FOUR YEAR UNDER GRADUATE (FYUG)

PROGRAMME UNDER

NEW EDUCATION POLICY, 2020

(1st and 2nd 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)

1ST 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 2nd Semester.
SEC				Student to choose one course out of the offered courses by the college under each category
VAC	VAC-104	3	45	Compulsory
Total		**20**		

2ND 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 1st 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
Total		**20**		

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

MAJOR/CORE PAPERS SEMESTER I & II

		SEMESTER I		*SEMESTER II*	
SL NO	**SUBJECT**	**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 – ADIYUG O MADHYAYUG	BEN-150	BANGLASAHITYERITIHAS – ADI O 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	MICROECONOMICS 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 MAITPHANGÏA 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

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 11th 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-dialents.

Learning Outcome: Students will be able to learn about the history, development and characteristics ofthe 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 vasarupavasar parisoy

Unit-IV:

Asomiya lipirutbhav aru bikash

Suggested Readings:

1. Baruah, Bhimkanta: *Asomiya Bhasa,*Banalata Publisher, 2012
2. Goswami, UpendraNath: *Asomiya vasarutbhav aru bikash*, Collecor: 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. *Kamarupasasanavali.* 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.

রাষ্ট্রীয়নব্যশিক্ষানীতি২০২০অনুসারেএইপাঠ্যক্রমটিতৈরীকরাহয়েছে।এইপাঠ্যক্রমেরমাধ্যমেছাত্ররা বাংলারগৌরবোজ্জ্বলইতিহাস, তারসামাজিক-রাজনৈতিকওসাংস্কৃতিকউত্থানপতনএবংবাংলাভাষারবিবর্তনসম্পর্কেঅবহিতহতেপারবে।ঔপনিবেশিকআধুনিকতারসংস্পর্শেএসেবাঙালীরচিন্তা-চেতনা, জীবনমানওসাহিত্যেযেআধুনিকতারসঞ্চারহয়েছেসেসম্পর্কেছাত্ররাজ্ঞানলাভকরবে।পেশাগতদিক থেকেওপাঠ্যক্রমটিসুবিধাপ্রদানকরবে।এছাড়াওপ্রতিবেশীরাজ্যওলোকসংস্কৃতি, লোকগাথাইত্যাদিপঠনপাঠনেরমাধ্যমেএকবৃহত্তরভারতবর্ষেরমূল্যবোধওবৈচিত্রময়সাহিত্যেরসাথেছাত্রদেরপরিচয়করানোওএইপাঠ্যক্রমেরউদ্দেশ্য।

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, *CharyagetiParichay*
9. Basu,Manindramohan, *Charyageeti.*

BEN-150: BANGLA SAHITYERITIHAS–ADI O ANT-MADHYAYUG
(History of BengaliLiterature)

(Contact Hours: 60, Credits: 4)

Course Objective*:The purpose of this lesson is to acquaint students with the history of early and later part of medieval Bengal and a specific aspect of the medieval era, the association with the Shakta poetry.*

Learning Outcomes**:***Students will acquire knowledge about the history of Bengali literature (ancient and medieval periods) and gain knowledge about a specific aspect of literature, the subject matter of Shakta poetry, and the relationship between poets and poetic style.*

UNIT 1. A.AnubadSahitya (Krittibas, Kashiramdas, Maladharbasu).
B.Arakanrajsabharsahitya (Doulatkaji, SaiyadAalaul)

UNIT 2. A. ShaktoPodaboli (Ramprasad, Kamalakanto).

D. Bharatchandra (Annadamangal).

UNIT3. ShaktoPodaboli :Agamoni O Bijoya (Selective poems)

Ramprasad	Giriebaramar Uma ele
	Aajsubhonishipohailotomar
	Ohepranathgiriboro he

UNIT 4.	Kamalakanto	Kobe jabe bolo giriraj
		Ki holonabaminishi

Suggested Reading:

1. BandopadhyayAsit kr. *Bangla SahityerItibritta*
2. Choudhury Bhudeb, *Bangla SahityerItikotha*
3. Dutta, Hirendranath*, banglagadyerkramabikash*.
4. SenSukumar, *banglasahityegadya*.
5. Mukhopadhay, Arun kr. *Bangla gadyaritiritihas*
6. Roy, Rathindranath, *Dwijendralalrayersahjahan.*
7. Gangopadhay, Narayan, *kothakobita Rabindranath.*
8. Chakraborty, satinath, *Rabindranathke Rabindranath*.

