of water; Hydrological cycle; Aquifer and water table. Zonation of Hydrosphere: lentic, lotic and marine. **(Contact hours: 15 hrs.)**

**Unit IV:** Identification of minerals and rocks; Plotting of Climograph (line & bar diagram method) and Hythergraph (G. Taylor's 12sided polygon method); Measurement of rainfall and wind speed; Estimation of moisture, temperature and conductivity of soil; Determination of transparency, temperature, pH and conductivity of water; Visits to institutions/centers of environmental significance. **(Contact hours: 30 hrs.)**

**Suggested readings:** ( All latest edition)

Anjaneyulu, Y. Introduction to Environmental Science. BSP Books Pvt. Ltd., Hyderabad.

Botkin, D.B. and Keller, E.A. Environmental Science: Earth as a Living Planet. John Wiley and Sons, New Delhi.

Cunningham, W.P. and Saigo, B.W. Environmental Science – A Global Concern. WCB/McGraw Hill, New York.

Lal, D.S. Climatology. Sharda Pustak Bhawan, Allahabad.

Lal, D.S. Physical Geography. Sharda Pustak Bhawan, Allahabad.

McKinney, M.L., Schoch, R. and Yonavjak, R.M. Environmental Science Systems and Solutions. Jones & Bartlett Publishing Inc., Delhi.

Purohit, S.S., Shammi, Q.J. and Agarwal, A.K.A Textbook of Environmental Science. Students Edition, Jodhpur.

Sharma, P.D. Ecology and Environment. Rastogi Publication, Meerut.

Singh, S. Environmental Geography. Prayag Pustak Bhawan, Allahabad.

Maiti, S.K. Hand Book of Methods in Environmental Studies. Vol. I & II. ABD Publishers, Jaipur.

Michael, P. Ecological Methods for Field and Laboratory Investigation. Tata McGraw Hill, New Delhi.

Misra, R. Ecology Workbook. Oxford & IBH Publications Co., New Delhi.

## **EVS-150: POPULATION AND COMMUNITY ECOLOGY**

**(Contact Hours: 75, Credits: 4)**

**Course Objective:** To give students an understanding regarding the various pollution sources in environment and their effect on environment and life.

**Learning Outcomes:** Students should get a clear idea regarding pollution, pollutants and their various effects on humans as well as ecosystem which will make them careful in future.

**Unit I:** Ecology: Definition of ecology; Division of ecology; Ecological factors: biotic and abiotic (light, temperature, precipitation, fire) factors; Shelford's law of Tolerance; Leibig's Law of minimum; Ecological amplitudes, ecotypes, ecoclines, ecological niche. **(Contact hours: 15 hrs.)**

**Unit II:** Population Ecology: Concept and characteristics of population: natality, mortality, age structure, population pyramids, population density, population dispersion, population growth, life table and survivorship curves; Carrying Capacity of the Earth. Population interactions: competition, predation, parasitism, symbiosis, commensalism, mutualism, and ammensalism. **(Contact hours: 15 hrs.)**

**Unit III:** Community Ecology: Concept of community, classification; Community structure: horizontal and vertical stratification. Community Characteristics; Analytical Characters of community: qualitative and quantitative; Methods of study of community. Ecological Succession: Concept, processes, stages and types of successions; Examples of succession; Concept of Climax; Climax communities; Climax Theories: Monoclimax and Polyclimax. **(Contact hours: 15 hrs.)**

**Unit IV:** Determination of requisite size and number of quadrats for vegetation analyses; Determination of frequency, density and abundance of species in a grassland community; Calculation of IVI of plant species in a grassland community; Qualitative and quantitative analyses of planktons; Determination of chlorophyll content. **(Contact hours: 30 hrs.)**

**Suggested Readings:**(All latest edition)

- Ambast, R.S. A Textbook of Plant Ecology. Students, Friends and Co., Varanasi.  
Arora, M.P..Ecology. Himalaya Publishing House, New Delhi.  
Chapman, J.L. and Reiss, M.J.Ecology - Principles and Applications. Cambridge University Press, Cambridge.  
Dakshini, K.M.M. and Foy, C.L. Principle and Practices in Plant Ecology. CRC, Boston. Misra, Dash, M.C. and Dash, S.P. Fundamentals of Ecology. Tata McGraw Hill Publishing Company Ltd., New Delhi.  
Miller, G.T. and Spoolman, S. Essentials of Ecology. Brooks/Cole Learning, USA.  
Odum, E.P.Fundamentals of Ecology. Nataraj Publisher, DehraDun.  
Kormondy, E.J. Concepts of Ecology. Fourth Edition. Prentice Hall of India, New Delhi.  
Rana, S.V.S. Essentials of Ecology and Environmental Science. Prentice Hall of India, New Delhi.  
Michael, P. Ecological Methods for Field and Laboratory Investigation. Tata McGraw Hill, New Delhi.  
Misra, R. Ecology Workbook. Oxford & IBH Publications Co., New Delhi.  
Sharma, P.D. Ecology and Environment. Rastogi Publications, Meerut.  
Tripathi, B.D. and Govil, S.R. Water Pollution (An Experimental Approach). CBS Publishers and Distributors, New Delhi.

## 17. FISHERY SCIENCE

**About the programme:**

Four-year undergraduate program in Fishery Science is a multidisciplinary course that teaches about the discipline of managing and understanding fisheries. The course is just not limited to the conservation of fishes but also imparts knowledge about catching, managing, breeding, and marketing of the fishes. Some of the subjects, which will be taught in this course include navigation and seamanship, gear and craft engineering, marine engines, fisheries economics and management and fisheries science extension along with fish taxonomy, fish anatomy, fish physiology and biochemistry, fish breeding, genetics, biotechnology, nutrition, and shellfish fisheries.

**Programme Outcomes (POs):**

Programme Outcomes include:

- To provide students with a broad understanding on the principles of fisheries science.
- To provide students with the knowledge and skills necessary to manage fisheries resources.
- To provide students with the knowledge and skills necessary to conduct research in fisheries science.
- To provide students with the knowledge and skills necessary to communicate effectively about fisheries science.

- Students, after completing this 4 years UG course, will have opportunities to engage in various jobs like Assistant Director, Research Assistant and Fisheries Inspector, Assistant Fisheries Development Officer, Fisheries Extension Officer, and District Fisheries Development Officer, Fish Exporter, Marine Biologist & Marine Scientist, Fish Trader, Fish Breeder, Hatchery/Farm Operator, Bio Scientists, Fisheries Researchers, Aqua Culturists, Educators, Environmental Consultants and Planners, Conservation Officers, and many others.

## **FSC-100: INTRODUCTION TO FISH AND FISHERIES**

**(Contact Hours: 60, Credits: 4)**

### **Course Objectives:**

- To impart the knowledge of fishery science and to make use of the knowledge in the daily life of students.
- To make the students aware of natural resources and environment.
- Application of knowledge in fisheries for nutrition, agriculture and livestock.

### **Learning Outcomes (LOs):**

On completion of the course, students will be able to:

- Understand about different characteristics of fishes, biochemical composition of fish with relative and medicinal value of both freshwater and marine fish.
- Classification of different fish groups with evolution of fish.
- Diversity of fish population, anatomy, types of scales and fins that are present in fish and their functional differences, colourations of fish etc.
- Dependence on fish culture, livelihood, global fisheries and fish culture, and the scope of fish and fishery industry in India.
- Enhancement of collaborative learning and communication skills through practical sessions,

**Unit I: Fish as food commodity:** Concept of fish: Characteristics of fishes; Biochemical composition of fish; Types of macro and micro components of fish flesh (Proteins, carbohydrates, fats, vitamins, minerals and water). Importance of fish to mankind: Nutritive and medicinal value of fish.

**Unit II: Major groups of fishes:** Affinities and evolution of fishes; Agnatha: Ostracoderms, lamprey and hagfishes; Gnathostomata: Placoderms, Chondrichthyes and Osteichthyes.

**Unit III: Fish morphology:** General external morphology: Diversity of body forms and compensation factors; Fins: Fin types and function; Types of scales, colouration and its significance.

**Unit IV: Fisheries sector:** Livelihood security and employment generation; Global fisheries and aquaculture; Fisheries in India: Present status and future trend.

**Suggested Readings:**

1. Francis D. (2007). The fishes of India, Vol 1 & 2. Jagminder Book Agency, New Delhi.
2. Jayram K.C. (2002). The fresh water fishes of India, A hand book. Zoological Survey of India.
3. Kar D. (2012). Taxonomy, APH Publishing Corporation, Ansari Road, Darya Ganj, New Delhi-110002.
4. Kar D. (2013). Essentials of Fish Biology. Dominant Publishers and Distributors(p) Ltd, Delhi-110053
5. Khanna. S.S. and Singh H.R. (2005). A Textbook of Fish Biology and Fisheries. Narendra Publishing House, Delhi-6.
6. Kumar S. and Tembhre M. (2010). Fish and Fisheries. New Central Book Agency.
7. Lagler K.F. (1981). Fresh Water Fishery Biology. 2<sup>nd</sup> edition. W. M. C. Brown Company Publishers, Dubugur, IOWA.
8. Moyle P.B. & Cech J.J. Jr. (2011). Fishes: An Introduction to Ichthyology. 5th edition. Prentice Hall India Learning Private Limited;
9. Norman, J.R. (2002). A history of fishes: a complete known account of fishes. Asiatic publishing House, Delhi.
10. Parihar R.P. (2004). A Text book of Fish Biology and Indian Fisheries. Central Publishing House, Allahabad
11. Sandhu G.S. (2005). A Text book of Fish and Fisheries. Daya Publishing House, New Delhi-35.
12. Sharma J. (2006). Fishes: Aid to collection and identification. Daya Publishing House, New Delhi-35.
13. Shukla A.N. (2009). Physiology of Fishes. Discovery Publishing Pvt. Ltd.
14. Srivastava C.B.L. (2006). A Text Book of Fishery Science and Indian Fisheries. Kitab Mahal; Classic Edition.
15. Tonapi G.T. (1980). Freshwater Animals of India. Oxford and IBH Publishing Company.
16. Yadav B.N. (2002). Fish and Fisheries, 2<sup>nd</sup> revised and enlarged ed<sup>n</sup>. Daya Publishing House, Delhi – 35.

## FSC-150: FUNDAMENTALS OF AQUATIC ECOLOGY

(Contact Hours: 60, Credits: 4)

### Course Objectives:

- To know the brief amount of component of aquatic system.
- To know the animal association and their environment.
- To know Disaster management in Fisheries-Basic concept.

### Learning Outcomes (LOs):

Upon completion of the course, students will be able to:

- Understand better about components of different ecosystem that are favourable to fish culture of different fish species, and also the diversity of aquatic ecosystem.
- Will be able to understand better on basic concepts of primary and secondary productivity, food chain and energy flow.
- Should be able to classify lakes depending upon the circulation, thermal stratification and on different biogeochemical cycles.
- Will understand better about eutrophication, their causative factors and their control.
- Physicochemical and biological differences between oligotrophic and eutrophic water bodies.

**Unit I: Introduction:** Basic concept of aquatic ecology; Components of the aquatic ecosystem: Fresh water (lotic and lentic), Estuarine (tidal marine, tidal brackish and tidal fresh-brackish) and Marine (epipelagic, mesopelagic, bathypelagic, abyssopelagic and the hadal zone). Diversity of the aquatic eco-system.

**Unit II: Trophic dynamics I:** Biological Productivity: Basic concepts, primary productivity and secondary productivity; Food chains, energy flow and trophic relationships in lentic and lotic biotopes.

**Unit III: Trophic dynamics II:** Classification of lakes, types of lakes based on circulation; Thermal stratification and overturn; Biogeochemical cycle: Nitrogen cycle, Carbon cycle and Phosphorous cycle of lentic system.

**Unit IV: Ecological succession:** Eutrophication: Causative factors, consequences and control; Physico-chemical and biological differences between oligotrophic and eutrophic water bodies; Macrophytic succession.

### Suggested Readings:

1. Moyle P.B. and Cech J.J. Jr. (2011). Fishes: An Introduction to Ichthyology. 5th edition. Prentice Hall India Learning Private Limited.



2. Francis D. (2007). The fishes of India, Vol 1 & 2. Jagminder Book Agency, New Delhi.
3. Jayram K.C. (2002). The Fresh Water Fishes of India, A hand book. Zoological Survey of India.
4. Sharma J. (2006). Fishes: Aid to Collection and Identification. Daya Publishing House, New Delhi-35.
5. Kar D. (2013). Essentials of Fish Biology. Dominant Publishers and Distributors Pvt Ltd, Delhi-110053
6. Kar D. (2012). Taxonomy, APH Publishing Corporation, Ansari Road, Darya Ganj, New Delhi-110002.
7. Khanna S.S. and Singh H.R. (2005). A Textbook of Fish Biology and Fisheries, Narendra Publishing House, Delhi-6.
8. Kumar S. and Tembhe M. (2010). Fish and Fisheries. New Central Book Agency.
9. Lagler K.F. (1981). Fresh Water Fishery Biology. 2<sup>nd</sup> edition. W. M. C. Brown Company Publishers, Dubugur, IOWA.
10. Norman J.R. (2002). A History of Fishes: A Complete Known Account of Fishes. Asiatic publishing House, Delhi.
11. Parihar R.P. (2004). A Text book of Fish Biology and Indian Fisheries. Central Publishing House, Allahabad
12. Sandhu G.S. (2005). A Text book of Fish and Fisheries. Daya Publishing House, New Delhi-35.
13. Shukla A.N. (2009). Physiology of Fishes. Discovery Publishing Pvt Ltd.
14. Srivastava C.B.L. (2006). A Text Book of Fishery Science and Indian Fisheries. Kitab Mahal; Classic Edition.
15. Tonapi G.T. (1980). Freshwater Animals of India. Oxford and IBH Publishing Company.
16. Yadav B.N. (2002). Fish and Fisheries, 2<sup>nd</sup> revised and enlarged ed<sup>n</sup>. Daya Publishing House, Delhi – 35.

## 18. GARO

### Preface

Ia programmeo poraigiparangna A·chikkuchi sea jotani dingtang dingtang rokomrang, jekai ku·akma, poedo, dakmesokani, songsarni golporangaro folkloreko mesoke on·na miksonga. A·chikkuona Bengali, Hindi, English aro gipin ku·sikranganiko pe·skae A·chik sea jotanio bariatniko u·iatna miksonga. Sea jotanio nama namgijaniko skie ra·na man·gen. Iana agreba A·chik ku·sikni bidingo poraiani, jatni dakbewal, tangbewal, A·chik Grammar aro Compositionko skie ra·aniko man·chapa. Changa sapani aro dakna man·ani bilko bariatna skianikoba on·gen.

(The programme is designed to introduce to the students various genres of Garo Literature, like Garo prose, poetry, drama, fiction and folklore. It also aims to familiarize students with the development of Garo literature through translation from Bengali, Hindi, English and other language into Garo; and mostly through English as a filter language. The course will also introduce and expose students with an understanding of literary theory and criticism. It also includes courses on Garo language study, culture, Garo Grammar and Composition. Courses on skill enhancement and ability enhancement of students also included.)

### PoraieMan·ani:

- A·chiku Sea-jotani dingtang dingtang rokomrangni namoroani bidingo ma·siani barigen.
- A·chikku segipa jotgiparangni seani rokom bewal aro katta jakkalanirangko ma·sie ra·gen.
- Pe·skae seanichi A·chikkuni ma·ambi, sea-jotani tangdoaniko poraigiparangna ma·siatna aro pe·skae seaniko dakani bidingo u·iatgen.
- A·chikkuchi name agangrikna man·ani aro A·chik Grammarni bidingo poraigiparang ma·sigen.
- Poraigiparango namgipa dakbewal, jatna a·songna ka·saani aro a·songko rikaniko gisiko ong·katatgen.

### (Programme Outcomes:

- Enable students to develop the understanding of different genres of Garo literature.
- To equip students to understand the themes and styles of Garo authors and poets.
- Enable students to have an overview of the history and development of Garo literature through translations along with the knowledge of aspects of translation.
- Students will be equipped with the knowledge of Garo grammar as well as the communicative competence.

- Inculcate in the minds of students the spirit of human values, patriotism and nation building.)

## **GAR-100: INTRODUCTION TO GARO PROSE AND POETRY**

**(Contact Hours: 60, Credits: 4)**

Ia course poraigiparangna ku·ritingchi aganrikrikgipa ku·akma aro poedo segiminrangko poraina tarigipa ong·a. Poraigiparangna chasong gitalni adita mongsonggipa A·chik poedo ki·taprangko poraina on·gen.

### **Courseni Miksonganirang:**

- Poraigiparangna A·chik ku·akma, chasong git Chamni poedorangni namroroani aro uni gunrangko u·iatgen.
- Poraigiparangko A·chik poedo segiparangni katta bichong aro seani bewalrangko u·iatna tariani
- Poraigiparang textko ning·tubate u·ina gita rhetoric aro prosodyko jakkalna tarigen.

### **Poraie Man·ani:**

Ia paper poraigiparangna A·chik ku·akma aro poedoko nigope ma·ambi aro namroroaniko u·ina dakchakgen. Poraigiparang rhetoric aro prosodyn adita mongsonggiparangko jakkaleA·chik ki·taprangko maikai sandirikkite poraina (critical interpretation) man·a uko skie ra·gen.

### **Unit-1: Ku·akma (Prose)**

Kroshnil D. Sangma: Katta Wal·tim

1. Katchini Kni Tom·gija
2. Salgra Gitok Chika
3. Abet Rangge
4. Tobeng
5. Rel Aragondi
6. Mijanggi Gnang
7. Mini Rasong Kata,
8. Jumango Paraka
9. Chram Anti Wari Chidit
10. Saman Rakgipa

### **Unit-II : Chasong Git Chamni Poedorang (Traditional Poetry)**

Harendra W. Marak: A·chik Aganbewalrang

Dani  
Dimrimbri Pal·wang A·dingko Katchini Anti Kaa  
Jumang Matpu Nika  
Gongani Kilbolma Supea  
Churugala aro Sasat So·a

### **Unit-III: Chasong Gitalni Poedorang (Modern Poetry)**

Lindrid D. Shira: A·chik Poedorang - I

Mikjumang A·gilsak	Jonmoni D. Shira
Angni Gisik	Couplane G. Momin
Matgrik Mil·am Sepi Gitcham	Johindra Ch. Marak
Ketket Rim·bo	K. D. Shira
Chengoni Manderang	Monensing R. Sangma

### **Unit- IV:**

Viola Sonachi B. Sangma: Rhetoric & Prosody

Bak – I Janapchengani  
Bak- II Apsan Ong·ao Pangchakgipa Bimangrang  
Bak-IV Dingtanggrikao Pangchakgipa Bimangrang  
Bak-V Gisikni Bimang Dakao Pangchakgipa Bimangrang  
Bak- VI Tongtong Ong·gijanio Pangchakgipa Bimangrang  
Bak-VII Gam·anio Pangchakgipa Bimangrang  
Bak-VIII Banaiani/ Rikanio Pangchakgipa Bimangrang  
Bak- IX. Namgipa Compositionko Sena Sapani

### **Suggested Reading:**

Chandra, N. D. R. & A. J. Sebastian :*Literary Terms in Poetry*. Authorpress, New Delhi, 2001  
Hudson, William Henry *An Introduction to the Study of Literature*, Kalyani, New Delhi, (Reprint 1996)  
Marak, Caroline R. *Influence of English on Garo Poetry*, Scholar Publishing House (P) Ltd., New Delhi, 1985.  
Marak, Gilberth K. *Ang' Gisik Ku·aning Bidol-I*. Author, Tura, 2002  
Marak, Harendra W. *A·chik Aganbewalrang* (Original Tales of the Garos). NEHU Publications, Shillong, 1983 (2<sup>nd</sup> Ed)  
Marak, Julius L. R. *Atchu Ambini Ku·bisring*. Author, Rongjeng, 2004  
Sangma, Brucellish K. *Sea Jotani Bidingo Seanirang*, Author, Tura, 2005  
Sangma, Brucellish K. *Sea Jotani Bidingo Seanirang*, Author, Tura, 2005  
Sangma, Kroshnil D. *Katta Wal·tim*. Tura Book Room, Tura, 1982 (8<sup>th</sup> Ed.)

Shira, Lindrid D. *A·chik Poedorang -1, L. D. Shira (Compiler)*, Garo Hills Book Emporium, Tura, 1994 (3<sup>rd</sup> Ed.)

Shira, Lindrid D. *Gisik Matgrikrang*. Author, Tura, 1993

Sangma, Viola Sonachi B. *Rhetoric & Prosody*, Author, Panthi Offset Printer, Tura, 2015

## **GAR -150: ORAL NARRATIVES & FOLKLORE**

**(Contact Hours: 60, Credits: 4)**

Ia paper oral aro folkloreni bakrangko talataniko on·a, jean A·chikku sea-jotanio mongsonggipa ong·a. Ia paper jatni dakbewal-tangbewalrangko segipa ki·taprangchi A·chikrangni ku·ritingo agananirang aro folkloreni talataniko on·gen. Ia paper kinggittam mongsonggipa chimonggimin A·chikkuchi aganritinganirango D.S.Rongmuthu, Dhoronsing K.Sangma aro Aldrich Ch. Mominni segimin ki·taprangko man·chapa.

### **Course-ni Miksonganirang:**

Ia course poraigiparango A·chikrangni ku·ritingchi ripingbagipa aro folkloreni gimin u·iatna tariaha. Ia papero poraigiparang ku·ritingchi aganrikrike ripingbagiminni gunrangko, folklore aro uni bakrang, mongsongbate jatni golpo aro mythrangko u·ie ra·gen. Ia paper poraigiparango jatni dakbewal-rikbewal, golpo, toe skiani, ku·ritingchi aganrikrikbaanirang aro legendrangni gimin u·ina dakchakgen.

### **Poraie Man·ani:**

Ia paper poraigiparango A·chikrangni ku·ritingchi agane ripingbaaniko skie ra·na dakchakgen. Poraigiparang A·chik mythology, bebera·ani aro nika niani bidingo mongsonggipa u·ianiko man·gen. Poraigiparang maikajjatni sea jotani aro ku·ritingchi agananiko sea-jotani, A·chik sea-jotani aro ku·ritingchi aganrikrikani bewalko taria aro bil man·a uko skie ra·gen.

### **Unit - 1 :**

D. S. Rongmuthu: Apasong Agana –Bakdilmong -I

A·ko Doka Chiko Gina  
Misini Dedrang A·ningni dedrangko Gro Dinga  
Susimemani Siani Salo  
Banggria  
Wa·alko Ba·a

**Unit - II:**

D. S. Rongmuthu : Apasong Agana - Bakdilmong -II

Miko Man·chengani  
 A·ba o·e Game Cha·chengani  
 Muniko Man·chenga  
 Marangni Atchia  
 Silchiko Man·chenga

**Unit - III**

Dhoronsing K. Sangma : A·chik Golporang Bak – I

Do·uang  
 Do·kuaming Mese  
 Peru Am·pak Kika  
 Nokmana Bisi Tikja  
 Mat An·chi Pila

**Unit -IV**

Aldrich Ch. Momin : A·chikni Ku·andik

Man·e Cha·gipa Manderangni Manianirang  
 Gipin Manianirang aro Dakbewalrang.

**Suggested Reading:**

Handoo, Jawaharlal *Folklore- an Introduction*. Mysore, Central Institute of Indian Languages, 1989.

Momin. Aldrich Ch. *A·chikni Ku·andik*. Author, 1985

Thomas, Iris Watre *Music & Musical Instruments of the Garo Tribe of North East India*. Akansha House, New Delhi, 2007

Rongmuthu, D.S. *Apasong Agana*. Sharona N. Marak, Tura, 1997 (Reprinted)

Rongmuthu, Dewansing S. *The Folktales of the Garos*. Gauhati University, Gauhati, 1960.

Rongmuthu, Dewansing S. *The Epic lore of The Garos*. Gauhati University, Gauhati, 1967.

Sangma, Smeri Alva B. *Rites of Passage in the Garo Oral Literature*. Akansha, New Delhi, 2012

Sangma, Dhoronsing K.: *A·chik Golporang Bak-I*. Author, Tura, Tura Book Room, 1988

Shira, J.D. *Atchu Ambini Golporang. Toe Skiani Golporangchi Gisikko Matrrame Wil·e Ra·bo*. Garo Hills Book Emporium, Tura, 1993

## **19. GEOGRAPHY**

### **Preface**

The syllabus for Geography at undergraduate level using the Choice Based Credit system has been framed in compliance with model syllabus given by UGC. The broad objective of this syllabus is to enable the students acquire a holistic understanding of the subject matter with emphasis on diverse approaches adopted by geographical sciences in dealing with spatial phenomena concerning both physical and human dimension in their interactive interface. Care has been taken to provide the students with a judicious mix of courses dealing with theories, techniques, and modern technologies in dealing with spatial interaction and research preparedness with an overall aim of inculcating spirit of critical thinking and improving employability through skill development in emerging areas of digital cartography, GIS and quantitative techniques in tune with the changing nature of the subject. Attempts have been made to equip the students with the ability to comprehend both analytical (spatial) as well as synthetic (regional) dimension of geographical knowledge through courses designed to focus on practical applicability of the acquired knowledge in diverse fields of the subject.

### **Programme outcome (PO)**

As an outcome of the syllabus it is expected that the students will be able to advance their level of understanding of geography as a holistic subject with acquired competence and expertise dealing with space and spatial issues and find solutions to the problems that concern global inequality, climate change, environmental degradation, pollution, hazards and disasters, bio-diversity loss, urbanisation, crowding, social and ethnic conflicts etc. at different levels of spatial hierarchy- from global to local.

### **GEO-100: INTRODUCTION TO HUMAN GEOGRAPHY**

**(Contact Hours: 60, Credits: 4)**

*Objective: To enable the students to understand the major themes in human geography*

*Learning Outcome: Students will acquire an understanding and appreciation on the relationship between geography and society*

### **Unit I - Introduction**

Geography and its branches; geography as a study of relationship between human and physical environment (determinism and possibilism); relationship of geography with other disciplines; nature and scope of human geography

### **Unit II - Economic Geography**

Approaches to the study of economic geography; classification of economic activities; types of agricultural practices

### **Unit III - Population Geography**

Growth, distribution, density of human population in the world; concepts of optimum, over and under population; migration - definition, types

### **Unit IV – Political Geography and Social Geography**

History and development of political geography; attributes of states - frontiers and boundaries; concept of geopolitics

Human races and its distribution; languages - classification and distribution; religion - origin and distribution

### **Suggested Readings**

- Bergman. E.F.(1995): **Human Geography-Culture, Connections and Landscape**, Prentice Hall, New Jersey.
- Dikshit R.D. (1994): **The Art and Science of Geography**, Prentice Hall of India, New Delhi.
- Dikshit R.D. (2000): **Geographical Thought-A Contextual History of Ideas**, Prentice Hall of India, New Delhi.
- Dikshit, R.D. (2000): **Political Geography: The Spatiality of Politics**, Tata McGraw Hill, New Delhi.
- Hartshorne, R. (1959): **Perspective on the Nature of Geography**, McNally and Co., Chicago.
- Harvey, D. (1972): **Explanations in Geography**, Edward-Arnold, London.
- Holt, J.A. (2001): **Geography; Its History and Concept**, Longman, London.
- Husain, M. (1984): **Evolution of Geographical Thoughts**, Rawat Publications, Jaipur.
- James, R. (2010): **The Cultural Landscape-An Introduction to Human Geography**, Prentice Hall of India, New Delhi.
- Knox, P.L. and Marston Sallie (2001): **Places and Regions in Global Context: Human Geography (2<sup>nd</sup> Edn.)**, Prentice Hall, New Jersey.
- Singh, L.R. (2002): **Fundamentals of Human Geography**, Sharda Pustak Bhawan, Allahabad.



## **GEO-150: INTRODUCTION TO PHYSICAL GEOGRAPHY**

**(Contact Hours: 60, Credits: 4)**

*Objective: To enable students in understanding the linkages between landscape form and processes, the factors that influence the earth's climate and the relationship between biotic and abiotic components.*

*Learning Outcome: Students will be able to explain the basic principles of the development of landforms through time. It also explains how the physical system plays a role in supporting lifeforms on the earth.*

### **Unit I - Geo-tectonics**

Interior of the earth; geological timescale; continental drift, sea floor spreading and plate tectonics; folds and faults

### **Unit II - Geomorphology**

Development of geomorphology; basic geomorphological concept; geomorphic processes - weathering, erosion and mass wasting; geomorphic forms - fluvial and glacial

### **Unit III - Climatology**

Heat budget; classification of air masses, fronts, cyclones and anti-cyclones; Koppen's scheme of classification of world climates.

### **Unit IV – Oceanography and Biogeography**

Ocean floor configuration (Pacific, Atlantic & Indian); Ocean currents (Pacific, Atlantic & Indian); Coral reefs: classification and distribution

Phyto-geographical and zoo-geographical regions; concept of biome - tropical forest and grassland biomes; ecosystem - food chain, food web and ecological pyramids

### **Suggested Readings**

Ahmad, E.(2001):**Physical Geography**, Kalyani Publishers, New Delhi.

Barry, R.G. and R.J. Chorley (2010): **Atmosphere, Weather and Climate**, Routledge, London and New York.

Critchfield, H. (1975): **General Climatology**, Prentice Hall, New York.

Dayal, P. (1996): **A Textbook of Geomorphology**, Shukla Book Depot, Patna.

Hagget, R. J. (2003): **Fundamentals of Geomorphology**, Routledge, London.

Kale, V.S. and Gupta Abhijit (2001): **Introduction to Geomorphology**, Orient Longman, Calcutta.

Lal, D.S. (2005): **Climatology**, Sharda Pustak Bhawan, Allahabad.

Negi, B.S. (2002): **Climatology and Oceanography**, Kedar Nath Ram Nath, Meerut.

Sarkar, Ashis (2015): **Systematic Geography: A Systematic Approach**, Orient Blackswan Private Limited, New Delhi

Sharma, Y.K. (2007): **Physical Geography**, Lakshmi Narain Agarwal, Agra.

Sharma, R.C. and M. Vatal (2018): **Oceanography for Geographers**, Surjeet Publications, New Delhi.

Thornbury, W.D. (1960): **Principles of Geomorphology**, John Willey & Sons, New York.

## 20. GEOLOGY

### PREFACE

#### **About the Programme:**

The Department of Geology offers a three/ four years Bachelor of Sciences (B.Sc.) in Geology. The course content of B.Sc. in Geology has been designed to impart knowledge in pure and applied aspects of Geology. The programme will help students to extract valuable information stored in rocks, minerals, and fossils.

#### **Programme Outcomes (POs):**

1. Students will understand the fundamental geological theories, principles, and ideas, including the structure of the Earth, its processes, and the interactions of its systems.
2. Develop fieldwork skills including geological mapping, sample collecting, data acquisition, observation, interpretation and analysis of geological features and phenomena.
3. Gain proficiency in mineral and rock identification, and characterization of geological materials. Use quantitative and qualitative methodologies to analyse and interpret geological data, including field observations, lab tests, and geographical data.
4. Students will be able to think critically and solve problems in order to recognise, evaluate, and handle a variety of geological issues, including identifying geological risks, evaluating geological resources, and analysing environmental effects. Use written reports, oral presentations, and graphic representations to convey geological ideas, observations, and findings; work cooperatively with teamwork abilities during fieldwork and project-based tasks.
5. Understand and uphold professional ethics and standards in geology, such as the prudent use of geological resources, the preservation of the environment, and the encouragement of safety during geological studies.
6. Students will gain the ability to adapt to cutting-edge technological developments in order to pursue employment in geology-related industries, such as mineral exploration, environmental consultancy, geological surveys, academia, and research institutes.

This programme will ensure a strong foundation in geology and the fundamental abilities students need to succeed professionally and make contributions to the geosciences industry.

## **GEL-100: INTRODUCTION TO GEOLOGY**

**(Contact Hours: 60, Credits:4)**

**Course Objectives (COs):**To understand the Solar System, the Earth and various features of Earth's surface.

**Learning Outcomes (LOs):** Students will gain knowledge about the Solar System and position of Earth in the solar system along with the concept behind movements of the tectonic plates.

**UNIT I** Introduction and scope of geology. The solar system – Planets, asteroids and meteorites. Earth – its position in the solar system. Internal structure and constitution of the Earth. Hydrosphere, atmosphere and biosphere. Interacting Earth systems.

**UNIT II** Rock cycle. Weathering and erosion and resultant products. Mass wasting. Erosional and depositional landforms associated with water, wind, glacial and coastal processes.

**UNIT III** Continental drift. Plates and Plate tectonics - plate motions, plate boundaries, sea-floor spreading. Rock deformation: folds, faults, joints, and unconformities. Landforms related to active folding and faulting. Earthquakes –mechanism and distribution. Volcanoes – types, products and distribution.

**UNIT IV** Understanding the past from geologic records; Nature of geologic records. Standard Geological time scale and introduction to the concept of time in geological studies; Introduction to geochronological methods and their application in geological studies. History of development in concepts of Uniformitarianism and Catastrophism. Fossils and the process of fossilization.

### **Suggested readings:**

Duff, P. M. D., & Duff, D. (Eds.). 1993. Holmes' Principles of Physical Geology. Taylor & Francis.

Emiliano, C. 1992. Planet earth: Cosmology, Geology, and the Evolution of Life and Environment. Cambridge University Press.

Flint, Richard Foster and Skinner Brian J., Physical Geology 2nd Edition.

Holmes, A., 1959. Principles of Physical Geology, 4<sup>th</sup> edition.

Mukerjee, P.K., A Textbook of Geology.

Plummer, Carlson & Hammersley, Physical Geology 14<sup>th</sup> Ed. McGraw Hill.

Prasad CVRK., Elementary Exercises in Geology, University Press.

Read, H.H. & Watson, J. Introduction to Geology Volume 1: Principles.

Tarbuck, E. J. & Lutgens, F. K., 1998. Earth: An Introduction to Physical Geology. Pearson.

## GEL-150: ROCKS AND MINERALS

(Contact Hours: 75, Credits:4)

**Course Objectives (COs):**To study the geomorphic processes as well as the basic knowledge about rocks and minerals.

**Learning Outcomes (LOs):** Students will gain knowledge about various geomorphic processes as well as common rock forming minerals and origin of Igneous, Sedimentary and Metamorphic rocks.

- UNIT I** Minerals - Definition, perspective, scope and significance. Physical properties of minerals: Properties based on interaction with light (colour, lustre, streak, play of colours, Chatoyancy and Asterism, Luminescence), Mechanical Properties (cleavage, parting, fracture, hardness, tenacity) and Mass related properties (density and specific gravity).
- UNIT II** Rocks- Definitions and types and process of rock formation. Textures and structures.  
Igneous rock - magma generation and differentiation.  
Sedimentary rocks - surface processes and sedimentary environments.  
Metamorphic rocks - factors and types of metamorphism.
- UNIT III** Geomorphology: Energy Flow in Geomorphic System; Volcanic and Karst - processes and landforms. Structurally controlled landforms -Landforms related to active folding and faulting. Drainage: types and patterns.
- UNIT IV**  
**Practical\***  
**(30 hours)**
1. Identification of common rock forming minerals in hand specimens: Quartz, plagioclase, microcline, calcite, garnet, hornblende, biotite, augite, sillimanite.
  2. Identification of some common Igneous, Sedimentary and Metamorphic rocks under hand specimen: granite, basalt, sandstone, limestone, marble, gneiss.
  3. Reading topographical maps of the Survey of India; Identification of some common landforms on topographic maps.

### Suggested Readings:

- Berry, L.G., Mason, B. and Deitrich, 1976. Mineralogy.  
Bloom A.L., 1998. Geomorphology. Prentice-Hall India.  
Datta A. K., An introduction to Physical Geology –Dastane Ram chandra and Co. Pune.  
Deer, W. A., Howie, R. A., & Zussman, J., 1992. An introduction to the rock-forming minerals (Vol. 696). London: Longman.  
Dexter Perkins., 2015. Mineralogy, 3<sup>rd</sup> edition.  
Gribble, C.D., 2005. Rutley's elements of Mineralogy, Springer.  
Homes A.,1993. Principle of Physical Geology 4th Ed., Chapman and Hall, London.  
Hurlbut, C. S., 1944. Manual of Mineralogy. 15<sup>th</sup>Ed., John Wiley & Sons, inc.

Klien C.K., Mineral Science John Wiley & Sons.  
Mukherjee P. K., 1991. A Text Book of Geology CBS Publisher and Dist., New Delhi.  
Plummer, Carlson & Hammersley, Physical Geology 14<sup>th</sup> Ed. McGraw Hill.  
Rathore, B. S., Crystallography, Mineralogy & Geochemistry.  
Raymond, L. A., 2002. Petrology: The study of Igneous, Sedimentary, and Metamorphic Rocks, McGraw-Hill Science Engineering.  
Read, H.H. & Watson, J., Introduction to Geology Volume 1 Principles.  
Rutley's Elements of Mineralogy 27th Ed. – revised by CD Gribbek.  
Thornbury W. D., 1958. Principles of Geomorphology John Wiley and Son.  
Tyrell GW., The Principles of Petrology, Asia Publishing House.  
Verma, V. K., 2002. Lectures on Geomorphology, Pilgrims Book House.

## 21. HINDI

### प्रस्तावना

प्रस्तुत पाठ्यक्रम राष्ट्रीय शिक्षा नीति -2020 के अनुरूप स्नातक स्तर पर समस्त विद्यार्थियों के सर्वांगीण विकास के लिए नियोजित है। प्रस्तुत पाठ्यक्रम के अध्ययन से विद्यार्थी जहां एक ओर उच्च शिक्षा हेतु आवश्यक अर्हता प्राप्त करेंगे वहीं दूसरी ओर उच्च मानवीय गुणों और मूल्यों के अनुशीलन करने में भी सक्षम होंगे। साथ ही राष्ट्रीय हित को सर्वोच्च प्राथमिकता देते हुए एक सर्वसमावेशी समाज के निर्माण में अपनी महत्वपूर्ण भूमिका सुनिश्चित करेंगे।

### HIN-100: हिन्दी भाषा एवं लिपि

(Contact Hours: 60, Credits:4)

*उद्देश्य :* प्रस्तुत पाठ्यक्रम के माध्यम से हिन्दी भाषा के विविध रूपों एवं मानक देवनागरी लिपि का ज्ञान कराया जाएगा और साथ ही हिन्दी भाषा के विकास के विभिन्न चरणों एवं हिन्दी की प्रमुख बोलियों एवं लिपि के मानकीकरण से संबन्धित पाठों का अध्ययन होगा।

*उपलब्धि:* इस पाठ्यक्रम के अध्ययन से विद्यार्थी भाषा के महत्त्व, राष्ट्रीय एकता में भाषा की भूमिका एवं हिन्दी तथा पूर्वोत्तर की भाषाओं के अंतर्संबंधों को समझने में सक्षम हो सकेंगे।

- इकाई 1 भाषा: परिभाषा एवं विशेषताएँ, भाषा के विविध रूप, भाषा के विविध पक्ष, राष्ट्रीय एकता में भाषा की भूमिका।
- इकाई 2 हिन्दी भाषा का विकास: प्राचीन भारतीय आर्यभाषाएँ, मध्यकालीन भारतीय आर्य भाषाएँ।
- इकाई 3 आधुनिक भारतीय आर्य भाषाएँ; हिन्दी की प्रमुख बोलियाँ; पूर्वोत्तर की भाषाओं से अंतर्संबंध।
- इकाई 4 नागरी लिपि: उद्भव एवं विकास, मानकीकरण, गुण-दोष एवं सुधार के उपाय।

## अभिस्तावित पुस्तकें:

1. नागरी लिपि और हिन्दी वर्तनी- अनन्तलाल चौधरी, बिहार ग्रन्थ अकादमी, पटना, 1992 ई.
2. भारतीय आर्य भाषा और हिन्दी- सुनीति कुमार चटर्जी, राजकमल प्रकाशन, दिल्ली, 1954 ई.
3. हिन्दी भाषा और देवनागरी लिपि- धीरेन्द्र वर्मा, हिन्दुस्तानी एकेडमी, इलाहाबाद, 1939 ई.
4. हिन्दी भाषा का उद्भव और विकास- उदय नारायण तिवारी, लोक भारती प्रकाशन, इलाहाबाद, 1995 ई.
5. भाषाविवेचन-भागीरथ मिश्र, साहित्य भवन, इलाहाबाद, 1990 ई.
6. भाषाशास्त्र की रूपरेखा- उदय नारायण तिवारी, भारती भण्डार, इलाहाबाद, 1963 ई.
7. सामान्य भाषा विज्ञान- बाबूराम सक्सेना, हिन्दी साहित्य सम्मेलन, इलाहाबाद, 1984 ई.
8. हिन्दी लिपि की कहानी- डॉ. गुणाकर मुले, राजकमल प्रकाशन, नई दिल्ली, 1974 ई.

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### HIN-150: हिन्दी व्याकरण

(Contact Hours: 60, Credits:4)

**उद्देश्य:** इस पाठ्यक्रम का उद्देश्य विद्यार्थियों को हिन्दी व्याकरण की आधारभूत संरचना के मुख्य घटकों यथा- संज्ञा, सर्वनाम, लिंग, वचन, प्रत्यय, उपसर्ग, समास आदि के साथ भाषा के विविध रूपों का परिचय प्रदान करना है।

**उपलब्धि:** इस पाठ्यक्रम के अध्ययन से विद्यार्थी हिन्दी भाषा के लेखन एवं संवाद में विशेष योग्यता प्राप्त कर सकेंगे, साथ ही हिन्दी भाषा की विविध भूमिकाओं का परिचय भी उन्हें प्राप्त होगा।

- इकाई 1 हिन्दी रूपरचना : हिन्दी संज्ञा और उसके विविध भेद; सर्वनाम और उसके विविध भेद; क्रिया और उसके विविध भेद ।
- इकाई 2 लिंग की परिभाषा और उसके विविध भेद; वचन की परिभाषा और उसके विविध भेद; प्रत्यय एवं उपसर्ग की परिभाषा और उसका स्वरूप; हिन्दीकारक; हिन्दी समास।
- इकाई 3 विशेषण और उसके भेद; भाषा के विविध अवयव-वर्ण, शब्द, पद, वाक्य, अर्थ ।
- इकाई 4 भाषा के विविध रूप: सामान्य हिन्दी, परिनिष्ठित हिन्दी, प्रयोजनमूलक हिन्दी, राष्ट्रभाषा हिन्दी, राजभाषा हिन्दी ।

## अभिस्तावित पुस्तकें-

1. हिन्दी व्याकरण-कामता प्रसाद गुरु, नागरी प्रचारिणी सभा, काशी, 1997 ई.
2. हिन्दी व्याकरण मीमांसा- काशीराम शर्मा, राधाकृष्ण प्रकाशन, नई दिल्ली, 1996ई.
3. प्रयोजनमूलक हिन्दी- डॉ. विनोद गोदरे, वाणी प्रकाशन, दिल्ली, 2004 ई.
4. प्रयोजनमूलक हिन्दी-डॉ. विजयपाल सिंह, संजय बुक सेंटर, वाराणसी, 1993ई.
5. प्रयोजनमूलक हिन्दी- रवीन्द्र कुमार श्रीवास्तव, केन्द्रीय हिन्दी संस्थान, आगरा, 1975ई.
6. प्रयोजनमूलक हिन्दी: सिद्धांत एवं प्रयोग- डॉ. दंगल झाल्टे, वाणी प्रकाशन, दिल्ली, 2002 ई.
7. प्रयोजनमूलक हिन्दी की नई भूमिका- डॉ. कैलाश नाथ पाण्डेय, लोकभारती प्रकाशन, इलाहाबाद, 2007 ई.
8. राजभाषा हिन्दी- कैलाश चंद भाटिया, प्रभात प्रकाशन, दिल्ली, 1994 ई.

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## 22. HISTORY

**The FYUG programme in History** has been framed in line with the NEP framework, focusing on discipline specific courses intended to inform students about socio-economic, political and cultural developments in the Indian subcontinent from the prehistoric to post-colonial times. Also offered, are courses with a global perspective with special reference to Europe, The USA, China and Japan, to familiarize students with the major political, economic and social forces that have shaped the world in general and the history of India in particular. Further, the courses emphasise the foundational character of the discipline, highlighting the continuous dialogue that exists between the past and the present that can inform the future.

Programme Outcomes (POs):

- I. Students will be familiar with the diverse sources, landscapes and approaches to the study of the history of ancient, medieval and modern India.
- II. Will understand the major political, economic and social forces that have shaped the world in general and the history of India in particular.
- III. Students will be acquainted with the historical trajectory of India's composite cultural heritage.
- IV. Will be familiar with regional history with special reference to Northeast India.
- V. Will be equipped to undertake research on the subject and to pursue a career in academics.
- VI. Will help students sitting for competitive examinations, a career in tourism and other allied fields.
- VII. Will create informed and responsible citizens.