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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 1MPotassium 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 7th Ed., W H Freeman & Co. Ltd.
2. Garrett R H & Grisham C M (2012) Biochemistry 5th Ed., Brooks Cole Publ.
3. Harper's Illustrated Biochemistry 32nd 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 Biochemistry3rd 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, 3rd Ed. New Age Int. Publ., New Delhi.
10. Segel Irwin H. (2010), Biochemical Calculations 2nd Ed., John Wiley & Sons.
11. Solomon T W G, Frhyle C B & Snyder S A (2016) Organic Chemistry 11th Ed., Wiley Madan R D (2018) Modern Inorganic Chemistry, S Chand Publ.
12. Voet D &Voet J G (2010) Biochemistry 4th Ed., John Wiley & Sons.
13. Zubay G (2020) Biochemistry 5th 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 hemi acetal, 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 (α, β 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 6th Ed., W H Freeman & Co. Ltd.
2. Boyer R F (2009) Modern Experimental Biochemistry 3rd Ed., 5th Impression Pearson Educ.
3. Damodaran G (2011) Practical Biochemistry, Jaypee Bros. Publ.
4. Devlin T. M. (2010) Textbook of Biochemistry with Clinical Correlations 7th Ed., Wiley Publ.
5. Freifelder D (1983) Physical Biochemistry, W H Freeman.
6. Garrett R H & Grisham C M (2012) Biochemistry 5th Ed., Brooks Cole Publ.
7. Harper's Illustrated Biochemistry 32nd 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 3rd Ed., Tata McGraw- Hill Sambrook J and Russel D W (2012) Molecular Cloning 4th 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, 3rd Ed. New Age Int. Publ., New Delhi.
14. Voet D &Voet J G (2010) Biochemistry 4th Ed., John Wiley & Sons.
15. Wilson K and Walker J (2002) Principles and Techniques of Practical Biochemistry 5thEd. Cambridge Publ.
16. Yadav V. K. et al (2012) Biochemistry & Biotechnology- A Lab Manual, Pointer Publ.
17. Zubay G (2020) Biochemistry 5th Ed., W C Brown Commun, Inc.

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.

ProgrammeOutcomes(POs): Expectedoutcomeoftheprogramme:

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):

Afterthecompletionofthecourse,thestudentswillbeableto:

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. 10th 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 MORPHOLOGYAND 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 Texbook of Botany: Angiosperms. S. Chand& Company Pvt Ltd.

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7. CHEMESTRY

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 Ψ and Ψ^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:- BeF_2, CO_2, BF_3, BO_3^{3-}, O_3, H_3O^+, NH_3, H_2O, PCl_3, PCl_5, SF_4, 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: BeF_2, BF_3, $AlCl_3$, H_3O^+, NH_3, H_2O, PCl_3, PCl_5, SF_4, SF_6, ClF_3, I_3^-, LCAO-MO theory and its application to homonuclear diatomic molecules (H_2, Be_2, N_2, N_2^+, N_2^{2+}, N_2^- N_2^{2-}, O_2, O_2^-, O_2^{2-}, O_2^+ 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) CH_4, CH_3^-, RNH_2 (ii) C_2H_4, CH_3^+, carbonyl compounds (C=O) and (iii) C_2H_2, R-C≡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, halohydration, 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, Liquification of 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-1: 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: Pb^{2+}, Cu^{2+}, Bi^{3+}, As^{3+}, Sb^{3+}, Sn^{2+}, Sn^{4+}, Fe^{2+}, Fe^{3+}, Al^{3+}, Ba^{2+}, Cr^{3+}, Zn^{2+}, Mn^{2+}, Co^{2+}, Ni^{2+}, Ca^{2+}, Sr^{2+}, Mg^{2+}, K^{+}, NH_4^{+}.

Anions: Cl^{-}, Br^{-}, I^{-}, SO_4^{2-}, NO_3^{-}, BO_3^{3-}, PO_4^{3-}, CrO_4^{2-}.

Interfering radicals/ions: borate, chromate, phosphate.