### **HIS-100: HISTORY OF INDIA: EARLIEST TIMES TO THE POST VEDIC PERIOD**

**(Contact Hours: 60, Credits: 4)**

#### **Objective**

To introduce stages of development in the Indian Sub Continent from the Prehistoric period to the rise of Iron Age urbanization during the 5<sup>th</sup> century BCE. The focus will be on key developments in Prehistory, Proto-history and early historical India, highlighting the elements of change and continuity in socio-economic, political and religious developments.

## Learning Outcome

Students will be familiar with the diverse sources, landscapes and approaches to the study of the history of ancient India as well as the major developments spanning the period under study.

### Unit I Reconstructing Ancient Indian History

Geographical Background of the Indian Subcontinent: landscapes and environment; sources for the historical reconstruction of the period under study; approaches to the understanding of ancient Indian History

### Unit II Pre and Proto Historic India

Palaeolithic cultures: Sequence and distribution; tool typology and technology; subsistence patterns; Mesolithic cultures: Regional and chronological distribution; new developments in technology and economy; Neolithic and the advent of food production; regional and chronological distribution; patterns of exchange; Chalcolithic cultures in India with special reference to Ahar, Kayatha, Malwa and Jorwe cultures; distribution pattern and subsistence economy.

### Unit III Harappan Civilization

Origin; settlement pattern and town planning; agrarian base; art and craft, trade; socio-political organization and religious beliefs; the problem of urban decline.

### Unit IV Vedic to Post-Vedic Period

Vedic culture: Early to Later-Vedic period (society, economy, polity and religion); post-Vedic period (Iron technology, trade, money economy and urbanization); the rise of heterodox sects; Buddhism and Jainism (origin and teachings); the rise of *Mahajanapadas*; emergence of Magadha as a paramount power.

## Suggested Readings

Agarwal D.P.,	<i>The Copper Bronze Age</i> , MunshiramManoharlal, New Delhi, 1969.
-----	<i>The Archaeology of India</i> , Select book Service Syndicate, New Delhi, 1985

Allchin , F.R. & Bridget,	<i>The Rise of Civilization in India and Pakistan</i> , Cambridge University Press, London, 1988.
Allchin , F.R.,	<i>The Archaeology of Early Historic South Asia: The Emergence of Cities and States</i> , Cambridge University Press, London, 1995
Chakravarty, Ranabir,	<i>Exploring Early India: Upto c.AD.1300</i> , Ratnasagar, Delhi, 2016.
-----	<i>Trade in Early India</i> , Oxford University Press, New Delhi, 2004
	<i>Trade and Traders in Early Indian Society</i> , Manohar, New Delhi, 2002.
Dhavilkar, M.K., (ed.)	<i>A Comprehensive History of India Prehistory of India</i> , Vol.1, Part-1, Manohar, New Delhi, 2013.
Ghosh, A.,	<i>The City in Early Historical India</i> , IAS, Simla, 1973.
Jayaswal, Vidula,	<i>Palaeohistory of India</i> , Agam Kala Prakashan, Delhi, 1978.
Jha, D. N.,	<i>Ancient India in Historical Outline</i> , Manohar, New Delhi, 2002 reprint.
Kosambi, D. D.,	<i>An Introduction to the Study of Indian History</i> , Popular Prakashan, Bombay, 2016 (reprint).
-----	<i>The Culture and Civilization of Ancient India in Historical Outline</i> , PPH, Delhi, 2001 (reprint).
Malik, S. C,	<i>Indian Civilization: The Formative Period</i> , Indian Institute of Advanced Studies, Shimla, 1999.
Sankalia, H.D.,	<i>Prehistory of India</i> , MunshiramManoharlal, New Delhi, 1977.
Ratnagar, Shereen,	<i>Understanding Harappa: Civilization in the Greater Indus Valley</i> , Tulika Books, New Delhi, 2017 (4 <sup>th</sup> edition).
Sahu, Bhairabi Prasad (ed.),	<i>Iron and Social Change in Early India</i> , OUP, New Delhi, 2006.
Sharma. R.S.,	<i>India's Ancient Past</i> , Oxford University Press, New Delhi, 2009.
-----	<i>Material Culture &amp; Social Formations in Ancient India</i> , Macmillan India Ltd., New Delhi, 2007 (2 <sup>nd</sup> edition).
-----	<i>Sudras in Ancient India</i> , MunshiramManoharlal, Delhi, 2016 (3 <sup>rd</sup> edn.).
Singh, Upinder,	<i>A History of Ancient and Early Medieval India</i> , Pearson, Delhi, 2008.
Thapar, B.K.,	<i>Recent Archaeological Discoveries in India</i> , The Centre for East Asian Cultural Studies, Tokyo, 1985.
Thapar, Romila,	<i>A History of India</i> , Vol.1, Penguin Books, Delhi, 1996 reprint.
-----	<i>The Penguin History of Early India</i> , Penguin books, New Delhi, 2002.
Basham, A.L.,	<i>The Wonder that was India</i> , Rupa &Co., New Delhi, 2002 reprint.
Chakrabarti, Dilip, K.	<i>The Oxford Companion to Indian Archaeology: The Archaeological Foundations of Ancient India, Stone Age to AD 13<sup>th</sup> Century</i> , Oxford University Press, New Delhi, 2006
Habib Irfan, (ed.)	<i>The People's History of India</i> , Vol.-1-4, Tulika Books, New Delhi, 2015.
Majumdar, R.C.et.al. (ed),	<i>The History and Culture of the Indian People</i> , Vol.1-II, (Bharatiya VidyaBhavan Series, Delhi, 1945-1960, latest editions)

## HIS-150: HISTORY OF INDIA: MAURYA TO POST GUPTA PERIOD

(Contact Hours: 60, Credits:4)

### Objective

To introduce the broad socio-economic, political and cultural developments in the Indian subcontinent from 320 BCE - 650 CE.

### Learning Outcome

Students will be informed about the historical developments in the period under study.

### Unit I Mauryan Empire

Sources of historical reconstruction; Background of the rise of the Mauryan Empire: the Nanda Dynasty; Invasion of Alexander and its impact; Political history of the Mauryas, society, economy, administration and art; Ashoka's *Dhamma*; the decline of the Mauryas.

### Unit II Post- Mauryan Period

Sources; political history of the Indo –Greeks, Sakas, Kushanas and Satvahanas; art and architecture (Gandhara, Mathura and Amaravati School; *Stupa*, *Chaitya* and *Vihara*); religious developments (Hinyana and Mahayana); society and economy (trade and commerce, guilds); the Sangam Age.

### Unit III Gupta-Vakataka Age

Sources; political history of the period with reference to Samudragupta and Chandragupta II; society and economy; rise of feudalism; cultural developments (architecture, sculpture, paintings with reference to Ajanta; literature and science).

### Unit IV Post-Gupta Developments

Political History (Harshavardhana of Kannauj, Pulkesin II Chalukya of Vatapi and Kumara Bhaskaravarman of Kamarupa); political organization and growing importance of *Samanta* system; religious developments (Vaisnavism, Shaivism and Shaktism); Pallava art and architecture.

### Suggested Readings

Barua, K.L.,	<i>Early History of Kamarupa: From Earliest Times to the End of the Sixteenth Century</i> , LBS Publications, Guwahati, 2020.
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Bhandarkar, R. G.,	<i>Vaisnavism, Shaktism and other Minor Religions</i> , Indology Book House, Varanasi, 1963 (reprint).
Chakravarty, Ranabir,	<i>Exploring Early India: Upto c.AD.1300</i> , Ratnasagar, Delhi, 2016.
-----	<i>Trade in Early India</i> , Oxford University Press, New Delhi, 2004
-----	<i>Trade and Traders in Early Indian Society</i> , Manohar, New Delhi, 2002.
Champaklakshmi, R.,	<i>Trade Urbanization and Ideology in South India</i> , Oxford University Press, New Delhi, 1996.
Chattopadhyaya, S.,	<i>Evolution of Hindu Sects: Up to the Time of Samkaracarya</i> , MunshiramManoharlal, Delhi, 1970.
Coburn, T.,	<i>Devi-Mahatmya: The Crystallisation of the Goddess Tradition</i> , MotilalBanarasidass, Delhi, 1984.
Goswami, Ranjit Kumar Dev,	<i>Essays on Sankardeva</i> , LBS Publication, Guwahati, 1996.
Jaiswal, Suvira,	<i>The Origin and Development of Vaisnavism: Vaisnavism from 200 BC to AD 500</i> , MunshiramManoharlal, Delhi, 1980 (reprint).
-----	<i>Caste: Origin, Function and Dynamics of Change</i> , Manohar, New Delhi, 1998.
Jha, D. N.,	<i>Ancient India in Historical Outline</i> , Manohar, New Delhi, 2002 reprint.
Kosambi, D. D.,	<i>An Introduction to the Study of Indian History</i> , Popular Prakashan, Bombay, 2016 (reprint).
-----	<i>The Culture and Civilization of Ancient India in Historical Outline</i> , PPH, Delhi, 2001 (reprint).
Mukhia, Harbans,	<i>The Feudalism Debate</i> , Manohar, New Delhi, 1990 (reprint).
Sharma. R.S.,	<i>India's Ancient Past</i> , Oxford University Press, New Delhi, 2009.
-----	<i>Indian Feudalism</i> , Macmillan, New Delhi, 2006.
-----	<i>Sudras in Ancient India</i> , MunshiramManoharlal, Delhi, 2016 (3 <sup>rd</sup> edn.).
Shastri, Nilakanta K.A.,	<i>History of South India</i> , OUP, Delhi, 1996.
Singh, Upinder,	<i>A History of Ancient and Early Medieval India</i> , Pearson, Delhi, 2008.
Thapar, Romila,	<i>A History of India</i> , Vol.1, Penguin Books, Delhi, 1996 reprint.
-----	<i>The Penguin History of Early India</i> , Penguin books, New Delhi, 2002.
-----	<i>Asoka and the Decline of the Mauryas</i> , K.P. Bagchi& Co. Calcutta, 2000
-----	<i>The Mauryas Revisited</i> , K.P. Bagchi& Co. Calcutta, 1993 (Reprint).

Basham, A.L.,	<i>The Wonder that was India</i> , Rupa &Co., New Delhi, 2002 reprint.
-----	<i>A Cultural History of India</i> , OUP, New Delhi, 1984 (reprint)
Barpujari, H.k., (ed.)	<i>The Comprehensive History of Assam</i> , Vol. I, Gauhati, 2004, (2 <sup>nd</sup> edn.)
Choudhury, P.C.,	<i>The History of Civilization of the People of Assam to the Twelfth Century A.D.</i> , DAHS, Gauhati, 1966.
Habib Irfan, (ed.)	<i>The People's History of India</i> , Vol.-1-4, Tulika Books, New Delhi, 2015.
Majumdar, R.C.et.al. (eds),	<i>The History and Culture of the Indian People</i> , Vol. II-V, (Bharatiya Vidya Bhavan Series, Delhi, 1945-1960, latest editions)

## 23. HOME SCIENCE

**FYUG programme in Home Science:** A student will learn in-depth in Home Science undergraduate programme about food and nutrition, communication and extension education, resource management, human development, textile, and clothing. This will develop their professional skills in food & nutrition, textiles, housing, product-making, communication technologies, and human development that will favour in research, innovation, and product designing.

**Programme Outcomes (POs):** A comprehensive knowledge in Home science will open up ample job opportunities in both public as well as private sectors. Some of the most popular job roles for home science graduates are food analyst, health care professional, food scientist, research assistant, nutritionist, professor/lecturer, chef, textile supervisor, fashion designer, child care, housekeeper, demonstrator, and pantry in-charge.

### HSC-100: INTRODUCTORY HOME SCIENCE 1

(Contact Hours: 60, Credits: 4)

#### Course Objectives (COs):

- To impart the knowledge on the basic concept of nutrition and health.
- To explain the need and the importance of studying human growth and development across life span.
- To get a brief insight on the scope of clothing and textiles.
- To understand different resources and its management.
- To provide knowledge on the different extension teaching methods

#### Learning Outcomes (LOs):

At the end of the course the student should be able to:

- Understand the various method of cooking and preservation of nutrients during food preparation
- Gain a scientific understanding of growth and development of a child.
- Develop understanding of technical terms involved in textiles
- Appreciation of the significance of management process in efficient use of resources

**Unit I-** Introduction to Home Science and its relevance in the current era. aim, scope and Content of public health nutrition, child growth and development and Extension Development.

Food- meaning, classification and function and food groups. Nutrition-Concept of Nutrition. Malnutrition and Health, Functions of food, Food groups -Types of food pyramids.

Methods of cooking, preservation of Nutrients while Cooking. Traditional methods

of enhancing the nutritional value of foods-germination, fermentation, etc. Nutraceuticals- the future of Nutrition care for health management, treatment and prevention of diseases.

**Unit II-** Introduction to Human Development. Concept, Definition and Need to study human

Development. Domains, Stages of development. Principles of Growth and development

Determinants of Development-heredity and Environment. Early Childhood Care and Education – Emerging trends.

Extension Education- objectives and methods used, integration of nutrition education with extension work, when to teach, whom to teach and who is to teach. Principles of planning, executing and evaluating extension education programmers. Designing nutrition and health messages, selecting communication channels, and developing and field-testing communication materials.

**Unit III** -Origin, Importance and functions of clothing- Social, emotional, psychological. Scope of clothing and textiles. Traditional textiles and costumes of different states India – The Northeastern States, Punjab, Himachal, Rajasthan, Hyderabad, Karnataka, Tamil Nadu, Introduction to textile terms- fibre, yarn, fabric, spinning, weaving, knitting. Classification of textile fibres based on source.

General properties of textile fibres- Cellulosic, Protein, Mineral, Man-made



Synthetic.

**Unit IV-** Concept of Management; Motivating factors in management- Values, Standards and Goals: meaning, types, and influences.

Decision-making-the crux of management, Importance, types of decision; Steps involved in decision-making. Management Process: Planning; Organising; Controlling; Evaluating.

Resources: meaning, classification and characteristics of resources; Factors affecting utilization of Resources. Family life cycle-demands upon resources like time, energy and money.

### **Suggested Readings**

1. Bamji M.S, Prahalad Rao N, Reddy V (2004). Textbook of Human Nutrition Edition, Oxford and PBH Publishing Co. Pvt. Ltd, New Delhi Banarasidas, Bharat Publishers, 1167, Prem Nagar, Jabalpur, 428 001(India)
2. Bhatt D.P (2008), Health Education, Khel Sahitya Kendra, New Delhi
3. Feldman, R., & Babu, N. (2009). Discovering the life span. New Delhi: Pearson
4. Kapadia, S. (2011). Psychology and human development in India. Country paper.
5. Keenan, T., Evans, S., & Crowley, K. (2016). An introduction to child development.
6. Koontz.H. and O'Donnel C Management – A systems and contingency analysis
7. Kreitner. 2009, Management Theory and Applications, Cengage Learning: India
8. Lightfoot, C., Cole, M., & Cole, S. (2012). The development of children (7<sup>th</sup> ed.). New York: Worth Publishers.
9. Narayanaswamy, N. (2009). Participatory Rural Appraisal: Principles, Methods and
10. Park A. (2007), Park's Textbook of Preventive and Social Medicine XIX Edition M/S
11. Rao V.S. and Narayana P.S., Principles and Practices of Management, 2007, Konark
12. Sandhu, A.S. (2015). Extension Programme Planning. New Delhi: Oxford & IBH Publishing Co.Pvt.Ltd
13. Srilakshmi, B., Dietetics, New Age International (P) Ltd., New Delhi, 2013.
14. Swaminathan M (2007), Essentials of Food and Nutrition. An Advanced Textbook Vol.I, The Bangalore Printing and Publishing Co. Ltd, Bangalore
15. Vatsala R Textbook of Textiles and Clothing, Riddhi International, 2003, Jodhpur
16. Yadav, K and Singh, O.S "Home Science", Atlantic Publishers and distributor and Private Ltd. (2014).

## **HSC-150: INTRODUCTORY HOME SCIENCE 2**

**(Contact Hours: 60, Credits: 4)**

### **Course Objectives (COs):**

- To study the functions of specific nutrients in maintaining health and understanding the importance of planning a balanced meal
- To describe the characteristics, needs and developmental tasks of different stages in the human life cycle
- To understand the different types of communication patterns
- To evaluate outcomes of effective time management and increase work efficiency.
- To get acquainted with the properties and uses of various textile fibers and different types of yarn.

### **Learning Outcomes (LOs):**

At the end of the course the student should be able to:

- Learn the functions of various nutrients in maintaining good health
- Understand the various developmental stages and requirements of children with special needs.
- Develop effective communication patterns in community development
- Efficiently use energy and time as a resource
- Analyze the types of fibers and yarns and their manufacturing processes.

**Unit I:** Introduction to nutrition. Balanced diet - Meal planning – steps in meal planning  
Nutrients: Nutrients Macro and Micronutrients- Sources, functions and deficiency. Carbohydrates, Proteins, Fats. Minerals – Calcium, Iron, Iodine. Vitamins – Fat-soluble vitamins – A, D, E & K. Water soluble vitamins – vitamin C Thiamine, Riboflavin, Niacin. Energy – factors affecting BMR. Fiber – Functions and sources. Nutrient antioxidants with potential health effects.

**Unit II:** Developmental Tasks during Infancy and Preschool Stage: Physical and Motor Development Social and emotional development, Cognitive and language development Children with special needs and special education: Definition of special needs children and special education, terminologies for children with special needs.

Gender and Development- Concept of gender, gender roles, changing trends. Concept, meaning, scope and significance of ECCE, Developmental

perspective, Neuroscience perspective, Human rights perspective Expansion from ECE to ECCE to ECD

**Unit III:** Meaning, definition, nature, scope and importance of communication. Functions of communication – information function, command or instructive function, influence or persuasive function and integrative function. Elements of Communication – three elements – source, message, receiver, Types of Communication – Formal and Informal Communication Pattern - one way, two ways, circular

Concept and significance of communication model. Principle of Programme planning, Elements, functions and criteria for developing a plan

Participatory Planning Importance of peoples' participation in Programme planning. Formation of Self-Help Groups.

**Unit IV:** Management Process applicable to specific resources: Time, Energy & Money Management; Time as a Resource; Tools in making time plan; Steps in making Time Plan.

Energy as a Resource – Energy cost in home making activity, fatigue – types their effect & avoidance of fatigue.

Family Income as a resource – Sources, types & methods of handling family income.

Manufacture and processing of fibres. Properties of (a) Cellulosic fibre- cotton, linen; (b) Protein fibres- Silk, wool; (c) Synthetic/Manmade fibres- nylon, polyester, acrylic, Rayon

Manufacture of yarn and yarn classification. Different fabric construction techniques- weaving, knitting, felting, braiding, Non-woven. Weaving of cloth- terminologies and steps in weaving.

### **Suggested Readings:**

1. Agarwal, J. C. (2007). Early childhood care and education: principles and
2. Berk, L.E. (2005). Child development (5<sup>th</sup> ed.). New Delhi: Prentice Hall. Cambridge: Cambridge University Press.
3. Canning, N. (2010) Play and practice in the early years: Foundation stage. New Co.New Delhi
4. Dhawan, M. (2011). Education of children with special needs. New Delhi: Isha Books.
5. Fler, M. (2010). Early learning and development: Cultural–historical concepts in play.

6. Gupta, D. (2007). Development Communication in Rural Sector. New Delhi: Mukhopadhyay
7. Kaul, V. (2009). Early childhood education Programme. National Council of Educational
8. Kreitner. 2009, Management Theory and Applications, Cengage Learning: India
9. Meenakshi Raman and Sangeetha Sharma. (2013). Technical Communication- Principles and Practice. New Delhi: Oxford University Press
10. Nisha, M. (2006). Understanding Extension Education. New Delhi: Kalpay Publications
11. Nutrition and Human Performance. William & Wilkin Publishing USA. Nutrition, Third Edition, Oxford and IBH Publishing Co. P. Ltd., New Delhi, 2012. NY.: Mcgraw-Hill Higher Education.
12. Santrock, J. (2017). A topical approach to life span development (9<sup>th</sup> ed.). New segregation to inclusion. New Delhi: Sage.
13. Singh, A. (2015). Foundations of Human Development: A life span approach. ND:
14. Singh, U.K and Nayak, A.K. (2007). Extension Education. New Delhi: Common Wealth Publishers
15. Swaminathan M. (2008) Essentials of Food and Nutrition Bangalore Printing Publishing

## 24. KHASI

### A. Preface

Ka Programme kan ai jingtip ia ki nongpule shaphang ki tnat bapher ka litereshor kum ka poitri, ka sawangka, ka parom mutdur bad ka thohtah. Ka thmu ruh ban hikai bad pynsngewthuh ia ki khynnah ha kaba iadei bad ka sengnia bad ka bishar bniah. Yn hikai ruh ia ki nongpule ban sngewthuh ia ki litereshor jong kiwei pat ki jaitbynriew lyngba ka kylla-ktien na ka Sanskrit, ka Greek, ka English bad na kiwei pat ki ktien; bad kham bunsien lyngba ka English kum ka ktien jiar. Ka Programme ka kynthup ruh ia ki phang pule, kum halor ka ktien Khasi, ka lolshor bad ka kylla-ktien. Shuh shuh, ka kynthup ruh ia ki phang pule kiba ai jingtbit bad jinglah ba khambha ia ki nongpule.

[The programme will familiarise students with various genres of Khasi literature including poetry, drama, fiction and prose. It also aims to introduce and expose students with an understanding of literary theory and criticism. It will expose students to the literature of other people through translation from Sanskrit, Greek, English and other languages into Khasi; and mostly through English as a filter language. The programme also includes courses on Khasi language study, Khasi culture and translation. Besides, it also contains courses which will provide skill enhancement and ability enhancement to students.]

#### **Ki jingmyntoi:**

1. Kan pynlah ia ki nongpule ban san ha ka jingsngewthuh bajylliew ia ki jait litereshor bapher bapher.
2. Kan pynioh ia ki nongpule ia ka jinglah ban pule bishar ia ki kot pule bad ban sngewthuh ia ki phangkren bapher kiba don ha ki kot pule.
3. Kan pynsan ha ka jingsngewthuh ia ka jinglong babha bad ka jinglah ban bishar bniah ia ki phang kiba don ha ki jingpule.
4. Ki nongpule kin don ka jingsngewthuh ia ka kramar bad ka jingtbit ban thoh bad ban kren.
5. Kan pynioh ia ki nongpule ia ka jingtip ia ki nongrim, ki rukom bad ki jait bapher ka kylla-ktien.
6. Kan pynsan ia ki jinglong babha ka longbriew manbriew bad ia ka mynsiem ban ieit bad ban tei ia ka ri bad ka jaitbynriew.

#### **[Programme Outcomes:**

1. Enabling students to develop an in-depth understanding on the various genres of literature.
2. Equipping students with the ability of critical reading of literary texts and of identifying various themes contained in the texts.
3. Development of moral and critical understanding on various issues found in literary text.
4. Students will be equipped with the knowledge of grammar as well as the communicative competence.
5. Equipping students with the knowledge of the principles, strategies and types of translation.
6. Development of human values and the spirit of patriotism and nation building.

## KHA-100: KA MAITPHANG ĪA KA LITERESHOR KHASI

(Contact Hours: 60, Credits: 4)

### Ki Jingthmu jong ka phang pule:

Īa kane ka phang pule la saiñdur ba ki nongpule kin tip Īa ki dur bad ki jait bapher jong ka Poitri, ka Sawangka, ka Parom Mutdur bad ka Thohtah. La saiñdur ruh ba ki nongpule kin sngewthuh Īa ki phangkren kiba Īadei bad ka imlang sahlang kumjuh ruh Īa kiwei pat ki phang ba ki kot pule ki pynphalang.

### Ki jingmyntoi na kane ka phang pule:

- Ki nongpule kin lah ban sngewthuh Īa ki dur bad ki jait bapher jong ka litereshor khamtam ka phawar.
- Ki nongpule kin lah ban sngewthuh ruh Īa ki mat bapher bapher kiba Īadei bad ka imlang shalang.
- Kin Īoh ruh Īa ka jinghikai bahok bad bakordor kiba ka jaitbynriew ka ju bud.
- Kin don ruh Īa ka mynsiem ban tei Īa ka Ri.

### Unit – I Poitri

- 1) Rabon Singh : “Ka Jingphawar Iasiat thong” na *Ka Kitab Jingphawar*
- 2) Soso Tham : “U Sim bala lait” na *Ka Duitara Ksiar*
- 3) Enami : “I Thakemon” na *Na Ka Thiar ki Longshuwa*
- 4) Oscar .M.Wahlang : “Ka Sohlyngngem” na *Ka Jutang jong ka Sur Pangnud u Khun Khasi*

### Unit – II Sawangka

- 1) Remy Fancon : “Ka Sngi Khatduh u Tiroto Sing” na *Mynhynnin , Mynta bad Lashai*

### Unit – III Parom Mutdur

- 1) K.K. Kharlukhi : *Ka Melody*

### Unit – IV Thohtah

- 1) R.Tokin Roy Rymbai : “Ki Samla bad la ka Ri” na *Ban Pynieng la*

*ka Rasong bad Kiwei de ki Ese*

- 2) L. Gilbert Shullai : “Ki Kur ki Bun Jaitbynriew tang Kawei” na  
*Talwiar u Sohpetbneng*

***Ki kot pule baroh ki long na ka bynta ban pule bniah.***

**Ki jingthoh kiba ïadei bad ka phang pule:**

Chyne, Trocylin. “Ka Mariang kumba ka paw ha ka poim “U Sim Ba La Lait” ba la thoh da u Soso Tham.” *Ka Thwet Jingstad(Quest for knowledge)* Vol. IV No.1 December, 2018. pp. 63-66

Fancon, Remy. *Mynhynnin , Mynta bad Lashai*, Don Bosco Press. 2008.

Jyrwa, M.B. “The Issue of Visual Disability in *Ka Melody*.” *Tribal Literature of North-East India*, edited by Badaplin War, Department of Khasi, NEHU, Shillong. 2008, pp.103-108.

Kharlukhi, K.K. *Ka Melody*, Hima Book Stall , 2000.

Lyngdoh, R.S. et al. *Na Ka Thiar ki Longshuwa*, Khasi Authors’ Society, 1980.

Majaw,S.S. *Ka Sohlyngngem u Oscar M. Wahlang*, Khasi Book Stall, 1992.

Nongbri, Banniewkor.L. “Ka Phawar ïasiatkhnam.” *Ka Thwet Jingstad(Quest for knowledge)* Vol. IV No.1 December, 2018. Pp.67-73

... “Ka Thaw Phawar bad ka Rukom Phawar ïa ka.” *Ka Thwet Jingstad(Quest for knowledge)* Vol. V No.1 December, 2021. pp.32-35

Rymbai, R.Tokin Roy. *Ban Pynieng la ka Rasong bad Kiwei de ki Ese*,Mrs. Witbon Hynniewta Rymbai, 1979.

Shullai, L. Gilbert. *Talwiar u Sohpetbneng*, Scorpio Printing Press,1993.

Singh, Rabon. *Ka Kitab Jingphawar*, Mrs Fair Beulah Lyngdoh, 2002.

Sten, H.W. *Khasi Poetry: Its Origin and Development*, Mittal Publication, 1990.

Tham, Soso. *Ka Duitara Ksiar*, Mrs. A.D. Dkhar, 1972.

Wahlang, Oscar. M. *Ka Jutang jong ka Sur Pangnud u Khun Khasi*, Ri Khasi Book Agency, 4<sup>th</sup> ed., 2022.

## KHA-150: POITRI, SAWANGKA BAD PAROM MUTDUR

(Contact Hours: 60, Credits:4)

### Ki Jingthmu jong ka phang pule:

Īa kane ka phang pule la saiñdur ba ki nongpule kin sngewthuh ĩa ki tnat bapher jong ka Litereshor kum ka Poitri, ka Sawangka, ka Parom Mutdur. La saiñdur ruh ba ki nongpule kin sngewthuh ĩa ki dur ki dar bad ki phangkren ha ka Poitri, ka Sawangka bad ka Parom Mutdur.

### Ki jingmyntoi na kane ka phang pule:

- Ki nongpule kin lah ban sngewthuh khambha ĩa ki tnat jong ka litereshor.
- Kin don ka jingbit ban pule bad bishar bniah ĩa ki dur kyntien, ki buit-thaw, ki phangkren bad ki snap bapher bapher jong ka Poitri, Sawangka bad Parom Mutdur.

### Unit – I Poitri

1. Soso Tham : “Ka Duitara” na *Ka Duitara Ksiar*
2. S.S. Majaw : “Kylla Pongpet” na *Ka Phawar Ksan Rngiew*
3. Kynpham Sing Nongkynrih : “U Slap u Ap bad la ki Um Bakyntang” na *Ki Mawsiang ka Sohra*
4. Streamlet Dkhar : “Ka Pharshi Ki ‘Tiew” na *Ki Kyrpien Jong Ka Por:Ki Tanka Ha Ka Khasi bad kiwei de ki poim*
5. Banlam Kupar Lyngdoh : “Saiñ-ruma” na *Khmi h Pynor: Ka Thup Poitri Khasi*

### Unit – II Sawangka

1. Dewi Singh Khongdup : *U Baieit Donshkor*
2. Wan Kharkrang : “Jubab Aiu sha phin ai?” na *U Syiem ka Mariang bad kiwei ki Playlet*

### Unit – III Parom Mutdur (Khana lyngkot)

1. S.J. Duncan : “Ki Mad ĩa ka Shillong” na *Phuit ka Sabuit bad kiwei kiwei de ki Khana*
2. I.M. Simon : “U Nonghikai Nongkyndong” na *Shikti na*



*ThweiMutdur*

3. Hughlet Warjri :“Ki Dienjat Khla” na *Ka Nongkylliang (Ki Jingiathuh khana lyngkot)*

**Unit – IV Parom Mutdur (Nobel)**

1. L.H Pde : *Tang Maphi Khun Baieid*

***Ki kot baroh ki long na ka bynta ban pule bniah.***

**Ki jingthoh kiba äadei bad ka phang pule:**

- Dkhar, S. *Ka Bishar bniah ia ka Sawangka U Baieit Donshkor*: ESES PLUS Publications, Reprint 2021.
- Dkhar, Streamlet. *Ki Kyrpien Jong Ka Por: Ki Tanka Ha Ka Khasi bad kiwei de ki poim*, ESES PLUS Publications, 2018.
- Duncan, S.J. *Phuit ka Sabuit bad kiwei kiwei de ki Khana*. NEHU Publications. 1987.
- Kharkrang, Wan. *U Syiem ka Mariang bad kiwei ki Playlet*, Rilum offset Printing House, 2011.
- Khongdup, Dewi Singh. *U Baieit Donshkor*, Ka Matti Ladehi Syiem, 2009.
- Lyngdoh, Banlam Kupar. *Khmi Pynor: Ka Thup Poitri Khasi*, Ri Khasi Book Agency, 2022
- Majaw, Icylda. *Ka Khana Lyngkot Kum Ka Buit Thaw Litereshor*, Sunny Hill, 2015.
- Majaw, S.S. *Ka Phawar Ksan Rngiew*, Don Bosco Press, 2014.
- Nongkynrih, Kynpham Singh. *Ki Mawsiang ka Sohra*, Pine Cone, 2001.
- Pde, L.H. *Tang Maphi Khun Baieid*, Author, 1984.
- Sawkmie, Joyfully. *Ki Phangkren Halor ka Imlang Sahlang ha ki Nobel Khasi: Ka Bishar Bniah.*, Don Bosco Press, Shillong, 2017.
- Simon, I.M. *Shikti na Thwei Mutdur*, G.M.S. Pariat, 2001.
- Tham, Soso. *Ka Duitara*, Mrs. A.D. Dkhar, 1972.
- Warjri, Hughlet. *Ka Nongkylliang (Ki Jingiathuh khana lyngkot)*, Scorpio Printers, 1985.

## 25. MASS COMMUNICATION AND VIDEO PRODUCTION

### **Preface**

The global demand for professional content creators has reached an unprecedented level due to the widespread adoption of digital technology, and the world's fascination with the magic of the moving image, shows no signs of slowing down. Film and television production encompasses a range of roles including producers, directors, cinematographers, scriptwriters, motion-graphics designers, and editors. This course is a hands-on production-based program, designed to equip students with the necessary knowledge and creative, technical, and managerial skills, to produce high-quality content for film, TV, live broadcasts, documentaries, commercials, and music videos. The course Mass Communication and Video Production also focuses on writing practices for visual media and provides solid theoretical framework on visual cultures, film and television studies touching upon contemporary debates. The course equips students with transferable practical skills that makes them highly employable, while also preparing them for a career in academia.

### **Program Outcomes**

1. Providing hands on training in film- making and television production.
2. Providing a comprehensive outlook on filmmaking and television production as a profession while also developing in students an aptitude in conducting further research in the said fields of study.
3. Providing an introduction to mass communication studies
4. Providing an overview of the media scene in India, and the management and entrepreneurial aspects of the media profession itself.

## MVP-100: INTRODUCTION TO MASS COMMUNICATION

(Contact Hours: 60, Credits: 4)

**Course Objective:** *This paper aims at introducing the students to the basics of what is communication and how this communication gets expanded through mass media and practically applied to the visual medium.*

### Learning Outcomes

- Students will be able to identify, examine and critically engage with communication processes at different levels.
- Students will be able to identify and understand the classical models of communication.
- Students will be equipped with an in-depth understanding of communication theories.
- Students will be trained in basic image making skills and will be able to put together and present coherent audio visual narratives.

<b>Unit I</b>	<b>Defining Communication</b> Definitions, Importance and Communication process, Levels of Communication, Meaning of Mass Communication and Mass Media-Functions of Mass Communication, Verbal and Non-Verbal Communication, Elements of Communication process, Barriers to Communication Process, Types of Communication, Defining Communication through Social Media.
<b>Unit II</b>	<b>Communication Models</b> Communication Model-Meaning and concept, Lasswell's Model, Shannon & Weaver's Model, ABX Model, Gerbner's Model, Osgood & Schramm's Model, Berlo's Model.
<b>Unit III</b>	<b>Communication Theories</b> Introduction to Communication Theory -Magic Bullet theory, Individual Difference Theory, Cultivation Theory, Agenda Setting Theory, Gate keeping Theory, Cultural Imperialism Theory, Play Theory, Uses & Gratification Theory, McLuhan's Theories of the Media, Criticism of the Media, Impact of Social media on Mass Communication, Mobilisation, Political information and agenda-setting through Social Media, normative theories of the press.
<b>Unit IV</b>	<b>AV Story Telling</b> Basic structure of Storytelling, Narrative Structures, introduction to basic photography, camera techniques and function, natural lighting, understanding sound and visual with reference to visual composition.

**Suggested Readings -**

- Berger, A. A. (1995). *Essentials of mass communication theory*. Sage.
- Biagi, S. (2012). *Media impact: An introduction to mass media*. Cengage Learning.
- McQuail, D., & Windahl, S. (2015). *Communication models for the study of mass communications*. Routledge.
- Vivian, J., & Maurin, P. J. (2012). *The media of mass communication*. Pearson Canada.
- McLuhan, M. (2004). *Understanding Media: The Extensions of Man; Marshall McLuhan*. TPB.

**Additional Readings**

- Bolter, J. D., Grusin, R., & Grusin, R. A. (2000). *Remediation: Understanding new media*. mit Press.
- Schram, W. E. (1954). *The process and effects of mass communication*.
- McCombs, M. (2014). *Setting the agenda: Mass media and public opinion*. John Wiley & Sons.
- Joel Sartore, (2019). *Photo Basics*. National Geographic, illustrated edition.

**MVP-150: VISUAL COMMUNICATION**

**(Contact Hours: 60, Credits: 4)**

**Objective:** *The aim of this paper is to enable the students to ideate, conceptualize and communicate in terms of images.*

**Learning Outcomes**

- The students will be able to understand principles of visual communication.
- The students will be able to understand different approaches to various aspects of visual imageries.
- The students will be able to evaluate art and art history from a visual cultural studies perspective.
- The students will be able to interpret the politics of image.

<b>Unit I</b>	<p><b>Definition and understanding:</b> History of visual communication- from cave art to digital.          Visual literacy- elements of visual literacy, Iconology          Visual Perception process, the eye, the brain - Colour, Form, Depth, Movement.</p> <p><b>Principles of Visual and other Sensory Perceptions-</b>          Gestalt Theory          Constructivism Theory          Cognitive Approach</p>
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	Semiotics
<b>Unit II</b>	<b>Visual culture-</b> Visualizing- Visual power- Visual pleasure Fundamentals of Design- Definition- Approaches- Elements - Line, Shape, Space, Color, Texture, Form- Principles of Design – Symmetry, Rhythm, Contrast, Balance, Mass/ Scale. Introduction to Typography- The Anatomy of Typesetting Text, Typefaces, Fonts and Families, Typeface Categories, The Design Psychology – Tools of Design. Culturally-Related Design, Web & Interactive Design, Ads layout, Posters layout.
<b>Unit III</b>	<b>Concept of Art, Structure, Form and Meaning.</b> Art as -Commerce, Commodity, human creation. Images: Reality and constructed. Functions of art in society. Art history and artist from different art movements.
<b>Unit IV</b>	<b>Introduction to Image making-</b> Image Issues: Techniques of image reading- connotation denotation, stereotypes, Image and gender Imagination and image. A Historical Approach to Understanding Documentary Photographs: Dialogue, Interpretation and Method.

### Suggested Readings -

- Kattula ,Vidyasagar(2022). Decoding Visual Communication: Semiotics.
- Boylan Alexis. (2020)Visual Culture.
- Lupton, Ellen. (2017). Design Is Storytelling.
- **J. Davis Meredith, Hunt Jamer (2017). Visual Communication Design: An Introduction to Design Concepts in Everyday Experience.**
- **Lester Paul M. (2013),Visual Communication: Images With Messages**

### Additional Readings-

- Sandler, Morgan. (2018). Visual Storytelling: How to Speak to the Audience Without Saying a Word: How to Speak to Your Audience Without Saying a Word.
- Bailey, G, A. (2014).Art in Time: A World History of Styles and Movements.
- Jonathan Baldwin, Lucienne Roberts. (2006).*Visual Communication: From Theory to Practice*
- **Carolyn Handa. (2006). Visual Rhetoric in a Digital World.**
- Smith, K, Moriarty, S,Barbatsis, Kenney K.(2005)Handbook of Visual Communication
- Gombrich. E.H. (1995). The Story of Art.

## 26. MATHEMATICS

### Preface

The programme aims to lay a strong basic foundation for higher mathematics both in pure and applied branches of Mathematics. It is meant for students who wish to pursue their careers involving mathematical research and skills. The programme is intended to teach the students the art of problem solving activities in both branches of Mathematics.

### Programme Outcomes:

At the end of the course, students:

1. Will have a strong foundation in both the pure and applied Mathematics.
2. Will be able to ask logical questions and also be able to solve them.
3. Will be able to interact with people from outside the state and communicate their ideas effectively.
4. Will have a sound knowledge in programming and computation.

### MTH-100: FUNDAMENTAL MATHEMATICS-I

(Contact Hours: 60, Credits: 4)

**Objectives:** The primary objective of this course is to introduce the foundational concepts of calculus and techniques of problem. The students will also learn the methods of classical algebra and the art of solving a cubic equation.

**Course Outcomes :** After this course students will be able to learn the rigorous idea of limit of a function which is foundational to grasp the concepts of continuity, differentiation. In addition to this the students will be able to calculate the volume and surface area of solids of revolution and learn the applications of continuity and derivative in Higher Algebra.

**Unit I : Limit and Continuity**  
hours)

(15

$\epsilon$ - $\delta$  definition of limit of a real valued function; standard theorems; limit at infinity and infinite limits;  $\epsilon$ - $\delta$  definition of continuity of a real valued function; standard theorems; geometrical interpretation of continuity; discontinuity - types of discontinuity; properties of continuous functions; Intermediate Value Theorem and its applications; fixed point theorem; location of roots - theorem and its application.

**Unit II : Differentiability**

(15 hours)

Differentiability of a real-valued function of a real variable; geometrical significance; standard theorems; stationary point; local extrema; Rolle's Theorem, Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem and their applications; differentiability and monotonicity; concavity; inflection point; differential; successive differentiation; Leibnitz's Theorem.

**Unit III : Integral Calculus**

(15 hours)

Definite Integral as a limit of a sum; fundamental theorem of integral calculus; properties of definite integral; applications of definite integral - area under a curve, length of simple plane curves, volume and surface areas of solids of revolution in standard cases; reduction formulas for  $\int \sin^n x dx$ ,  $\int \cos^n x dx$ ,  $\int \tan^n x dx$ ,  $\int e^{ax} x^n dx$ ,  $\int x^n \log x^n dx$ ,  $\int \sin^n x \cos^m x dx$ .

**Unit IV : Complex Numbers & Theory of Equations**

(15

hours)

Complex Numbers - properties; polar representation; Polynomials over  $\mathbb{Z}, \mathbb{Q}, \mathbb{R}, \mathbb{C}$  - definition and standard properties; Division Algorithm; gcd, Euclidean Algorithm, Unique Factorisation Theorem over  $\mathbb{Q}, \mathbb{R}, \mathbb{C}$  (statement and application); root of a polynomial; detailed study of the roots of a polynomial; Fundamental Theorem of Algebra (statement and corollary) and its failure over  $\mathbb{Z}, \mathbb{Q}, \mathbb{R}$ ; Remainder Theorem and Factor Theorem; Synthetic division; multiple roots; complex roots and surd roots; Descartes' rule of signs; Relation between roots and coefficients of a polynomial; symmetric functions of roots with special reference to cubic equations;  $n^{\text{th}}$  roots of unity; De Moivre's Theorem and its applications; Euler's Theorem (statement only); solution of a cubic equation by Cardan's Method.

**Notes:** A candidate must obtain the minimum pass marks (as per NEHU Rule) to clear the course.

**Suggested Readings:**

1. Calculus, H. Anton, I. Bivens, S. Davis, Wiley India Pvt. Ltd. (2015).
2. Differential Calculus, R.K. Ghosh, K.C. Maity, New Central Book Agency Ltd. (2011).
3. Integral Calculus, R.K. Ghosh, K.C. Maity, New Central Book Agency Ltd. (2013).
4. Higher Algebra Classical, S.K. Mapa, Levant Books India (2021).
5. Mathematical Analysis, S.C.Malik, S.C.Arora, New Age International Publication (2021).
6. Thomas Calculus, G.B.Thomas, J. Hass, C. Heil, Pearson Education (2018).
7. Calculus: Early Transcendentals, J. Stewart, Cengage India Pvt Ltd. (2017).
8. Introduction to Real Analysis, R.G. Bartle, D. R. Sherbert, Wiley India Edition (2021).
9. Higher Algebra, B.Das, S.R.Maity, AsokePrakasan (2010).

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## MTH-150: FUNDAMENTAL MATHEMATICS-II

(Contact Hours: 60, Credits: 4)

**Learning Objectives:** The primary objective of this course is to study the properties of standard geometrical objects in two and three dimensional spaces. The course will also introduce the basic concepts of multivariable calculus and vector calculus with applications in Physics.

**Unit I : Two Dimensional Geometry** (15 hours)

Transformation of coordinates - Change of axes, invariants, removal of  $xy$  term.

Pair of straight lines - General and homogeneous equations of second degree, angles between pair of straight lines represented by a second degree equation, bisectors of the angles between a pair of straight lines through the origin.

Conics - General equation of second degree, reduction to standard form, equation of tangents, conditions of tangency, equation of normal, parametric form of conics, conjugate diameters of ellipse and hyperbola.

**Unit II : Three Dimensional Geometry** (15 hours)

Planes - General equation of a plane, normal form of a plane, angle between two planes, perpendicular distance of a point from a plane, planes through intersection of two planes.

Spheres - General equation of a sphere, plane section of a sphere, sphere through a given circle, tangent plane, intersection of two spheres.

Cones - Equation of a cone with a conic as a guiding curve, enveloping cone, mutually perpendicular generators, tangent planes, reciprocal cone, right circular cone.

**Unit III : Multivariable Differential Calculus** (15 hours)

Real-valued functions of two and three real variables ( $f: \mathbb{R}^2 \rightarrow \mathbb{R}, f: \mathbb{R}^3 \rightarrow \mathbb{R}$ ); Limits and continuity of real-valued functions of two and three real variables (basic concepts and simple problems); Partial Derivatives of first order and its geometrical significance.



Second order partial derivatives - basic concepts and examples; Schwarz's theorem (statement and examples only); Laplacian; Chain rule; Euler's theorem on homogeneous functions upto three variables.

#### **Unit IV : Vector Calculus**

(15 hours)

Scalar and vector products of three and four vectors - properties, geometrical significance, and applications.

Vector-valued functions of real variables ( $f: \mathbb{R} \rightarrow \mathbb{R}^2, f: \mathbb{R} \rightarrow \mathbb{R}^3$ ); Derivative of a vector-valued function of a real variable; Properties and geometrical applications - arc length, unit tangent vector, normal vector, curvature.

Gradients of real-valued functions of two or three variables - physical and geometrical significance, and elementary properties; Directional derivatives of real-valued functions of two or three variables and its geometrical significance, maximum directional derivative; Tangent planes and normal lines.