End-semester External Evaluation Distribution (Duration: 6 hours)		
1	Qualitative Analysis	12 Marks
2	Viva voce	5 Marks
3	Laboratory record	2 Marks
In-semester Internal Evaluation Distribution		
1	Laboratory attendance and performance	2 Marks
2	Test and Viva voce	4 Marks

Suggested books:

1. Concise Inorganic Chemistry, J. D. Lee, 5th Ed., Wiley India, New Delhi (2014).
2. General and Inorganic Chemistry (Part-I), R. Sarkar, 3rd Revised Ed., New Central Book Agency, India (2011).
3. Vogel's Qualitative Inorganic Analysis, G. Svehla, 6th 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, 7th 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_2, $AgNO_2$), Difference between nucleophiles and bases, S_N^1, S_N^2, NGP, S_N^i, 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^1, E^2, E^1cB 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 (Cp) and volume (Cv), Concept of heat, Relation between Cp and Cv, 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 ΔH and ΔU 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.*

(a) Detection of elements (N, Cl, Br and I)

(b) Determination of one of the following functional groups present in a single organic compound (with systematic reporting)

-COOH, -OH (phenolic), -CHO, >C=O, $-NH_2$ and $-NO_2$

(c) Preparation of the derivative.

End-semester External Evaluation Distribution (Duration: 6 hours)		
1	Qualitative Analysis	12 Marks
2	Viva voce	5 Marks
3	Laboratory record	2 Marks
In-semester Internal Evaluation Distribution		
1	Laboratory attendance and performance	2 Marks
2	Test and Viva voce	4 Marks

Suggested Books:

1. Inorganic Chemistry, R. L. Dutta, 3rd Ed., The New Book Stall, India (1973).

2. Principles of Inorganic Chemistry, B. R. Puri, L.R. Sharma and K.C. Kalia, 33rd 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, 2nd Ed., Oxford University Press, London (2018).
5. Physical Chemistry, P. C. Rakshit (revised by S. C. Rakshit), 6th Ed., Sarat Book House, Kolkata (2014).
6. A Textbook of Physical Chemistry, Vol 1 & 2, K. L Kapoor, 4th 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, 5th Ed., John Wiely, 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.

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 programmeare-

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 solvingtechniques through flowcharts and algorithm along with IDE and Compilers for C.
- Step-by-stepanalyses and develop a program to solve real world problems. Understand and Apply Variable, Conditional Statements, Loops, Functions, pointers, structures in C.

OutlineofthePaper

UNIT	Topic	Hours	External Marks	Internal Marks
I	CBasic Concepts	15	18	19
II	Functions, Arrays	15	19	
III	Pointers, Structure and Union	15	19	
IV	Practical	30	19	6
Total		**75**	**75**	**25**

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 >=60
    (b) Marks in physics >=50
    (c) Marks in chemistry >=40
    (d) Total in all three subjects >=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 + 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

   1 for x>0
   Y= 0 for x=0
   -1 for x<0

   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

Distributionofmarksforpractical

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, 2nd Edition,2016.
2. Byron Gottfried,ProgrammingwithC,Schaum'sOutlineSeries,McGraw Hill Education,4thEdition,2018.
3. Brian W. Kernighan, Dennis Ritchie, ANSI C: The C Programming Language, Pearson Education India, 2nd Edition, 2015.
4. Jery R Hanly, Elliot BKoffman,ProblemSolvingandProgramDesignInC,Pearson, 2nd Edition, 2016.

ReferenceBooks:

1. YeshawanKanetkar, LetUs C: Authentic Guide To C Programming Language,BPBPublications,NewDelhi, 18th Edition, 2021.
2. E. Balagurusamy,ProgramminginANSIC,McGraw Hill Education,NewDelhi, 8th 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

UNIT	Topic	Hours	External Marks	Internal Marks
I	HTML, JavaScript and CSS	15	18	15
II	Server Side Programming Using PHP	15	19	
III	MySql and PHP	15	19	
IV	Practical	30	19	6
Total		**75**	**75**	**25**

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 QueriesQuerying Web Databases: Querying a MySQL Database using PHP, Processing User InputWriting 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= u*t+½ a*t^2 where s = distance, u= initial velocity, t = time, a= acceleration

    A=½*b*h where A = Area, b = base, h = 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 , ,<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

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:

Theory	**Practical**
2 Hours	2 Hours

Evaluationofmarksforpractical Exam:

10% :Syntaxandinput/outputscreens
30% :Logicandefficiency(sourcecode,pseudocode,andalgorithm)
20% :Errortrapping(illegalorinvalidinput,stackoverflow,underflow,insufficientphysicalmemoryetc.)
20% :Completion
20% : Result

Suggested Readings:

Text Books:

1. Hugh E Williams and David Lane, *Web Database Applications with PHP and MySQL,* O'Rielly, 2nd Edition, 2004.
2. Luke Welling and Laura Thomson, *PHP and MySQL Web development,* SAMS Publishing, 2ndEdition.
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, 5th Edition, 2010.
5. Eric Meyer, Estelle Weyl, CSS: The Definitive Guide, Shroff/O'Reilly, 4th Edition, 2017.

Reference Books:

1. Rasmus Lerdorf, Peter MacIntyre, Kevin Tatroe, *Programming PHP*, 2nd Edition, O'Reilly Publishing.
2. W. Jason Gilmore, *Beginning PHP 5 and MySQL 5: From Novice to Professional*, 2nd Edition, APress.

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 1st semester

EDN-100: Introduction to Education (Major)
MDC- 116: Introduction to Psychology
SEC- 131: Motivation

Three papers in 2nd 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

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 Ddemocracy

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.

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 (14th to 17th Century)

a. Geoffrey Chaucer: "The Tale of the Wyf of Bathe"
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 (16th 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 (18th 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/

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.

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·sikrangoniko pe·skae A·chik sea jotanio bariataniko 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 namroroani 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 gernres 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 gitchamni 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 prosodyni 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 Gitchamni 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 (2nd 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 (8th Ed.)

Shira, Lindrid D. *A·chik Poedorang* -1, *L. D. Shira (Compiler),* Garo Hills Book Emporium, Tura, 1994 (3rd 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 folkloreko 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 poraigiparangko 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 poraigiparangko jatni dakbewal-rikbewal, golpo, toe skiani, ku·ritingchi aganrikrikbaanirang aro legendrangni gimin u·ina dakchakgen.

Poraie Man·ani:

Ia paper poraigiparangko 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 maikaijatni 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 Matrsrame Wil·e Ra·bo*. Garo Hills Book Emporium, Tura, 1993

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 महत्त्वपूर्ण 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 नारायन 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.

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 एवंउपसर्ग की परिभाषा और उसका स्वरूप;हिन्दीकारक; हिन्दी समास।

इकाई 3 विशेषणऔर 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, 1993**ई.**
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 5th 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.,	*The Copper Bronze Age*, MunshiramManoharlal, New Delhi, 1969.
----------	*The Archaeology of India*, Select book Service Syndicate, New Delhi, 1985