Divergence & Curl - physical and geometrical significance, and elementary properties; Solenoidal and irrotational vector fields.

**Course Outcomes** :After this course students will be able to understand the properties of geometrical objects in two and three dimensions. They will learn conceptual variations while advancing from one variable to several variable in calculus. In addition to this they will intuitively understand how the language of vectors is used in other fields of science like Physics.

**Notes:** A candidate must obtain the minimum pass marks (as per NEHU Rule) to clear the course.

#### **Suggested Readings:**

1. Calculus, H. Anton, I. Bivens, S. Davis, Wiley India Pvt. Ltd. (2015).
2. Analytical Geometry and Vector Analysis, B. Das, Orient Book Company (2008).
3. Analytical Solid Geometry, S. Narayan, P.K. Mittal, S. Chand & Company (2007).
4. Differential Calculus, R.K. Ghosh, K.C. Maity, New Central Book Agency Ltd. (2011).
5. Vector Analysis, R.K. Ghosh, K.C. Maity, New Central Book Agency Ltd. (2011).
6. Analytical Geometry and Vector Analysis, J.G. Chakravorty, P.R. Ghosh, U.N. Dhur& Sons Pvt Ltd. (2012).
7. Calculus: Early Transcendentals, J. Stewart, Cengage India Private Limited. (2017).
8. Calculus and Analytic Geometry, G.B. Thomas Jr., R.L. Finney, Pearson Education India (2010).
9. Vector Calculus, S. J. Colley, Pearson (2012).

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## 27. MEDIA TECHNOLOGIES

### **Preface**

With the instating of the National Education Policy 2020, and upon scaling the demands of the media professional market today, including that of research and academia in the said field, the said course is being offered as a BA in Media Technologies. The Media Technologies Course simultaneously focuses on the theoretical underpinnings as well as the practices associated with photography, sound for media and digital media technologies. While continuing to concentrate on advanced photography studies and sound for media (that has proven to be in demand by students undertaking the said course since its inception in 2001), with the rise in convergent media technologies, and with the growing demand for digital media skills becoming the need of the hour, the course also specifically focusses on digital media studies.

### **Program Outcomes**

1. Providing a comprehensive approach in understanding photography, sound production and digital media studies.
2. Developing a hands-on advanced professional expertise in photography skills, photojournalism and in comprehending the aspects of photography genres, aesthetics and other more advanced forms of comprehending the art itself.
3. To create an understanding of the several facets of digital media.
4. To develop skills to produce content for the digital media space.
5. To introduce and meet the needs and opportunities in digital media.
6. Providing a hands-on approach to understanding advertising both as a subject of study and a professional expertise.

## MET-100: INTRODUCTION TO COMMUNICATION THEORY

(Contact Hours: 60, Credits: 4)

**Objective:** This is a foundational paper which will explore the various facets of communication, theories and models of communication. It will also explore the communication process through the different media channels such as the traditional and folk media to mass media and the emerging digital media outlets.

### Learning Outcomes

- **LO1:** Students will be able to understand the InDesign environment, creating a workspace that is suitable to the student’s workflow, set-up document according to the required page size for their publications and learn how to save and export their design publications.
- **LO2:** Students will be able to create and modify text and objects, threading text frames, creating page numbers and creating jump lines, working with spell check and creating a user custom dictionary.
- **LO3:** Students will be able to understand how to work with typography, creating and applying color and gradient to text and objects and creating and applying the different types styles in InDesign
- **LO4:** Students will be able to import and modifying graphic, create sophisticated tables and working with transparency and effects for text and objects.

<b>Unit I</b>	<ul style="list-style-type: none"> <li>• Basic Concepts of Communication, types, elements, barriers, characteristics of communication, models of communication.</li> </ul>
<b>Unit II</b>	<ul style="list-style-type: none"> <li>• Introduction to Communication Theory</li> <li>• Magic Bullet theory, Individual Difference theory, Cultivation theory, Agenda Setting Theory, Gate keeping Theory, Cultural Imperialism Theory, Play Theory, Uses &amp; Gratification Theory.</li> <li>• Communication Model-Meaning and Concept</li> </ul>
<b>Unit III</b>	<ul style="list-style-type: none"> <li>• Working with Typography: Adjusting vertical spacing, Changing fonts and type styles, Fine-tuning columns, Creating drop cap, Adjusting letter and word spacing, Creating tabs and indents, Adding rule above a paragraph.</li> <li>• Working with Color: Creating and applying colors, Working with gradients, Creating tint, Creating spot colors, Applying colors to text and objects, Using advance gradient techniques.</li> <li>• Working with Styles: Creating and applying paragraph styles, Creating and applying character styles, Creating and applying object styles, Creating and applying table and cell styles, Globally updating styles.</li> </ul>

<b>Unit IV</b>	<ul style="list-style-type: none"> <li>• Importing and Modifying Graphics: Adding graphics from other programs, Comparing graphics and bitmap graphics, Updating revised graphics, Adjusting display quality, Working with clipping paths, Working with alpha channels.</li> <li>• Creating Tables: Converting text to table, Formatting a table, Creating header row, Adding graphics to table cells, Creating and applying table and cell styles.</li> <li>• Working with transparency: importing and colorizing a grayscale image, Applying transparency settings, Adding transparency effects to imported vector and bitmap graphics, Importing and adjusting Illustrator files that use transparency, Applying transparency settings to text, Working with effects.</li> </ul>
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**Suggested Readings-**

- Adobe InDesign CS6, Classroom in a book, The official training workbook from Adobe Systems, 2012
- The Fundamentals of Graphic Design. First Edition by Ambrose, Gavin. and Harris, Paul. (2008) Lausanne, Switzerland: AVA Publishing.

**Additional Readings-**

- Graphic Design the New Basics. Second Edition by Lupten, Ellen and Philipps, Jennifer Cole. (2015) New York: Princeton Architectural Press.
- Real World Adobe InDesign CS by Olav Martin Kvern and David Blatner (Peach pit Press). 1<sup>st</sup> Edition, 2010

**MET- 150: INTRODUCTION TO NEW MEDIA**

**(Contact Hours: 60, Credits: 4)**

**Objective:** This paper will introduce the students into emerging new media forms and help them to produce and manage content across multiple platforms, including print, radio, the Internet, television, social media and other digital and interactive platforms.

**Learning Outcomes**

**LO1:** Students will be able to grasp a comprehensive understanding of the new media landscape.

**LO2:** Students will be able to gain media skills required in the approach of emerging convergent media practices that require new media skills to be incorporated within the students portfolio of work.

**LO3:**Students will be able to gather comprehensive understanding of important terminologies that have been developed over time as part of the new media landscape has also been taken into account.

**LO4:**Students will be able to understand concepts related to new media and digital studies and will be prepared to take on a hands-on approach to the practice in new media skills and techniques itself.

<b>Unit I</b>	<b>New media-</b> Meaning and Characteristics, Principles of New Media, The New Media Interface , New Media Economy <b>Understanding New Media Technologies &amp; Applications</b> Digitization of media- _media convergence, Constituents of new media- _Web 2.0-3.0, Blogs, Micro Blogs, Wikis, Social Media, Constituents- _Facebook, Twitter, Wordpress, Blogger, YouTube, Docs, Drive, Hangouts, social bookmarking, slideshare, Skype.
<b>Unit II</b>	<b>New Media Ecology, Installations &amp; Screens</b> , Elements of Transmedia Narratives across multiple media, Gaming & Storytelling, digital games, player cultures, online games & their impact, New Media Art
<b>Unit III</b>	<b>Impact of New Media on Journalism</b> , Mass Communication The new media practitioners- _Characteristics and new roles of Journalists in the Internet age and the Digital Era. Creating and managing a Blog, trends in web/online Journalism and Communication.
<b>Unit IV</b>	<b>New Media Ethical issues</b> - Journalism ethics and restraint in new media, IPR Copyright & Legal issues in cyber space, Using social media to engage public, Activism in Cyber space, ICT's in new media; ICT and Social Inclusion, Globalization & Emerging Cyber cultures

#### **Suggested Readings -**

- Poster, M. (2018). *The second media age*. John Wiley & Sons.
- Manovich, L. (2001). *The language of new media*. MIT press.
- Reeves, B., & Nass, C. I. (1996). *The media equation: How people treat computers, television, and new media like real people and places*. Cambridge university press.
- Jenkins, H. (2006). *Convergence culture: Where old and new media collide*. NYU press.

#### **Additional Readings-**

- Flew, T. (2007). *New media: An introduction*. Oxford: Oxford University Press.
- Gerbaudo, P. (2018). *Tweets and the streets: Social media and contemporary activism*. Pluto Press.
- Lievrouw, L. A., & Livingstone, S. (Eds.). (2002). *Handbook of new media: Social shaping and consequences of ICTs*. Sage.
- Castells, M. (2004). *The network society A cross-cultural perspective*. Edward Elgar.

## 28. MICROBIOLOGY

### **Programme in Microbiology:**

The microbiology program focuses on practical applications, providing students with a comprehensive understanding of microbiological tools, techniques, and methodologies. Through a combination of theory and experiential learning, students establish a strong foundation in microbiological principles, laboratory techniques, and data analysis. They acquire proficiencies in microbial culturing, microscopy, molecular biology, and biochemical analysis. These skills enable them to investigate the characteristics and behavior of microorganisms, explore their genetic composition, and analyze biochemical data. By integrating theory with practical experience, students develop a profound understanding of microbiology and essential proficiencies for project work, analysis, and report preparation. This prepares them for successful careers in research, healthcare, and environmental monitoring, where their expertise in microbiology is highly valued.

### **Programme Outcomes (POs):** Expected outcome of the programme:

**PO1:** Demonstrate comprehensive understanding of microbiological principles, tools, techniques, and methodologies.

**PO2:** Acquire proficiency in microbial culturing and laboratory techniques for studying bacteria, fungi, and viruses.

**PO3:** Utilize microscopy effectively to observe and classify microorganisms based on cellular structures.

**PO4:** Apply molecular biology techniques to explore genetic composition and mechanisms of microorganisms.

**PO5:** Apply biochemical techniques to analyze metabolic pathways and physiological characteristics of microorganisms.

## **MIC-100: INTRODUCTORY MICROBIOLOGY**

**(Contact Hours: 75, Credits: 4)**

### **Course Objectives (Cos):**

This course is design with an objective to provide the basic information about the history of microbiological development. Further this course is also design to provide basic information and understanding about the different types of microorganisms and different culture media used for their growth.

### **Learning Outcomes (LOs)**

1. Thorough knowledge and understanding of the concepts of basic microbiology
2. Learn about the working principle of Dark field and Bright Field Microscope
3. Learn about the different types of microorganisms
4. Understanding the fundamentals of culturing and growing microorganisms.

### **Unit I: History of Microbiology**

1. Theory of Biogenesis and Abio-genesis (Spontaneous generation).
2. Contribution of Scientists to the field of Microbiology- Antony Von Leuwenhoek, Louis Pasteur, Joseph Lister, Robert Koch, Alexander Flemming, Iwanovsky.
3. Scope and branches of Microbiology.

### **Unit II: Basic principles and concept**

1. Microscope: Bright field and Dark field Microscope.
2. Sterilization: Dry heat (hot air oven, incineration); Moist heat (autoclave, pasteurization), Radiation (U.V rays, Gamma rays) Chemicals agents (Alcohol, phenols); Filtration (membrane filter)
3. Culture Media: Basal media, selective media, differential media, enriched and enrichment Media; pure culture techniques.

### **Unit III: Introduction to types of Microorganisms**

Distribution, occurrence, morphology, mode of reproduction and economic importance.

1. Bacteria, Viruses and Fungi.
2. Virioids and Prions.
3. Cyanobacteria, Protozoa and Algae.

### **Unit - IV: Practical**

**(Contact hours 30)**

1. Good laboratory practice in Microbiology and safety measures.

2. Study of aseptic technique-Preparation of cotton plug, wrapping of glassware, transfer of media and inoculum.
3. Preparation of culture media- Solid and liquid.
4. Pure culture techniques- Serial Dilution, pour plates, spread plates.
5. Slide study – Bacteria (Cocci and Bacilli), Fungi (*Aspergillus* and *Penicillium*), Cyanobacteria (*Anabaena* and *Nostoc*).

**Suggested Readings:**

1. Atlas R. M, Mosby (2005). Principles of Microbiology.
2. A.R. Mitra and K. Sarkar(2016). Practical Manual of Modern Microbiology. Himalaya Publishing House
3. Benson Harold J. W.C.B (2006). Microbiological Application. McGraw-Hill of India Private Limited
4. Dubey, R.C. and Maheshwari, D.K (1999). Text book of Microbiology. S. Chand & Company Ltd.,New Delhi.
5. Dubey, R.C. and Maheshwari, D.K (1999). Practical Microbiology. S. Chand & Company Ltd., New Delhi.
6. J.M. Cappuccino and Sherman, N. 11<sup>th</sup> Edition. Pearson (2014). Microbiology: A laboratory manual.
7. Pelczer, M.J. and Chan, E.C.S (2003). Elements of Microbiology. Tata McGraw-Hill.
8. Prescott, Harley and Klein's(2008). Microbiology, Mac Graw Hill Higher education.
9. Stainer, RY, Ingraham, JL, Wheelis, ML., and Painter, P.R(2000). General Microbiology. The Macmillan Press Ltd.



## **MIC-150: BACTERIOLOGY**

**(Contact Hours: 75, Credits: 4)**

### **Course Objectives (Cos):**

This course is design with an objective to provide the basic features of bacteria, their growth and adaptation. Further, this course also provides information regarding bacterial classification, reproduction and significance.

### **Learning Outcomes (LOs):**

1. To describe the classification of bacteria.
2. Know about the morphology and structure of bacterial cells.
3. Know about the nutritional requirements of bacteria for their growth and reproduction.

### **Unit I: Structure and Classification**

1. Overview of Bergey's manual of classification
2. Fine structure and function of bacterial-
  - a. Cell wall and Cell membrane,
  - b. Cytoplasm and Nucleoid,
  - c. Flagella, Pili/Fimbriae,
  - d. Slime layer and Capsule,
  - e. Spores and Cyst.

### **Unit II: Staining of bacteria**

1. Principles and procedure –
  - a. Simple staining and Negative staining
  - b. Differential staining- Gram's staining and acid-fast staining
  - c. Structural staining- Endospore, capsule and flagella.

### **Unit III: Bacterial growth and Reproduction**

1. Bacterial reproduction- Asexual
2. Mathematical nature and expression of growth- Growth curve, Generation time and Growth rate,
3. Culture techniques-Batch, Continuous (Chemostat, Turbidostat)and Synchronous cultures
4. Quantitative measurements of growth.

### **Unit - IV: Practical**

**(Contact hours 30)**

1. Morphological characterization of bacteria- Colony and Microscopic characteristics.
2. Estimation of bacterial growth by Spectrophotometry

3. Measurement of cell dimension by micrometry.
4. Staining- Simple and negative.
5. Differential staining- Gram's staining.

**Suggested Reading:**

1. Atlas R. M, Mosby (2005).Principles of Microbiology.
2. A.R. Mitra and K. Sarkar (2016). Practical Manual of Modern Microbiology. Himalaya Publishing House.
3. Benson Harold J. WCB (2006). Microbiological Application, McGraw-Hill of India Private Limited
4. Dubey, R.C. and Maheshwari, D.K (1999). Practical Microbiology. S. Chand & Company Ltd., New Delhi.
5. J.M. Cappuccino and Sherman, N. 11<sup>th</sup> Edition. Pearson (2014). Microbiology: A laboratory manual.
6. Pelczar, M.J. and Chan, E.C.S (2003).Elements of Microbiology. Tata McGraw-Hill.
7. Prescott, Harley & Klein's (2008), Microbiology, Mac Graw Hill Higher education.
8. Stainer, R.Y, Ingraham, J.L, Wheelis, M.L., and Painter, PR. (2000). General Microbiology. The Macmillan Press Ltd.

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## 29. MIZO

### **Programme Outcomes:**

1. Enabling students to develop an in-depth understanding on the various genres of literature.
2. Equipping students with the ability of critical reading of literary texts and of identifying various themes contained in the texts.
3. Development of moral and critical understanding on various issues found in literary text.
4. Students will be equipped with the knowledge of grammar as well as the communicative competence.

### **MIZ-100: INTRODUCTION TO MIZO LANGUAGE**

**(Contact Hours: 60, Credits: 4)**

### **Course Objective:**

This paper will introduce the student to the origin and the development of the Mizo language. It will also help them in learning the various periods of Mizo Literature together with poetry. By introduction of these topics, the students will be trained to understand the community, religion, gender and politics of the different period. It will also expand their knowledge in the subject and acquire deeper insight into the language and literature.

### **Learning Outcomes:**

The students will gain a coherent and systematic knowledge of the different aspects of Mizo language and literature. Students will be familiarized with the development, background, initial attempts of Mizo literature, its periodization and nomenclature. They will also learn and be acquainted with the contribution of writers and poets through the different periods.

### **UNIT 1: INTRODUCTION TO MIZO LANGUAGE ( Mizotawngchanchin)**

1. Mizo tawngbulbal - Lalthangliana Philips
2. Mizo tawngtobulleh a chhehvel - B. Lalthangliana

**UNIT-2:** Mizo Literature hunpui then dan lehhlá

**UNIT -3:** 1. Relthang ka dawn zo lo - Capt. L. Z. Sailo

2. AukhawkLasi–Lalzuithanga

**UNIT- 4:** 1. Falak Rairah - J. Liankhuma

2. Dawi ang I dawm ang u - C. Chhuanvawra

**Suggested Readings:**

1. Fungki Bu thar- CTBEB Publication, 2012

2. Thuhlaril (Literary trends & History of Mizo Literature), CTBEB Publication, Aizawl, 2006

3. Lalthangliana, b.ed.ZotawngBulpuileh a hmanna , MCI Publication. 2002

5. Lalzuithanga, AukhawkLasi, 1983

**MIZ-150: MIZO POETRY, SHORT PLAY AND LEGENDS**

**(Contact Hours: 60, Credits: 4)**

**Course objective:**

This course is a combination of traditional heroes and the socio-political scenario of Mizoram during the 1960's. It informs the students the values of an ideal man in traditional Mizo society and the change that took place. It encourages the student for improvement and development as an individual and the community as a whole.

The romantic poems are the artistic expressions of the different poets to give them exposure to traditional cultural experiences

**Learning outcome:**

The course will enable students to learn traditional values. it will also inculcate in them a spirit of competition for improvement and development.

**Unit 1 Ramngaihhlhla(Patriotic songs)**

1. Harh la harh la Zoram - Rokunga

2. Khawkhawmhla - Suakliana

3. Tho la ding ta che - V. Thangzama

## **Unit-2 Short plays**

1. Thangthar Nun - Khawlkungi
2. Thawmvunga - Dr.laltluanglianaKhangte
3. Hmasawnnarahbi - P C. Lalrinpuia

## **Unit 3 LengzemHla(Romantic poems)**

1. Nghilhlohna par - P. S. Chawngthu
2. Mangtha - Lalzova
3. Di Hmeltha–BuangiSailo

## **Unit 4 Legends**

1. PasalthaKhuangchera
2. PasalthaVanapa

## **Suggested Readings:**

1. Fungki Bu thar- CTBEB Publication, 2012
2. Khangte, Laltluangliana, Khawlkungileh a kutchhuak. 2011
3. Ngirtling- CTBEB Publication, 2012
4. Zawla, K. Mizo Pi lehPuteleh an thlahtechanchin, 2011
5. Lalzuithanga, Mizo Legend ( a study of Mizo legendary tales), Aizawl, 2019
6. Contemporary short stories from Mizoram- Margaret Ch.Zama .

Published by Sahitya Akademi

### 30. NEPALI

Under Graduate Nepali degree provides curriculum on Nepali literature including its history, prose, poetry and grammar to equip students to undertake higher studies in the subject as well as pursue career and employment based on the acquired knowledge at the undergraduate level of learning.

#### **Programme outcome (PO):**

At the end of the Undergraduate Programme in Nepali, the graduates will be able to:

- PO 1:** Apply knowledge of Nepali language and literature at an appropriate level to the discipline.
- PO 2:** Understand the history of Nepali literature and articulate the same while executing knowledge with peers.
- PO 3:** Acquire knowledge in domain of Nepali Prose, Poetry and Grammar enabling their applications .
- PO 4:** Apply written and oral communication skills to communicate effectively in academia and research.

#### **NPL-100: HISTORY OF NEPALI LITERATURE AND POETRY**

नेपाली साहित्येतिहास र काव्य

**(Contact Hours: 60, Credits: 4)**

प्रस्तुत पाठ्यक्रमले इसाको एघारौं शताब्दीदेखि एक्काइसौं शताब्दीसम्म क्रमसः विकास हुँदै आएको नेपाली साहित्येतिहास तथा विभिन्न कालमा प्राप्त केही प्रमुख कवि र तिनका कविताको परिचय गराउने अवसर प्रदान गर्ने छ।(The paper covers the history of Nepali Literature and Poetry from 10<sup>th</sup> Century AD to 21<sup>st</sup> Century AD).

**Course Objectives:** यस पाठ्यक्रमका मुख्य उद्देश्यहरू यस प्रकार छन् (The major objectives of the course are):

- CO1: नेपाली साहित्येतिहास तथा कविता-विकासको इतिहासका विषयमा जान्नु। (To provide an overview of historical development of Nepali literature and poetry).
- CO2: नेपाली कविताको पूर्व-आधुनिक कालको अध्ययन र केही प्रमुख कविहरूको परिचय दिनु। ( To develop understanding of the importance of ancient to Modern history of Nepali poetry and introduction of prominent poets).
- CO3: नेपाली कविताको आधुनिककालको परिभाषा, अध्ययन, स्वच्छन्दतावादी तथा समसामयिक धाराका प्रमुख कविहरूको परिचय गराउनु।(To learn the importance of modern history of Nepali poetry and prominent poets -Romantic and Contemporary).
- CO4: पूर्व-आधुनिककाल तथा आधुनिककालका प्रमुख कविहरूको योगदान जान्नु र उनीहरूका विषयमा लेख्नसक्ने क्षमताको विकास गर्नु। (To develop the understanding and writing skills of poets and their contributions).

**Learning Outcomes:** प्रस्तुत पाठ्यक्रम अध्ययन गरिसकेपछि विद्यार्थीहरू निम्नलिखित ज्ञान र क्षमता प्राप्त गर्न सक्षम हुनेछन् : (On successful completion of this course, students are expected to learn the following:)

- LO1: नेपाली साहित्येतिहासको पृष्ठभूमि, प्रारम्भिक प्रयास, काल विभाजन र नामकरण जान्नु। (Know about the development, background, Initial attempts of Nepali Literature, Periodisation process and nomenclature of Nepali literary history)
- LO2: नेपाली कविताको पूर्व-आधुनिककाल तथा माध्यमिककालको परिचय र केही महत्वपूर्ण कविहरूको योगदानका विषयमा जानकारी पाउनु।( Learn about the introduction of Pre-Modern Period of Nepali poetry and the contribution of the poets).
- LO3: नेपाली कविताको आधुनिककालको परिचय तथा स्वच्छन्दतावादी एवं समसामयिक धाराका केही प्रमुख कविहरूको अध्ययन गर्नु। (Know about the Modern Period of Nepali poetry and the contribution of the poets).

LO4 :प्राथमिक, माध्यमिक र आधुनिककालका केही प्रतिनिधि कवि र तिनका प्रमुख कविताहरू अध्ययन गर्न।

(Understand about Prominent Poets of Pre-Modern Period and Modern Period).

एकाइ-१ (Unit-1) नेपाली साहित्येतिहासको विकास :

- (i) नेपाली साहित्येतिहासको पृष्ठभूमि
- (ii) नेपाली साहित्येतिहासका प्रारम्भिक प्रयास
- (iii) नेपाली साहित्येतिहासको कालविभाजन प्रक्रिया र नामकरण

एकाइ-२ (Unit-2) नेपाली कविताको पूर्व आधुनिक काल :

- (i) प्राथमिक काल (परिचय र प्रमुख कवि)
- (ii) माध्यमिक काल( परिचय र प्रमुख कवि)

एकाइ-३(Unit-3) नेपाली कविताको आधुनिक काल :

- (i) स्वच्छन्दतावादी धारा (परिचय र प्रमुख कवि)
- (ii) समसामयिक धारा (परिचय र प्रमुख कवि)

एकाइ-४ (Unit-4)कवि र काव्य

- |                             |   |                     |
|-----------------------------|---|---------------------|
| (i) सुवानन्ददास             | – | पृथ्वीनारायण        |
| (ii) भानुभक्त आचार्य        | – | चपला अबलाहरू        |
| (iii) मोतीराम भट्ट          | – | प्यारा राम          |
| (iv)) लक्ष्मीप्रसाद देवकोटा | – | यात्री              |
| (v) हरिभक्त कटुवाल          | – | आकाशका तारा के तारा |
| (vi) पारिजात                | – | म सडक बोल्दै छु     |



## सन्दर्भग्रन्थः

१. उपाध्याय, केशवप्रसाद, **प्राथमिककालीन कविर काव्य प्रवृत्ति**, काठमाडौं : साझा प्रकाशन, सन् १९८५।
  २. उपाध्याय, टेकनारायण र जोशी, वसन्तराज, **स्नातकीय नेपाली साहित्य**, शिलाङ्ग : नेपाली पाठ्यपुस्तक प्रकाशन समिति, सन् २०१५।
  ३. थापा, वशु र राई, विक्रम, **नेपाली कविता कल्प**, दार्जिलिङ्ग : एकता बुक्स, सन् २०१२।
  ४. नेपाल, घनश्याम, **नेपाली साहित्यको परिचयात्मक इतिहास**, सिलगढी : नेपाली साहित्य प्रचार समिति, सन् १९९१।
  ५. लुइटेल, खगेन्द्रप्रसाद, **नेपाली कविताको इतिहास**, काठमाडौं : विद्यार्थी पुस्तक भण्डार, सन् २०००।
  ६. लुइटेल, खगेन्द्रप्रसाद, **नेपाली काव्य समालोचना**, काठमाडौं : विद्यार्थी पुस्तक भण्डार, सन् २००५।
  ७. शर्मा, मोहनराज र श्रेष्ठ, दयाराम, **नेपाली साहित्यको इतिहास**, काठमाडौं : साझा प्रकाशन, सन् १९८९।
  ८. शर्मा, तारानाथ, **नेपाली साहित्यको इतिहास**, काठमाडौं : सहयोगी प्रकाशन, सन् २००१।
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## NPL-150: LINGUISTICS, POETICS AND GRAMMAR

भाषाविज्ञान, काव्यशास्त्र र व्याकरण

(Contact Hours: 60, Credits: 4)

प्रस्तुत पाठ्यक्रमले भाषासँग सम्बन्धित भाषाविज्ञान, काव्यशास्त्र र व्याकरणका बारेमा जान्न र बुझ्नका लागि मञ्च प्रदान गर्ने छ। (The course provides platform to learn and acquire understanding about linguistics, poetics and grammar related to language).

**Course Objectives:** यस पाठ्यक्रमका मुख्य उद्देश्यहरू यस प्रकार सुचिबद्ध छन् (The course objectives are listed as)

CO1: भाषाविज्ञानमा लेखन कौशलका आधारभूत अवधारणाहरू विकास गर्न सक्षम हुने छन्।(Develop the fundamental concepts of the writing skill in Linguistics.

CO2: लेखनका आधारभूत अवधारणाहरूबारे लेख्न, कविता लेखनको सीपको विकास गर्न सक्षम हुने छन्। ( Learn to write fundamental concepts of the writing skill in Poetics).

CO3: काव्यशास्त्रका मुख्य भिन्नताहरूबारे लेख्न सिक्ने छन् र कवितामा रचनात्मक लेखन विकास गर्न सक्षम हुने छन्। (Learn to write about the Major Modes of Poetics and develop creative writing in poetry).

CO4: नेपाली व्याकरण सिकेर साहित्यिक विधाहरूमा लेखन कौशलको विकास गर्ने छन्। ( Learn Nepali Grammar and develop the writing skills in literary genres).

**Learning outcomes:** प्रस्तुत पाठ्यक्रम अध्ययन गरिसकेपछि विद्यार्थीहरू निम्नलिखित ज्ञान र क्षमता प्राप्त गर्न सक्षम हुने छन्: (On successful completion of this course, students are expected to learn the following)

LO1: भाषाविज्ञानको परिभाषा,भिन्नता, नेपाली भाषाका विशेषताहरू र तिनका शाखाहरूबारे जान्नसक्ने क्षमता। (Ability to know about the definition of Linguistics, distinction, characteristics of Nepali Language and their branches).

LO2: कविता, कवि, कविताका उद्देश्यबारे जान्नसक्ने क्षमता। ( Ability to know about the Poetics, Poet, Poetics Purpose).

LO3: काव्यशास्त्रका मुख्य भिन्नताहरू र यसका प्रकार(छन्द, अलङ्कार र रस)बारे जान्नसक्ने क्षमता, कारक र विभक्ति,सन्धि र समास, उखान र बाग्धारा आदिको क्षमता विकास। (Ability to know about the Major Modes of Poetics and its Types (Chanda, Alankar Rasa , Case, Case-ending, Compoundand Morpheme, Proverbs and phrases).

एकाइ-१ (Unit-1) भाषाविज्ञान :

(i) भाषाको परिभाषा, भेद र विशेषता

(ii) भाषा र भाषिका

(iii) भाषाविज्ञानका शाखाहरूको परिचय

एकाइ-२ (Unit-2) काव्यशास्त्र परिचय :

- (i) कवि र काव्य
- (ii) काव्य प्रयोजन
- (iii) काव्य हेतु

एकाइ-३ (Unit-3) काव्यशास्त्रका प्रमुख भेद:

- (i) छन्दको परिचय र प्रकार( अनुष्टुप, शार्दूलविक्रीडित, झ्याउरे र सवाई)
- (ii) अलङ्कारको परिचय र प्रकार( यमक, अनुप्रास, उपमा र रूपक)
- (iii) रसको परिचय र प्रकार

एकाइ-४ (Unit-4) नेपाली व्याकरण :

- (i) कारक र विभक्ति
- (ii) सन्धि र समास
- (iii) उखान र बाग्धारा

**सन्दर्भग्रन्थ:**

१. अधिकारी, हेमाङ्गराज, **पूर्वीय समालोचनाको सिद्धान्त**, काठमाडौं : साझा प्रकाशन, सन् १९९०।
  २. उपाध्याय, केसवप्रसाद, **साहित्य-प्रकाश**, काठमाडौं : साझा प्रकाशन, सन् २००२।
  ३. थापा, मोहन हिमांशु, **साहित्य परिचय**, काठमाडौं : साझा प्रकाशन, सन् १९९०।
  ४. न्यौपाने, टङ्कप्रसाद, **भाषाविज्ञानको रूपरेखा**, काठमाडौं : जय प्रकाशनसन् २००५।
  ५. पराजुली, कृष्णप्रसाद, **राम्रो रचना मिठो नेपाली**, काठमाडौं : साझा प्रकाशन, सन् १९९८।
  ६. बन्धु, चुडामणि, **भाषाविज्ञान**, काठमाडौं : साझा प्रकाशन, सन् २००४।
  ७. भण्डारी, राजेन्द्र, सम, पारसमणि, **भाषा-साहित्य**, गान्तोक : सहकारी लिमिटेड, सन् २००२।
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## 31. PHILOSOPHY

### **About FYUP Programme of Philosophy:**

The Programme will have a trust in developing what philosopher Hannah Arendt had once termed as 'life of the mind'. Similar expression is found in noted Indian Philosopher Krishna Chandra Bhattacharya, who called the growth of intellect as 'swaraj in ideas'. The Programme in Philosophy aims at developing critical thinking and an ability to raise significant questions on any knowledge related issue from multiple points of view such as metaphysical, spiritual, logical, scientific, ontological, ethical and a host of such categories of reasoning and ideas.

On the practical side, learning philosophy would enable students to distinguish between what is rational and what is irrational, what is logical and what is illogical. Going deeper, philosophical aptitude would help in developing deeper understanding of a text or a formula or even a software program. As philosophers tend to find out the basic structure of understanding in any given frame of knowledge, philosophical ability to reason, argue and contradict the given shall yield a substantive amount of high level and mature analytical ability and practical approaches in applying those analytical finds.

### **Programme Outcomes:**

- 1) Enhancement of ability for Critical analysis of a situation, problem or text of knowledge to a level that would mark originality and maturity.
- 2) Development of refined and sophisticated capability to self-assess and to respond to genuine needs of humanity in terms of universal values like goodness, truth and beauty.
- 3) Practical skills of analytical, logical and linguistic analysis to solving problems that arise at every walk of life.
- 4) A virtuous, moral and aesthetic selfhood that recognizes difference and looks for underlying unity between school of thoughts and their applied dimensions
- 5) Better managerial skills to manage human relations and ability to deliberate and resolve conflicts by way of providing good reasons wherever called for.
- 6) A versatile, multidisciplinary capacity to see connections between various branches of science, metaphysics, religion and any collectively arrived at decision-making process.
- 7) Development of healthy, accommodative, inclusive approaches to issue of life creating good citizenship values inculcated through philosophical knowledge.
- 8) Scientific bent of mind, democratic temperament and ability to draw distinctions that clarifies any confusion centering an issue or in case of difference of opinions.
- 9) Induction into a synthesizing role of culture and education by philosophical combining of disciplines and traditions of thought that are very important from historical and civilizational points of view.

- 10) An artistic, creative, rigorous and a sharp capacity to grasp and understand things at a deeper level than what goes by commonly held beliefs.
- 11) Achievement of a potential to be different in a purposive and productive manner that bridges between theory and practice.

## **PHI-100: UNDERSTANDING PHILOSOPHY**

**(Contact Hours: 60, Credits: 4)**

**Course Objectives (CO):** To impart basics of knowledge through sophisticated philosophical approaches that makes a first-hand knowledge of reality possible.

**Learning Outcomes (LO):** Analytical and logical ability, capacity to apply philosophical knowledge in practical contexts of life, Science, human values and Technology.

Unit-I: Meaning and Method of Philosophy

- (a) Meaning of Philosophy
- (b) Relation of Philosophy to Science
- (c) Relation of Philosophy to Religion

Unit-II: Sources of Knowledge

- (a) Western: Empiricism, Rationalism and Critical Philosophy
- (b) Indian: Perception, Inference and Verbal Testimony
- (c) Phenomenological: Experience and Transcendence

Unit-III: Theories of Truth

- (a) Coherence
- (b) Correspondence
- (c) Pragmatism

Unit-IV: Theories of Reality

- (a) Monism, Dualism and Pluralism
- (b) Realism and Idealism
- (c) Internal Realism

Suggested Readings:

1. Hospers, John, *An Introduction to Philosophical Analysis*, Allied Publishers, New Delhi, 1980.

2. Russell, Bertrand ,*Problems of Philosophy*, Oxford University Press, Oxford, 1912.
3. Hiriyanna, M, *The Essentials of Indian Philosophy*, George Allen & Unwin,London, 1985.
4. Smith, N. K. ( trans.),*Immanuel Kant's Critique of Pure Reason*, Palgrave Macmillan, London, 2007.
5. Sharma, C. D., *Critical Survey of Indian Philosophy*, Motilal Banarasidass, New Delhi, 1975.
6. Datta,D. M., Chatterjee, S., *Introduction to Indian Philosophy*, University of Calcutta, Kolkata,1984.
7. Lehrer, Keith, *Knowledge*, Clarendon Press, Oxford, 1974.
8. [Niiniluoto](#), Ilkka, *Critical Scientific Realism*, Chapter 7, Oxford University Press, London, 2002.
9. Goldberg, S.C., *Relying on others: An essay in Epistemology*, Oxford University Press, London, 2012.

## **PHI-150: ETHICS**

**(Contact Hours: 60, Credits: 4)**

**Course Objectives (CO):** Teaching students basic theories of Ethics, how to argue in Ethics.

**Learning Outcomes (LO):** Making students aware of primacy of Ethics in everyday affair, Making students capable of establishing ethical view and practice in every aspect of personal and social .

Unit-I: Nature and Scope of Ethics

- (a) Nature and Scope of Moral Philosophy
- (b) Nature of Moral Judgments
- (c) Ethics and Meta-ethics

Unit-II: Moral Concepts and Issues in Applied Ethics

- (a) Good, Right, Duty and Virtue
- (b) Purusartha, Niskama Karma and Ahimsa
- (c) Public and Private Good

Unit-III:Ethical Theories

- (a) Teleological: Hedonism, Utilitarianism

- (b) Deontological (Kant's Categorical Imperative)
- (c) Moral Education

#### Unit-IV:Theories of Punishment

- (a) Preventive
- (b) Reformative
- (c) Retributive

#### **Suggested Readings:**

1. MacIntyre, Alasdair., *A Short History of Ethics*, Rutledge and Kegan Paul, London, 1967.
2. Frankena, William K.,*Ethics*, Prentice Hall of India, New Delhi, 1982.
3. Walzer, Michael, *Spheres of Justice: A Defense of Pluralism and Equality*, Basic Books,New York, 1983
4. Taylor, Michael, *Anarchy and Cooperation*,Wiley Blackwell, New York,1976.
5. Jain,Amit, *Karma, Dharma and Moksha: The Art and Science of Living Dying and Enlightenment*, D.K. Printworld, New Delhi,2012.
6. Sharma, C. D., *Critical Survey of Indian Philosophy*, Motilal Banarasidass, New Delhi, 1975.
7. Datta,D. M., Chatterjee, S, *Introduction to Indian Philosophy*, University of Calcutta, Kolkata, 1984.
8. Hand, M., *A Theory of Moral Education*, Routledge, London, 2018.
9. Hiriyanna, M., *The Essentials of Indian Philosophy*, London George Allen & Unwin 1985.
10. Shaida, S. A., *Problems of Ethics*, Spectrum Publications, New Delhi, 2003.
11. Prasad, R., *Karma, Causation and Retributive Morality: Conceptual essays in Ethics and Metaethics*, ICPR and South Asia Books, New Delhi, 1990.
12. Kovesi, Julius, *Moral Notion*, Routledge & Kegan Paul, London, 1969.
13. Prasad, R., "The theory of Purusārthas: Revaluation and reconstruction", *Journal of Indian Philosophy*, vol.9, pp.49–76, 1981.

## 32. PHYSICS

### Preface

The Four Years UG Physics syllabus under NEP-2020 has been framed to enhance the knowledge acquired at the +2 level and to motivate and inspire the students to create deep interest in Physics.

### Programme Outcomes

Upon successful completion of these courses, the students will be able to understand basic laws of Physics and their applications in solving most of the microscopic and macroscopic dimensional problems in nature.

### **PHY-100: MATHEMATICAL PHYSICS, PROPERTIES OF MATTER AND WAVES**

**(Contact Hours: 75, Credits: 4)**

**Course Objectives:**Mathematical physics serves as a tool to understand physics. Mechanics helps the students to understand the basic laws of physics in day-to-day life and Waves and Vibrations help to understand different types of wave motion in physical systems. Practical will help students to determine and verify physical quantities related to mechanics and waves.

**Learning Outcomes:**Upon successful completion of this course, the students will be able to understand how to solve various problems of physics using mathematical tools; various laws of motion and properties of matter using mechanics; waves and oscillation in different physical media. These principles are basic requirements for higher studies of physics. The practical performed by the students will help them to measure some of the important physical quantities related to mechanics and waves for better understanding of the topics.

### **Unit I: Mathematical Physics-I**

**(15 hours)**

**Vector Calculus:** Scalar and vector field, Definitions and significance of Gradient, Divergence and Curl, Gauss's divergence theorem, Stoke's Theorem, Green's Theorem (without proofs) in Cartesian coordinates.

**Coordinate systems:** Polar, Spherical and Cylindrical co-ordinates.



**Differential Equations:** Ordinary differential equation, 1<sup>st</sup> order homogeneous linear differential equations and 2<sup>nd</sup> order homogeneous linear differential equations with constant coefficients.

## **Unit II: Mechanics and Properties of Matter**

**(15 hours)**

Newton's Laws of Motion, Free body diagram and applications.

**System of particles and rigid body motion:** Center of Mass (CM) and Laboratory frames, motion of the center of mass. Linear and angular momentum of a system of particles. Moment of inertia of sphere, disc and cylinder.

**Frames of reference:** Inertial and non-inertial frames, uniformly rotating frame of references, Centrifugal and Coriolis force and their applications.

**Elasticity:** Hooke's Law, Elastic constants and their relations, Poisson ratio, torsional cylinder, bending of beam, cantilever (weightless) loaded at the free end.

**Fluid Dynamics:** Equation of continuity, Bernoulli's theorem and its applications, Surface tension and surface energy, Capillarity and formation of droplets, Streamline and turbulent flow, Viscosity, Terminal velocity, Stoke's Law, Poiseuille's equation.

## **Unit III: Waves and Oscillations**

**(15 hours)**

**Simple harmonic motion (SHM):** Differential equation of simple harmonic motion and its solution. Superposition of two simple harmonic oscillations. Lissajous figures and their uses.

**Damped and forced oscillations:** Damped SHM, energy of damped SHM, Q-value of damped oscillations. Forced vibrations, Transients and steady state oscillations of forced vibrations, and condition of resonance.

**Wave motion:** Representation of plane progressive wave, Classical wave equation of a plane progressive wave and its general solution. Energy and energy density of a plane progressive wave. Qualitative idea of spherical waves. Phase velocity and group velocity.

## **Unit IV: Experimental Physics-I**

**(30 hours)**

1. Determination of the value of acceleration due to gravity (g) using Bar Pendulum.
2. Determination of the acceleration of gravity (g) using Kater's Pendulum.
3. Determination of the moment of inertia of a regular solid about an axis passing through its centre of gravity using torsional pendulum.
4. Determination of the rigidity modulus of a cylindrical body by static torsion apparatus.
5. Determination of co-efficient of viscosity of liquid by capillary tube method.
6. Determination of the surface tension of a liquid by Jaeger's method

7. Determination of the frequency of a tuning fork by Melde's method.
8. Determination of Young Modulus of a wire by Searle's Method.

**Suggested readings: (All latest edition)**

1. Essential of Mathematical methods K. F. Riley and M. P. Hobson, Cambridge University (2011).
2. An Introduction to Mechanics: Daniel Kleppner and Robert Kolenkow, Cambridge University Press (2011).
3. A Treatise on General Properties of Matter: Chatterjee and Sengupta, New Central book Agency, Kolkata (2011).
4. Mechanics: J. C. Upadaya, Himalaya Publishing House, Agra (1999).
5. The Physics of Waves and Oscillations, N. Bajaj, McGraw Hill Education, Europe (2017).
6. Schaum's Outline of Mathematics for Physics Students (Schaum's Outline Series) (2011).
7. Mechanics: D. S. Mathur, S. Chand & Co., New Delhi (2000).
6. Acoustics, Waves and Oscillations: S. N. Sen, New Age International (1990).
7. Waves and Oscillation: R. N. Choudhuri, New Age International (2010).
8. B. Sc. Practical Physics, C. L. Arora, S. Chand & Co. (2005).
9. A Text Book of Practical Physics, S. K. Ghosh, New Central Book Agency, Kolkata (2004).
10. A Text Book on Practical Physics, K. G. Majumdar & B. Ghosh, Sreedhar Publishers, Calcutta

**PHY-150: ELECTRICITY AND MAGNETISM, OPTICS AND ELECTRONICS**

**(Contact Hours: 75, Credits: 4)**

**Course Objectives:** The course on Electromagnetism will help the students to understand the effect of charge at rest and in motion and dielectric properties of the matter. Study of geometrical optics will help the students to picturize image formation. The basics of electronics are required to understand the different functions of electronic devices. The practical will help the students to determine physical properties of electrical and electronic components and also help them to understand the optics related topics.

**Learning Outcomes:** Upon successful completion of this course, the students will be able to understand the basic laws of electricity and magnetism, the formation of optical images, concepts of both analog and digital electronics. The practical will help the students in handling the multimeter, potentiometer and function generators, whereas the experiments performed on optics will help to measure different parameters of lenses.

## **Unit I: Electricity and Magnetism**

**(15 hours)**

Coulomb's law and Electric field, Electrostatic potential, Gauss' law in electrostatics (both differential and integral forms) and its application due to a linearly charged rod and a solid sphere, Polarization and displacement vector, Gauss' law in dielectric media.

Biot and Savart's Law and its application due to a straight conductor and solenoid, Ampere's law and its applications, Law of magnetostatics in differential forms.

Integral and Differential form of Faraday's laws, Modification of Ampere's law, Maxwell's equation in free space and in dielectric medium.

Circuits, Kirchhoff's Laws, Series and Parallel resistances, Capacitances, Parallel plate capacitor. Use of complex numbers to find impedance and voltage in series and parallel LCR circuits, Power dissipation, Quality factor and Resonance.

## **Unit II: Theory of image formation and matrix optics**

**(15 hours)**

Fermat's Principle and its applications to reflection and refraction at plane and curved boundaries.

General theory of image formation: Cardinal points of an optical system, Refraction through a thick lens, Relation between the distances of cardinal points, Combination of thin lenses separated by a distance.