Allchin , F.R. & Bridget,	*The Rise of Civilization in India and Pakistan*, Cambridge University Press, London, 1988.
Allchin , F.R.,	*The Archaeology of Early Historic South Asia: The Emergence of Cities and States*, Cambridge University Press, London, 1995
Chakravarty, Ranabir,	*Exploring Early India: Upto c.AD.1300*, Ratnasagar, Delhi, 2016.
----------	*Trade in Early India*, Oxford University Press, New Delhi, 2004
	Trade and Traders in Early Indian Society, Manohar, New Delhi, 2002.
Dhavilkar, M.K., (ed.)	*A Comprehensive History of India Prehistory of India*, Vol.1, Part-1, Manohar, New Delhi, 2013.
Ghosh, A.,	*The City in Early Historical India,* IIAS, Simla, 1973.
Jayaswal, Vidula,	*Palaeohistory of India*, Agam Kala Prakashan, Delhi, 1978.
Jha, D. N.,	*Ancient India in Historical Outline*, Manohar, New Delhi, 2002 reprint.
Kosambi, D. D.,	*An Introduction to the Study of Indian History,* Popular Prakashan, Bombay, 2016 (reprint).
----------	*The Culture and Civilization of Ancient India in Historical Outline,* PPH, Delhi, 2001 (reprint).
Malik, S. C,	*Indian Civilization: The Formative Period*, Indian Institute of Advanced Studies, Shimla, 1999.
Sankalia, H.D.,	*Prehistory of India*, MunshiramManoharlal, New Delhi, 1977.
Ratnagar, Shereen,	*Understanding Harappa: Civilization in the Greater Indus Valley*, Tulika Books, New Delhi, 2017 (4th edition).
Sahu, Bhairabi Prasad (ed.),	*Iron and Social Change in Early India*, OUP, New Delhi, 2006.
Sharma. R.S.,	*India's Ancient Past*, Oxford University Press, New Delhi, 2009.
----------	*Material Culture & Social Formations in Ancient India*, Macmillan India Ltd., New Delhi, 2007 (2nd edition).
----------	*Sudras in Ancient India, MunshiramManoharlal, Delhi, 2016 (3rdedn.).*
Singh, Upinder,	*A History of Ancient and Early Medieval India*, Pearson, Delhi, 2008.
Thapar, B.K.,	*Recent Archaeological Discoveries in India*, The Centre for East Asian Cultural Studies, Tokyo, 1985.
Thapar, Romila,	*A History of India*, Vol.1, Penguin Books, Delhi, 1996 reprint.
----------	*The Penguin History of Early India*, Penguin books, New Delhi, 2002.
Basham, A.L.,	*The Wonder that was India*, Rupa &Co., New Delhi, 2002 reprint.
Chakrabarti, Dilip, K.	*The Oxford Companion to Indian Archaeology: The Archaeological Foundations of Ancient India, Stone Age to AD 13th Century*, Oxford University Press, New Delhi, 2006
Habib Irfan, (ed.)	*The People's History of India*, Vol.-1-4, Tulika Books, New Delhi, 2015.
Majumdar, R.C.et.al. (ed),	*The History and Culture of the Indian People*, Vol.1-II, (BharatiyaVidyaBhavan 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.,	*Early History of Kamarupa*: *From Earliest Times to the End of the Sixteenth Century*, LBS Publications, Guwahati, 2020.

Bhandarkar, R. G.,	*Vaisnavism, Shaktism and other Minor Religions*, Indology Book House, Varanasi, 1963 (reprint).
Chakravarty, Ranabir,	*Exploring Early India: Upto c.AD.1300*, Ratnasagar, Delhi, 2016.
----------	*Trade in Early India*, Oxford University Press, New Delhi, 2004
----------	*Trade and Traders in Early Indian Society,* Manohar, New Delhi, 2002.
Champaklakshmi, R.,	*Trade Urbanization and Ideology in South India*, Oxford University Press, New Delhi, 1996.
Chattopadhyaya, S.,	*Evolution of Hindu Sects: Up to the Time of Samkaracarya*, MunshiramManoharlal, Delhi, 1970.
Coburn, T.,	*Devi-Mahatmya: The Crystallisation of the Goddess Tradition, MotilalBanarasidass, Delhi, 1984.*
Goswami, Ranjit Kumar Dev,	*Essays on Sankardeva*, LBS Publication, Guwahati,1996.
Jaiswal, Suvira,	*The Origin and Development of Vaisnavism: Vaisnavism from 200 BC to AD 500*, MunshiramManoharlal, Delhi, 1980 (reprint).
----------	*Caste: Origin, Function and Dynamics of Change,* Manohar, New Delhi, 1998.
Jha, D. N.,	*Ancient India in Historical Outline*, Manohar, New Delhi, 2002 reprint.
Kosambi, D. D.,	*An Introduction to the Study of Indian History,* Popular Prakashan, Bombay, 2016 (reprint).
----------	*The Culture and Civilization of Ancient India in Historical Outline,* PPH, Delhi, 2001 (reprint).
Mukhia, Harbans,	*The Feudalism Debate*, Manohar, New Delhi, 1990 (reprint).
Sharma. R.S.,	*India's Ancient Past*, Oxford University Press, New Delhi, 2009.
----------	*Indian Feudalism*, Macmillan, New Delhi, 2006.
----------	*Sudras in Ancient India, MunshiramManoharlal, Delhi, 2016 (3rd edn.).*
Shastri, Nilakanta K.A.,	*History of South India*, OUP, Delhi,1996.
Singh, Upinder,	*A History of Ancient and Early Medieval India*, Pearson, Delhi, 2008.
Thapar, Romila,	*A History of India*, Vol.1, Penguin Books, Delhi, 1996 reprint.
----------	*The Penguin History of Early India*, Penguin books, New Delhi, 2002.
---------	*Asoka and the Decline of the Mauryas*, K.P. Bagchi& Co. Calcutta, 2000
----------	The Mauryas Revisited, K.P. Bagchi& Co. Calcutta, 1993 (Reprint).