Matrix optics: Reflection, refraction and translation matrices, Lens maker formula by matrix method, System matrix of thin and thick lens, Equation of image plane.

## **Unit III: Electronics-I**

**(15 hours)**

Binary system, Binary to decimal and decimal to binary conversion, Binary arithmetic-addition and subtraction, Signed binary numbers, two's complement scheme.

Logic gates: OR, AND, NOT gates and their realization with diodes and transistors, NOR and NAND as universal gates.

Boolean algebra: De' Morgan's theorems, Boolean expression, Simplification of Boolean expression and their representation with basic logic gates.

Diodes and their applications, Bipolar junction transistor (BJT): Different current components and characteristics of a BJT, CB and CE configurations and related characteristics, active, cut-off and saturation regions, current amplification factors in CB and CE configuration.

## **Unit IV: Experimental Physics-II**

**(30 hours)**

1. Determination of the value of an unknown low resistance using potentiometer.

2. Determination of the value of EMF of a Cell using potentiometer.
3. Determination of the resistance per unit length of the meter bridge wire by Carey-Foster method.
4. Determination of the value of unknown capacitance using De-Sauty's method.
5. Determination of the focal length of two thin lenses in contact using displacement method and verification of the result by measuring the focal length of individual lenses.
6. Determination of refractive index of the materials of a prism by measuring angle of prism and minimum deviation using spectrometer.
7. To find the frequency response of series LCR circuit.
8. To find the frequency response of parallel LCR circuit.
9. Construction and verification of AND and OR gates using diodes and resistors.
10. Study the characteristics of a transistor (CE/CB mode).

**Suggested readings: (All latest edition)**

1. Foundations of Electromagnetic Theory, John R. Reitz, Frederick J. Milford, and Robert W. Christy, Pearson (2008).
2. Electricity and Magnetism: D. C. Tayal, Himalayan Publisher (2019).
3. Electricity and Magnetism: K. K. Tewari, S. Chand & Co., New Delhi (2012).
4. Electricity and Magnetism: Edward M. Purcell, Mc-Graw Hill Education (2013).
5. A textbook of Optics: D. N. Subrahmanyam, BrijLal and M. N. Avadhanulu, S. Chand & Co., New Delhi (2012).
6. Physical Optics: A. K. Ghatak, Tata Mc-Graw Hill India (1997).
7. Modern Optics: A. B. Gupta, Books and Allied (P) Ltd. (2006).
8. Basic Electronics: D. C. Tayal, Himalayan Publisher (2010).
9. Basic Electronics: Devices, Circuits and its Fundamentals: S. Kal, Prentice Hall India, New Delhi (2002).
10. Principles of Electronics: V. K. Mehta and R. Mehta, S. Chand & Co., New Delhi (2005).
11. B. Sc. Practical Physics, C. L. Arora, S. Chand & Co. (2005).
12. A textbook of Practical Physics, S. Ghosh, New Central Book Agency, Kolkata (2004).
13. A textbook of Practical Physics, K. G. Mazumdar, Syndicate Press (2006).
14. B. Sc. Practical Physics, Harnam Singh, P. S. Hemne, S. Chand & Co., New Delhi (2011).

## 33. POLITICAL SCIENCE

### Preface

**About the Programme:** The four-year undergraduate programme (FYUG), revised as per the New Education Policy 2020 framework is designed to enhance the basic theoretical, conceptual and analytical skills of the students. The undergraduate Programme in Political Science continues to be among the most sought-after and prestigious programmes offered at the University. The course covers the entire spectrum of the major sub-discipline of Political Science, Multidisciplinary Courses (MDCs), Skill Enhancement Courses (SECs), Ability Enhancement Courses (AECs) and Value Added Courses (VACs).

**Programme Outcomes:** The students will be able to understand the basic concepts, foundational, theoretical and advanced knowledge in Political Science. Courses on Multidisciplinary, Skill Enhancement, Ability Enhancement and Value Added Courses will broaden their understanding of the issues and problems in addition to their core discipline.

### POL-100: POLITICAL THEORY

(Contact Hours: 60, Credits: 4)

#### Course Objectives:

This course aims to introduce basic concepts, ideas and theories in Political Science. It will also examine the various perspectives, dimensions and relevance of political theory.

#### Learning Outcomes:

This course will enable students to understand the basic political theory concepts and engage them in critically analyzing the subject. It will also provide an opportunity for the students to familiarize themselves with contemporary interpretations of the theories and views of scholars for a deeper understanding of the subject.

#### Unit I: Nature, Scope and Significance of Political Theory.

Theories of the Origin of State: Social Contract, Evolutionary and Marxist.  
Sovereignty: Nature, Characteristics, Monistic and Pluralistic theories.

#### Unit II: Rights: Natural, Legal and Marxist Theory of Rights.

Liberty: Negative and Positive.  
Equality: Kinds of Equality, Relationship between Liberty and Equality.

**Unit III:** Law: Natural, Sociological and Marxist Theories of Law.  
Justice: Natural, Distributive and Social Justice.  
Political Obligation: Grounds of Political Obligation and Resistance.

**Unit IV:** Dimensions of Democracy: Social, Economic and Political;  
Liberal and Marxist Perspectives.

**Suggested Readings:**

- Barker, E., *Principles of Social and Political Theory*, Calcutta, Oxford University Press, 1976.  
Barry, N.P., *Introduction to Modern Political Theory*, London, Macmillan, 1995.  
Bercht, A., *Political Theory: The Foundations of Twentieth Century Political Thought*, Bombay, The Times of India Press, 1965.  
Bhargava, Rajib and A. Acharya, *Political Theory: An Introduction*, Pearson, 2008  
Cunningham, F., *Theories of Democracy – A Critical Introduction*, London and New York, Routledge, 2002.  
Dahl, R., *A Preface to Democratic Theory*, Chicago, University of Chicago Press, 1965.  
Engels F., *Origin of Family, Private Property and the State*, 1902 (English Edition)  
Dunn, J., *Modern Revolutions*, London, The Clarendon Press, 1989.  
Held, D., *Models of Democracy*, Cambridge, Polity Press, 1987.  
-----, *Political Theory Today*, Cambridge, Polity Press, 1991.  
Heywood, Andrew, *Political Theory: An Introduction*, New York, Palgrave Macmillan, 2002.  
Johari, J. C., *Contemporary Political Theory*, New Delhi, Sterling, 2004.  
-----, *Principles of Modern Political Science*, New Delhi, Sterling, 2004.  
Kukathas, C and P. Pettit, *Rawls' A Theory of Justice and its Critics*, Cambridge, Polity Press, 1998.  
Macpherson, C.B., *Democratic Theory: Essays in Retrieval*, Oxford, The Clarendon Press, 1977.  
Macpherson, C.B., *The Real World of Democracy*, Oxford University Press, 1970.  
Milliband, R., *Marxism and Politics*, Oxford, Oxford University Press, 1977  
Poggi, G., *The State: Its Nature, Development and Prospects*, Cambridge, Polity Press, 1990.  
Ramaswamy, S., *Political Theory: Ideas and Concepts*, Delhi, Macmillan, 2002.  
Sartori, G., *Democratic Theory*, Oxford University Press, 1974.  
Singh, R., *Reason, Revolution and Political Theory*, New Delhi, People's Publishing House, 1997.  
Thakurdas, F., *Essays in Political Theory*, New Delhi, Gitanjali, 1992.  
Varma, S.P., *Modern Political Theory*, New Delhi, Vikas, 1993.  
Vincent Andrew, *The Nature of Political Theory*, OUP, 2007.  
Wasby, S., *Political Science: The Discipline and its Dimensions*, Calcutta, Scientific Book Agency, 1970.

## **POL-150: INDIAN POLITICAL SYSTEM**

**(Contact Hours: 60, Credits: 4)**

### **Course Objectives:**

The paper focuses on the political processes and the actual functioning of the Indian political system with an emphasis on the role of social and economic processes.

### **Learning Outcomes:**

The paper will familiarise students with the dynamics of Indian Politics and enable them to understand both constitutional and the socio-economic dimensions of the Indian political system.

**Unit I:** Nature of Indian State: Historical and Ideological basis.  
Fundamental Rights, Duties and Directive Principles of State Policy.

**Unit II:** Federalism and Parliamentary Democracy: Union-State Relations,  
Working of Parliament, Judicial Review and Judicial Activism.

**Unit III:** Changing Nature of Party System, Role of Political Parties and Pressure groups in Indian politics.

**Unit IV:** Globalization, Economic Liberalization and Indian Politics.

### **Suggested Readings:**

Abbas, H. et.al (eds), *Indian Government and Politics*, Pearson, New Delhi, 2011.

Austin, G., *Working a Democratic Constitution: The Indian Experience*, Delhi, Oxford University Press, 2000.

Basu, D.D., *An Introduction to the Constitution of India*, New Delhi, Prentice Hall, 1994.

Baxi, U., *The Indian Supreme Court and Politics*, Delhi, Eastern Book Company, 1980.

Baxi and B. Parekh (ed.), *Crises and Change in Contemporary India*, New Delhi, Sage, 1994.

Bhambri, C.P., *The Indian State: Fifty Years*, New Delhi, Shipra, 1999.

Brass, P., *Politics of India since Independence, 2<sup>nd</sup> edn.*, Cambridge, Cambridge University Press, 1994.

-----, *Caste, Faction and Party in Indian Politics, 2 Vols.*, Delhi, Chanakya Publications, 1984-1985.

- , *Ethnic Groups and the State*, London, Croom Heim, 1985.
- , *Language, Religion and Politics in North India*, London, Cambridge University Press, 1974.
- Frankel, F. R. et.al., (eds.) *Transforming India: Social and Political Dynamics of Democracy*, New Delhi, OUP, 2000.
- R.L. Hardgrave, *India: Government and Politics in a Developing Nation*, New York, Harcourt, Brace and World, 1965.
- Hassan, Zoya, (ed.), *Party and Party Politics in India*, New Delhi, OUP, 2003.
- Jayal, N. G., (ed.) *Democracy in India*, Delhi, Oxford University Press, 2001.
- Kashyap, S., *Our Parliament*, New Delhi, National Book Trust, 1992.
- Kohli, A., *Democracy and Discontent: India's Growing Crisis of Governability*, Cambridge, Cambridge University Press, 1991.
- M.P. Singh and S. R. Raj (eds), *Indian Political System*, Pearson, New Delhi, 2012
- Mukherjee, Rahul, *India's Economic Transition*, New Delhi, OPU, 2007
- Narang, A.S., *Indian Government and Politics*, Gitanjali Publishing House, New Delhi, 2012.
- Shakir, M., *State & Politics in Contemporary India*, Delhi, Ajanta, 1986.
- Omvedt, Gail., (ed.) *Land, Caste and Politics in Indian States*, Delhi, 1981.
- Oommen, T.K., *Protest and Change, Study in Social Movements*, New Delhi, Sage, 1990.
- Pylee, M.V., *An Introduction to the Constitution of India*, New Delhi, Vikas, 1998.
- Saez, L., *Federation Without a Centre: The Impact of Political and Economic Reform on India's Federal System*, New Delhi, Sage, 2002.
- Sathe, S.P., *Judicial Activism in India*, New Delhi, OUP, 2002.
- Thakur, R., *The Government & Politics of India*, London, Macmillan, 1998.
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## 34. SOCIAL WORK

### **Programme Outcome :**

The Social Work programme provides students with knowledge, values and skills necessary for culturally sensitive generalist social work practice. The curriculum is designed to prepare students to provide services that aid in well-being of individuals, families, groups, organizations and communities. The students are expected to integrate theoretical and applied knowledge in order to engage in the planned change processes at the micro, mezzo and macro levels of practice and overall promotion of social, economic and sustainable just society.

### **BSW-100: SOCIAL WORK: AN INTRODUCTION**

**(Contact Hours: 60, Credits: 4)**

**Course Objectives:** To orient the students with the basic concepts relevant to Social Work practice.

**Learning Outcomes:** Students will become aware of the development of Social Work practice, its nature and skills.

### **CONTENTS:**

#### **Unit I: Introducing Social Work:**

- Nature, Definition, Scope, Philosophy, Values, Ethics, Assumptions,
- Methods, Functions and Principles in Social Work;
- Roles of a Social worker;

#### **Unit II: Historical development of Social Work:**

- Development of professional social work- USA, UK, India
- Social work as a profession
- Social work Education in India
- Indigenisation of Social work

#### **Unit III: Basic concepts relating to Social work:**

- Social work, Social service, Social welfare, Social reforms
- Social justice, Social security, Social action, Social development

- Voluntary Organisations in India

#### **Unit IV: Tools and Processes in Social work**

- **Social Work Process:** Study, Assessment, Goal formation, Treatment, Evaluation, Follow-up and Termination
- **Social Work Tools:** Contacting key persons, Collateral Contacts, Observation, Interviewing, Home- visits and Recording

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- Chowdhury D Paul. (1992) *Introduction to Social work*. New Delhi: Atma Ram and Sons
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- Gore, M. S. (1965) Social work and Social work Education, New Delhi: Asia Publishing House.
- Jainendra Kumar Jha: Encyclopaedia of Social Work 1<sup>st</sup> September 2002, India
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- Rameshwari Devi and Ravi Prakash: Social Work Methods, Practices and Perspectives
- Upadhya, R. K. 1<sup>st</sup> January 2021, Social Case work, New Delhi, India
- Wadia, A. R. (1968): History and Philosophy of Social Work in India, Mumbai: Allied Publisher Private Ltd.

## **BSW-150: ORIENTATION FOR FIELD-WORK**

**(Credits: 4)**

**Course Objectives:** to orient and familiarize the students with different Non-governmental and Governmental settings..

**Learning Outcomes:** Through the field visits students will develop an understanding of services provided by various organizations in terms of meeting the needs of the people. This will help them gain practical knowledge.

### **GUIDELINES FOR ORIENTATION VISIT:**

The college shall arrange 10 orientation visits for 10 days of fieldwork sessions for the students. During the orientation visits, the students will develop an understanding of different types of activities/action, research and training programmes and projects run by these organizations. Each student shall be required to submit the report of orientation visits within 15 days of such visit. The teacher and the fieldwork coordinator have to accompany the students for such visits.

The understanding acquired by the students shall be evaluated as part of the second semester examinations and the field supervisors are expected to assess the capability achieved by the students, and offer suggestions and guidelines to the students for further clarity and improvement.

The Orientation visit should be on any of the following thematic areas/organisations given under:

- **Rehabilitation centre**
- **Old age home**
- **NGOs working for vulnerable Women**
- **Vulnerable Children**
- **Destitute –Homeless, Refugees, Victims of Disasters**
- **Juvenile Home**
- **Community development**
- **Mental Health**
- **Correctional Settings**
- **Domestic Workers**
- **Institution for the specially-abled**
- **Hospitals**

- **SHGs**

The students are required to interact with the various personnel working in the agencies/ organizations and collect the information on the following points during their visits which will be incorporated in their orientation report.

1. History and philosophy of the agency/organization
2. Organizational structure of the agency/organization with special emphasis on the category of personnel engaged
3. Area of working of the agency/organization with reference to the different field of social work
4. The client, group, agency, or the organization served by the agency/organization
5. Networking strategies with similar types of the agency/organization
6. Sources of funding of the agency/organization
7. Intervention strategies adopted by the agency/organization for serving the various groups
8. Success stories, if any, of the agency/organization

The student shall undergo 10 days of fieldwork lab sessions as per the 10 orientation visits. The objective of the fieldwork lab session is to make students understand the basic components required in report writing and to brief the students on the basic social work knowledge, skills and tools to be used during the orientation visits. An IC/GC with the student is paramount to make them understand the importance of Orientation Visits and report writing.

Evaluation Criteria: the students shall be evaluated on the learnings acquired during the Orientation Visits which is based on the basic social work knowledge and on their fieldwork reports (Internal Assessment) and fieldwork viva (External Assessment). The total marks of the assessment shall be 100. Internal assessment shall be 25 marks based upon each of the skills and tools as mentioned in this paper, with equal weightage. The external assessment or the fieldwork viva shall be of 75 marks and will be based on the comprehensive summary of all the reports on the orientation visits as well as the knowledge acquired during the fieldwork with respect to the mentioned requirements.

## 35. SOCIOLOGY

### Preface

**About the FYUG programme of Sociology:** The four year undergraduate programme (FYUG) has been devised as per New Education Policy 2020 framework. Under this programme, various courses such as major courses, multi disciplinary courses (MDCs), skill enhancement courses (SECs), ability enhancement courses (AECs) value added courses (VACs) will be offered to the students.

**Programme Outcomes (POs):** The students will be able to understand, examine and analyse the conceptual and theoretical issues in sociology which will enable them to draw insights and articulate the empirical events. Multi-disciplinary courses will help them to widen their understanding on the issues and problems outside their core discipline. Furthermore, the students will get an opportunity to enhance their skills on the theme of their choice.

### SOC-100: INTRODUCTION TO SOCIOLOGY

**(Contact Hours: 60, Credits: 4)**

**Course Objectives (COs):** The course intends to familiarize the students with the origin of sociology as a discipline.

**Learning Outcomes (LOs):** The students will be able to develop insights to understand the sociological concepts which will help them to examine the sociological issues and problems. The students will learn nature, scope and methods of sociology. They will also learn various concepts of sociology.

#### Unit I- Sociology and its Trajectory

Definition, Origin and Development of Sociology

Nature, Scope and Method of Sociology

Relationship with other Social Sciences/Humanities: Political Science, History,  
Philosophy and Anthropology

#### Unit II - Sociological Concepts

Society and Community, Associations and Institutions

Status and Role; Structure and Function

Folkways and Mores; Norms and Values

### **Unit III - Socialization and Culture**

Socialization: Meaning, Stages and Agencies

Culture: Meaning, Elements and Cultural Lag

Civilization: Meaning and Distinction with Culture

### **Unit IV – Social Change**

Evolution, Progress and Development

Factors of Social Change: Culture, Demography and Technology

Agencies of Social Change: Education, Law and Planning

### **Suggested readings:**

Abraham, M. Francis. 2006. *Contemporary Sociology*. New Delhi: OUP.

Albrow, Martin. 1999. *Sociology: The Basics*. London: Routledge.

Alex, Inkeles. 1979. *Sociology*. London: Prentice Hall.

Bottomore, T. B. 2014. *Sociology*. London: George Allen and Unwin.

Davis, K. 1949. *Human Society*. New Delhi. The Macmillan Co.

Giddens, A. 2021. *Sociology*. Cambridge: Polity Press.

Ginsberg, Morris. 2016. *Sociology*. California: OUP.

Gisbert, P. 2010. *Fundamentals of Sociology*. New Delhi: Orient Blackswan.

Haralambos, M. 1980. *Sociology: Themes and Perspectives*. New Delhi: OUP.

## **SOC-150: PRINCIPLES OF SOCIOLOGY**

**(Contact Hours: 60, Credits: 4)**

**Course Objectives (COs):** The course intends to familiarise the students with various social institutions and sociological concepts.

**Learning Outcomes (LOs):** The students will be able to understand the aspects of diverse social institutions such as marriage, family, polity, economy and religion. The students will also learn sociological concepts such as social control, social groups and social process which will help them to analyse the sociological issues and problems.

### **Unit I - Social Institutions I:**

Marriage: Meaning and Types, Functions

Family: Meaning, Types and Changes

Kinship: Meaning, Types and Usages

### **Unit II - Social Institutions II:**

Polity: Stateless Societies, State and Nation

Economy: Production, Consumption, Distribution and Property

Religion: Beliefs and Rituals, Sacred and Profane

### **Unit III - Social Control:**

Meaning and Definition

Types of Social Control- Formal and Informal: Law; Custom

Conformity, Deviance and Delinquency

### **Unit IV – Social Group and Social Processes:**

Social Group: Meaning and Types (Primary and Secondary, Reference Groups, In-Group and Out-Group)

Interaction, Cooperation, Competition, Conflict

Assimilation, Acculturation and Accommodation

### **Suggested readings:**

Abraham, M. Francis. 2006. *Contemporary Sociology*. New Delhi: OUP.

Albrow, Martin. 1999. *Sociology: The Basics*. London: Routledge.

Alex, Inkeles. 1979. *Sociology*. London: Prentice Hall.

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Giddens, A. 1989. *Sociology*. Cambridge: Polity Press.

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Gisbert, P. 2010. *Fundamentals of Sociology*. New Delhi: Orient Blackswan.

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Harmondsworth: Penguin Books.

Goode, William J. 1984. *Family*. New Delhi: Prentice Hall of India.

Majumdar, D.N. and Madan, T. N. 1956. *An Introduction to Social Anthropology*. Bombay:  
Asia Publishing House.

Uberoi, P. (ed.). 1994. *Family, Kinship and Marriage in India*. Delhi: OUP.

## 36. STATISTICS

### **Preface:**

The Four-Year Undergraduate (FYUG) programme in Statistics offers courses in Statistical theory and methods with applications to various fields including Biology, Environment and Health studies, Agriculture, Economics, Business, Engineering, and research methodology.

**Programme Outcomes (POs):** On successful completion of the course, a student is expected learn scientific methods and tools to transform data into meaningful and actionable information and acquire evidence-based decision-making skills under uncertainty. A student is expected to develop mathematical comprehension ability essential for tackling diverse statistical applications.

### **STA-100: INTRODUCTORY STATISTICS**

**(Contact Hours: 75, Credits: 4)**

**Course Objectives:** To impart the students a thorough knowledge on the development, meaning and definition of Statistics, various types of data, graphical representation of data, concept of concept of univariate, bivariate and multivariate data, descriptive statistics, correlation, regression, analysis of bivariate data and theory of attributes.

**Learning Outcomes:** Upon successful completion of this course, the students will understand how the subject Statistics has emerged and developed in analysing data. Students will understand different data types on the ways to represent them. They will get idea of measuring relationship between variables.

#### **UNIT-I: Introduction to Statistics**

Historical development of Statistics. Definition and meaning of Statistics. Collection of Data: meaning and need of data, primary and secondary data, scientific methods of collecting primary data, sources of secondary data. Types of data: Qualitative, Quantitative, Cross-Sectional, Time series, Discrete and Continuous, Univariate, bivariate and multivariate data. Scales of Measurement. Presentation of data (Univariate): Classification, tabulation and diagrammatic representation of data.



## **UNIT-II: Descriptive measures**

Descriptive Measures of data- concepts and properties of different measures of central tendency and dispersion (univariate data) and their application in different scales of measurement. Moments; skewness and kurtosis.

## **UNIT-III: Bivariate Analysis and Theory of Attributes**

Tabulation and diagrammatic representation of bivariate data: scatter diagram. Covariance, correlation and its properties. Rank correlation. Regression, Principle of least squares and fitting of Linear regression.

Analysis of Categorical Data: Consistency of Categorical Data. Independence and Association of Attributes.

## **UNIT-IV: Practical (30 hours)**

Problem on drawing of line, bar, multiple bar, divided bar & pie diagrams, Problem on drawing of histogram, frequency polygon, frequency curve, ogives. Problem on measures of central tendency. Problem on measures of dispersion. Problem on moments (up to 4<sup>th</sup> Orders). Problem on coefficients of skewness & kurtosis. Problem on correlation and regression coefficients (for both, grouped & ungrouped data). Problem on fitting of Straight Line. Problem on Spearman's rank correlation coefficient.

### **Suggested readings:**

1. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2002): Fundamentals of Statistics, Vol. I & II, 8th Edn. The World Press, Kolkata.
2. Gupta, S. C., & Kapoor, V. K. (2002). Fundamental of Mathematical Statistics. Sultan Chand & sons.
3. Mann, Prem S. (2007). Introductory Statistics, 7<sup>th</sup> Edition. John Wiley & Sons.
4. Medhi, J. (2006). Statistical Methods: An Introductory Text. New Age International (Pvt) Limited, New Delhi.
5. Agarwal, B.L. (2020). Basic Statistics, 6<sup>th</sup> Edition. New Age International (P) Limited.
6. Ott, R Lyman., Longnecker Michael. (2010). An Introduction to Statistical Methods and Data Analysis, 6<sup>th</sup> Edition. Cengage Learning.
7. Mood, A.M., Graybill, F.A., Boes, D.C. (2007). Introduction to the Theory of Statistics, 3<sup>rd</sup> Edition. Tata McGraw-Hill Education Pvt Ltd, Chennai.
8. Miller, Irwin., Miller, Marylees. (2006). John E Freund's Mathematical Statistics with Applications, 8<sup>th</sup> Edition. Pearson Education India, New Delhi.

## **STA-150: INTRODUCTION TO PROBABILITY AND APPLIED STATISTICS**

**(Contact Hours: 75, Credits: 4)**

**Course Objectives:** To impart the students a knowledge on the concept of probability and to prepare them for careers in business, industry, or government.

**Learning Outcomes:** Upon successful completion of this course, the students will be able to understand what probability is as well as associated concepts such as an event, an outcome, and a sample space; to determine the number of births and deaths that occur within the nation; to understand the meaning, importance and method of constructing *index numbers*; understand time series data, its components and its applications to various fields; acquire knowledge and develop analysis skills on industrial experimentation, acquire knowledge on acceptance sampling principles and methods.

### **UNIT-I: Elementary Probability**

Concept of probability: Random experiment, outcome, trial, event, sample points, sample space (Discrete and Continuous), favourable events, equally likely events, mutually exclusive, independent and exhaustive events. Concept of Permutation and Combination. Definition of probability: Classical and statistical and their limitations. Additive and multiplicative theory of probability. Conditional probability. Bayes' theorem and its applications.

### **UNIT-II: Vital Statistics and Index Number**

Sources of Demographic Data. Measurements of Mortality: Crude Death Rate, Age-Specific Death Rate, Standardized death Rates, Infant Mortality Rate, Concept of Life Table. Measurements of Fertility: Crude Birth Rate, General Fertility Rate, Total Fertility Rate, Gross reproduction Rate, Net Reproduction Rate.

Index numbers: Definition, applications of Index Number; Problem Involved in Constructing Index Number. Simple and Weighted Aggregate Methods: Laspeyre's, Paasche's, Dorbish-Bowley's, Marshal-Edgeworth's and Fisher's Index Numbers. Simple and Weighted Average of Price Relative Method. Time and Factor Reversal Tests. Cost of Living Index number (CLIN).

### **UNIT-III: Time Series and Statistical quality control**

Time series: Its Components, Illustrations, Additive and Multiplicative Models. Estimation of Trend by Methods of Moving Average and Mathematical Curves. Seasonal Variation: Meaning, Estimation of Seasonal Variation by ratio to trend method and Link Relative Method.

Statistical Process and Product Control, General Theory of Control Charts, Control Limits, tools for Statistical Quality Control (SQC). Control Charts - for Mean,  $\sigma$ , R, p and c. advantages and limitations of AQC, Acceptance Sampling Plan, Producer's and Consumer's Risks.

**UNIT-IV: Practical (30 hours)**

Problems on Computation of Measures of Mortality and Fertility. Problem on Construction of Complete Life Tables. Problems on Construction of Control Charts - for Mean,  $\sigma$ , R, p and c. Problem on Computation of Trend using Mathematical Curves (up to degree two) and Moving Average Method.

Problem on Computation of Seasonal Variations using ratio to trend method and Link Relative Method. Problems on Construction of Index Numbers using Laspeyre's, Paasche's and Fisher's Methods. Problem on Construction of Cost of Living Index Number.

**Suggested readings:**

1. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2002): Fundamentals of Statistics, Vol. I & II, 8th Edn. The World Press, Kolkata.
2. Gupta, S. C., & Kapoor, V. K. (2002). Fundamental of Mathematical Statistics. Sultan Chand & sons.
3. Gupta, S. C., & Kapoor, V. K. . Fundamental of Applied Statistics. Sultan Chand & sons.
4. Mann, Prem S. (2007). Introductory Statistics, 7<sup>th</sup> Edition. John Wiley & Sons.
5. Medhi, J. (2006). Statistical Methods: An Introductory Text. New Age International (Pvt) Limited, New Delhi.
6. Agarwal, B.L. (2020). Basic Statistics, 6<sup>th</sup> Edition. New Age International (P) Limited.
7. Ott, R Lyman., Longnecker Michael. (2010). An Introduction to Statistical Methods and Data Analysis, 6<sup>th</sup> Edition. Cengage Learning.
8. Mood, A.M., Graybill, F.A., Boes, D.C. (2007). Introduction to the Theory of Statistics, 3<sup>rd</sup> Edition. Tata McGraw-Hill Education Pvt Ltd, Chennai.
9. Hogg, R.V., Tanis, E.A., Rao, J.M. (2009). Probability and Statistical Inference, 7<sup>th</sup> Edition. Pearson Education, New Delhi.
10. Miller, Irwin., Miller, Marylees. (2006). John E Freund's Mathematical Statistics with Applications, 8<sup>th</sup> Edition. Pearson Education India, New Delhi.

## 37. ZOOLOGY

### **The FYUG programme in Zoology:**

The key learning objectives of the programme in Zoology include the following: -

Students will imbibe a comprehensive understanding of the principles and concepts of zoology, including the organization and diversity of the animal kingdom, genetics, cell biology, biochemistry, developmental biology, molecular biology, biotechnology physiology, endocrinology, ecology, evolution, behaviour, parasitology, and entomology.

Students will be able to design, conduct, and analyze experiments to investigate questions related to zoology. They will also be able to evaluate scientific evidence, critically analyze data, and interpret results.

Students will develop effective written and oral communication skills in order to convey scientific information, including the ability to write laboratory reports, scientific papers, and presentations.

Students will develop critical thinking skills necessary to analyze and evaluate scientific evidence, assess the validity of scientific claims, and identify and solve problems related to zoology.

Students will learn and adhere to ethical principles and professional standards in scientific research and in interactions with animals, colleagues, and the public.

Students will develop skills in the use of technology and information resources relevant to zoological research and communication, including the use of databases and software.

Students will be exposed to interdisciplinary perspectives, including the interface between zoology and other scientific disciplines, such as molecular biology, biotechnology, and conservation biology.

Students will be exposed to and appreciate the diversity of animal life and the role of zoology in understanding and promoting conservation and the well-being of animals and humans. They will also learn to work effectively with diverse groups of people.

Students will develop a curiosity for learning and a desire to continue their education throughout their lives, including staying current with developments in the field of zoology.

### **Programme Outcomes (POs)**

Upon successful completion of the four-year undergraduate programme in Zoology, the students will be able to:

### **POs1**

- Demonstrate a deep understanding of the fundamental principles of Zoology, including its historical context, its relevance to society, and its relationship with other scientific disciplines.
- Identify, describe, and classify organisms from different taxa, including their morphology, functional anatomy, physiology, behaviour, and ecology.
- Develop a strong foundation in genetics, evolution, cell and molecular biology and ecology, and apply this knowledge to understand the patterns and processes that shape the diversity of life on Earth.
- Develop practical skills in laboratory techniques, fieldwork, and data analysis, including the use of statistical software and the interpretation of datasets.

### **POs2**

- Apply the scientific method to investigate and solve biological problems, including designing experiments, collecting data, analyzing results, and drawing conclusions.
- Apply critical thinking and analytical skills to evaluate scientific literature, assess competing hypotheses, and develop evidence-based arguments.
- Communicate scientific information effectively to different audiences, including writing scientific reports, giving oral presentations, and participating in scientific discussions.

### **POs3**

- Demonstrate an understanding of the ethical and societal implications of biological research and the responsible conduct of science.
- Develop transferable skills, including teamwork, problem-solving, time management, and adaptability, that will be useful in a variety of professional settings.
- Develop a passion for lifelong learning and a commitment to stay current with the latest advances in Zoology, through participation in professional development opportunities and engagement with the scientific community.

## **ZOO-100: TAXONOMY AND ANIMAL DIVERSITY**

**(Contact Hours: 75, Credits: 4)**

### **Course Objectives (Cos):**

- To impart the fundamental concepts in Animal Taxonomy and Diversity
- To introduce the notion of biodiversity

### **Learning Outcomes (LOs)**

On completion of the course, students will be able to:

- Understand the importance of systematics, taxonomy and structural organization of animals.
- Appreciate the diversity of non-chordates and chordates living in varied habit and habitats.
- Be in a position to critically analyze the organization, complexity and characteristic features of non-chordates and chordates familiarizing them with the morphology and anatomy of representatives of various animal phyla.
- Enhancement of collaborative learning and communication skills through practical sessions, team work, group discussions, assignments and projects.
- Learn the skills for dissection of anatomical systems in an invertebrate and a vertebrate.
- Identify the major structures of the nervous system and statocysts in prawn, the digestive and reproductive systems in fish.
- Learn the principles, procedure, and skill of permanent mounting of biological specimens.
- Identify some anatomical structures of invertebrates and vertebrates, and their roles in the organisms' biology.
- Identify animals and to describe the identifying characters. They will also be able to classify the animals following the taxonomic hierarchy.

**Unit-I:** Taxonomy: Definition of taxonomy, phylogeny, systematics, category, taxon, classification, nomenclature; Biological species concept; Taxonomic hierarchy; Binominal nomenclature.

Seven-kingdom classification of organisms according to Michael A. Ruggiero et.al., (2015) which include Archaea, Bacteria, Protozoa, Chromista, Fungi, Plantae, and Animalia.

Salient features and classification of kingdom Protozoa up to phylum with example of representatives from each phylum.

Protozoa: *Paramecium* - Morphology and reproduction.

Salient features and classification of the following phyla up to class with example of representatives from each class: Porifera, Cnidaria, and Platyhelminthes.

Porifera: *Sycon* - Morphology and canal system.

Cnidaria: *Obelia* - Morphology and reproduction.

Platyhelminthes: *Taeniasolium* – Morphology and the life cycle.

**Unit-II:** Salient features and classification of the following phyla up to class with example of representatives from each class: Nematoda, Annelida, Onychophora, Arthropoda, and Mollusca.

Nematoda: *Ascaris lumbricoides* – Morphology and the life cycle.

Annelida: Leech - Morphology and urogenital system.

Onychophora: *Peripatus* – Morphology.

Arthropoda: Prawn - Morphology and Reproductive systems.

Mollusca: *Pila* - Morphology and Nervous Systems.

Introduction to Minor Phyla.

**Unit III:** Salient features and classification of the following phyla up to class with example of representatives from each class: Echinodermata, Hemichordata, and Chordata.  
 Echinodermata: *Asterias* - Morphology and water vascular system.  
 Hemichordata: Morphology of *Balanoglossus*.  
 Cephalochordata: Morphology of *Amphioxus*.  
 Urochordata: Morphology of *Ascidia*.  
 Cyclostomata: *Petromyzon*– Morphology.  
 Pisces: *Labeo* - Morphology and respiratory systems.  
 Mammalia: Rabbit - Morphology, digestive, circulatory and nervous systems

**Unit-IV: Practical (Contact hours: 30)**

**1. Dissection**

- a) Dissection of Prawn - nervous system; b) Dissection of Prawn - statocysts; c) Dissection of *Channa/Labeo*/common carp - digestive system; d) Dissection of *Channa/Labeo*/common carp - reproductive system.

**2. Mounting**

- a) General protocol for preparation of permanent mount; b) Permanent mount of: *Obelia* colony, parapodium of *Nereis*, gemmules of sponge, and cycloid scale of fish.

**3. Museum Specimens**

(Preferably representatives from the different classes/orders of the phylum. The number within the brackets indicates the minimum number of specimens to be studied).

- a) Protozoa whole mount (2); b) Porifera (2); c) Cnidaria (3); d) Platyhelminthes (2); e) Nematoda (1); f) Annelida (3); g) Onychophora (1); h) Arthropoda (5); i) Mollusca (5); j) Echinodermata (3); k) Hemichordata (1); l) Cephalochordata (1); m) Urochordata (1); n) Agnatha (1); o) Pisces (4); p) Amphibia (3); q) Reptilia (3); r) Aves (2); s) Mammalia (3).

**\*Note:**

- For the Seven Kingdom classification, follow the classification scheme from “Ruggiero, M. A., et.al., (2015). A higher level classification of all living organisms. *PloS one*, 10(4), e0119248.
- For Invertebrates classification, follow the classification schemes from “Barnes, R.D. (2006). *Invertebrate Zoology*, 7<sup>th</sup> Edition, Cengage Learning, India.”
- For Chordate Classification, follow the scheme from "Kardong, Kenneth V. (2015). *Vertebrates: Comparative Anatomy, Function, Evolution*, 8<sup>th</sup> Edition, McGraw-Hill Education.

**Suggested Readings:**

1. Barnes, R.D. (2006). *Invertebrate Zoology*. (7th ed.). Cengage Learning, India.

2. Brusca, R.C., Moore, W., & Shuster, S.M. (2016). *Invertebrates*. (3rd ed.). Oxford university press. New York.
3. Chaki, K.K., Kundu, G., & Sarkar, S. (2021). *Introduction to General Zoology Vol 1*. (1st ed.). New Central Book Agency. Kolkata.
4. Chaki, K.K., Kundu, G., & Sarkar, S. (2021). *Introduction to General Zoology Vol 2*. (1st ed.). New Central Book Agency. Kolkata.
5. Ganguli, B.B., Adhikari, S., & Sinha, A.K. (2011). *Biology of Animals: Volume I*. (3rd ed.). New Central Book Agency. Kolkata.
6. Ghosh, K.C. and Manna, B. (2009). *Practical Zoology*. (3rd ed.). Central Book Agency, Kolkata.
7. Kardong, Kenneth V. (2015). *Vertebrates: Comparative Anatomy, Function, Evolution*, 8<sup>th</sup> Edition, McGraw-Hill Education. New York.
8. Kotpal, R.L. (2019). *Modern Textbook of Zoology: Invertebrates*. (12th ed.). Rastogi Publications. Meerut.
9. Kotpal, R.L. (2019). *Modern Textbook of Zoology: Vertebrates*. (4th ed.). Rastogi Publications. Meerut.
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11. Lal, S.S. (2015). *Practical Zoology: Vertebrate*. (10th ed.). Rastogi Publications. Meerut.
12. Mayr, E. & Ashlock, P.D. (1991). *Principles of Systematic Zoology*. (2nd ed.). McGraw-Hill (India). New Delhi.
13. Pechenik, J. A. (2015). *Biology of the Invertebrates*. (7th ed.). McGraw-Hill Education. New York.
14. Pough, F.H., & Janis, C.M. (2019). *Vertebrate Life*. (10th ed.). Oxford University Press. New York.
15. Ruggiero, M. A., Gordon, D. P., Orrell, T. M., Bailly, N., Bourgoin, T., Brusca, R. C., ...& Kirk, P. M. (2015). A higher level classification of all living organisms. *PloS one*, 10(4), e0119248.
16. Sinha, A.K., Adhikari, S., Ganguli, B.B., and Goswami, B.C.B. (2012). *Biology of Animals: Volume I*. (7th ed.). New Central Book Agency. Kolkata.
17. Verma, P.S. (2010). *A Manual of Practical Zoology: Chordates*. (11th ed.). S. Chand & Co. New Delhi.
18. Verma, P.S. (2010). *A Manual of Practical Zoology: Invertebrates*. (15th ed.). S. Chand & Co. New Delhi.
19. Verma, P.S., & Jordan, E.L. (2013). *Chordate Zoology*. (14th ed.). S.Chand& Co. New Delhi.
20. Verma, P.S., & Jordan, E.L. (2022). *Invertebrate Zoology*. (16th ed.). S.Chand& Co. New Delhi.
21. Young, J. Z. (2004). *The Life of Vertebrates*. (3rd ed.). Oxford university press. New York.

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## ZOO-150: FUNCTIONAL AND COMPARATIVE ANATOMY

(Contact Hours: 75, Credits: 4)

### Course Objectives (Cos):

- The course will provide in depth knowledge of the biology of form and functions.
- It will examine vertebrate anatomy to understand how the structures develop, how they evolve, interact with one another and allow animals to live in variety of environments.

### Learning Outcomes

Upon completion of the course, students will be able to:

- Learn about the importance of structural organization of animals.
- Understand evolutionary history and relationships of different groups through functional and structural affinities.
- Critically analyze the organization, complexity and characteristic features of different groups making
- Understand the morphology and anatomy of representatives of various animal phyla.
- Compare and contrast each organ system across various vertebrate groups.
- Understand the evolutionary relatedness of various groups of invertebrates and vertebrates through affinities study.
- Learn the skills for dissection of anatomical systems in an invertebrate and a vertebrate and identify the major structures of the accessory respiratory organs and afferent branchial system of fish.
- Identify some anatomical structures, histological samples of tissues and organs, and whole mounts of specimens.
- Identify and learn the characteristic features of bones in a mammal.

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**Unit-I:** Protozoa: Locomotion and nutrition.  
Porifera: Canal system and skeletal systems.  
Cnidaria: Polymorphism in Siphonophora; Corals and coral reefs.  
Annelida: Excretory system.  
Arthropoda: Comparative study of respiratory systems.  
Mollusca: Torsion and detorsion in Gastropoda

**Unit II:** Echinodermata: Comparative study of water vascular system.  
Hemichordata: Affinities of *Balanoglossus*.  
Cephalochordata: Affinities of *Amphioxus*.  
Urochordata: Retrogressive metamorphosis in *Ascidia*.  
Agnatha: Comparative study of *Petromyzon* and *Myxine*.

**Unit-III:** Pisces: Scales and fins in fishes; Accessory respiratory organs.  
Amphibia: Comparative study of the morphological features of the three orders.  
Reptilia: Venomous and non-venomous snakes; Poison apparatus and mechanism of biting.  
Aves: Comparative study of Flight and flightless birds.  
Mammalia: Affinities of Monotremata, Affinities of Marsupialia, and dentition in mammals.  
Comparative anatomy of kidney in vertebrates.  
Comparative anatomy of heart in vertebrates.  
Comparative anatomy of respiratory organs (skin, gills, lungs, and air sacs) in vertebrates.

## Practical

**Credit 1 (Contact hours: 30)**

- Unit-IV:**
1. **Dissection**
    - a) Accessory respiratory organs in teleost fish; b) Dissection of Channa/Labeo/common carp - Afferent branchial vessels
  2. **Permanent mounting**
    - a) Setae of earthworm; b) Scales (placoid and ctenoid) of fish; c) Feathers {down, filoplume, contour (showing barb and barbules)} of birds.
  3. **Study of permanent sections**
    - a) Histological study of tissues: epithelia, connective, muscle, and nervous;
    - b) Histological study of stomach, intestine, kidney, liver, lungs, testis, and ovary of vertebrate; c) Transverse sections of: *Ascaris* male and female; Earthworm through typhlosolar region; *Amphioxus* through branchial region.
  4. **Osteology**
    - a) Study of skull of rabbit/guinea pig b) Study of pelvic and pectoral girdle of rabbit/guinea pig; c) Study of humerus, radius-ulna, femur, tibio-fibula of rabbit/guinea pig; d) Study of vertebrae: Atlas, axis, and typical vertebra of rabbit/guinea pig.

## Suggested Readings:

1. Barnes, R.D. (2006). Invertebrate Zoology. (7th ed.). Cengage Learning, India.
2. Brusca, R.C., Moore, W., & Shuster, S.M. (2016). Invertebrates. (3rd ed.). Oxford university press. New York.
3. Ganguli, B.B., Adhikari, S., & Sinha, A.K. (2011). Biology of Animals: Volume I. (3rd ed.). New Central Book Agency. Kolkata.

4. Ghosh, K.C. and Manna, B. (2009). Practical Zoology. (3rd ed.). Central Book Agency, Kolkata.
5. Kardong, Kenneth V. (2015). Vertebrates: Comparative Anatomy, Function, Evolution, 8th Edition, McGraw-Hill Education. New York.
6. Kotpal, R.L. (2019). Modern Textbook of Zoology: Invertebrates. (12th ed.). Rastogi Publications. Meerut.
7. Kotpal, R.L. (2019). Modern Textbook of Zoology: Vertebrates. (4th ed.). Rastogi Publications. Meerut.
8. Lal, S.S. (2011). Practical Zoology: Invertebrate. (10th ed.). Rastogi Publications. Meerut.
9. Lal, S.S. (2015). Practical Zoology: Invertebrate. (10th ed.). Rastogi Publications. Meerut.
10. Parker, T.J., & Haswell, W.A. (1972). Textbook of Zoology Vol.I: Invertebrates (7th ed.). Macmillan Education Australia.
11. Parker, T.J., & Haswell, W.A. (1972). Textbook of Zoology Vol.II: Vertebrates. (7th ed.). Macmillan Education Australia.
12. Pechenik, J. A. (2015). Biology of the Invertebrates. (7th ed.). McGraw-Hill Education. New York.
13. Pough, F.H., & Janis, C.M. (2019). Vertebrate Life. (10th ed.). Oxford University Press. New York.
14. Sinha, A.K., Adhikari, S., Ganguli, B.B., and Goswami, B.C.B. (2012). Biology of Animals: Volume I. (7th ed.). New Central Book Agency. Kolkata.
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18. Verma, P.S., & Jordan, E.L. (2022). Invertebrate Zoology. (16th ed.). S.Chand& Co. New Delhi.
19. Young, J. Z. (2004). The Life of Vertebrates. (3rd ed.). Oxford university press. New York.

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