Basham, A.L.,	*The Wonder that was India*, Rupa &Co., New Delhi, 2002 reprint.
----------	*A Cultural History of India*, OUP, New Delhi, 1984 (reprint)
Barpujari, H.k., (ed.)	*The Comprehensive History of Assam*, Vol. I, Gauhati, 2004, (2nd edn.)
Choudhury, P.C.,	*The History of Civilization of the People of Assam to the Twelfth Century A.D.*, DAHS, Gauhati, 1966.
Habib Irfan, (ed.)	*The People's History of India*, Vol.-1-4, Tulika Books, New Delhi, 2015.
Majumdar, R.C.et.al. (eds),	*The History and Culture of the Indian People*, Vol. II-V, (Bharatiya Vidya Bhavan Series, Delhi, 1945-1960, latest editions)

24. KHASI

A. Preface

Ka Programme kan ai jingtip ïa 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 ïa ki khynnah ha kaba ïadei bad ka sengnia bad ka bishar bniah. Yn hikai ruh ïa ki nongpule ban sngewthuh ïa 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 ïa ki phang pule, kum halor ka ktien Khasi, ka lolshor bad ka kylla-ktien. Shuh shuh, ka kynthup ruh ïa ki phang pule kiba ai jingtbit bad jinglah ba khambha ïa 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 ïa ki nongpule ban san ha ka jingsngewthuh bajylliew ïa ki jait litereshor bapher bapher.
2. Kan pynïoh ïa ki nongpule ïa ka jinglah ban pule bishar ïa ki kot pule bad ban sngewthuh ïa ki phangkren bapher kiba don ha ki kot pule.
3. Kan pynsan ha ka jingsngewthuh ïa ka jinglong babha bad ka jinglah ban bishar bniah ïa ki phang kiba don ha ki jingpule.
4. Ki nongpule kin don ka jingsngewthuh ïa ka kramar bad ka jingtbit ban thoh bad ban kren.
5. Kan pynïoh ïa ki nongpule ïa ka jingtip ïa ki nongrim, ki rukom bad ki jait bapher ka kylla-ktien.
6. Kan pynsan ïa ki jinglong babha ka longbriew manbriew bad ïa ka mynsiem ban ieit bad ban tei ïa 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 ÏA KA LITERESHOR KHASI

(Contact Hours: 60, Credits: 4)

Ki Jingthmu jong ka phang pule:

Ïa kane ka phang pule la saiñdur ba ki nongpule kin tip ïa 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 ïa ki phangkren kiba ïadei bad ka imlang sahlang kumjuh ruh ïa kiwei pat ki phang ba ki kot pule ki pynphalang.

Ki jingmyntoi na kane ka phang pule:

- Ki nongpule kin lah ban sngewthuh ïa ki dur bad ki jait bapher jong ka litereshor khamtam ka phawar.
- Ki nongpule kin lah ban sngewthuh ruh ïa ki mat bapher bapher kiba ïadei bad ka imlang shalang.
- Kin ïoh ruh ïa ka jinghikai bahok bad bakordor kiba ka jaitbynriew ka ju bud.
- Kin don ruh ïa ka mynsiem ban tei ïa 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 Tirot 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 Beaulah 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, 4th ed., 2022.

KHA-150: POITRI, SAWANGKA BAD PAROM MUTDUR

(Contact Hours: 60, Credits:4)

Ki Jingthmu jong ka phang pule:

Ïa kane ka phang pule la saiñdur ba ki nongpule kin sngewthuh ïa ki tnat bapher jong ka Litereshor kum ka Poitri, ka Sawangka, ka Parom Mutdur. La saiñdur ruh ba ki nongpule kin sngewthuh ïa 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 ïa ki tnat jong ka litereshor.
- Kin don ka jingtbit ban pule bad bishar bniah ïa 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 *Khmih 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 ïa 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 Jingïathuh 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 ïadei bad ka phang pule:

Dkhar, S. *Ka Bishar bniah ïa ka Sawangka U Baieit Donshkor*: ESES PLUSPublications, 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. *Khmih 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 Jingïathuh khana lyngkot),* Scorpio Printers, 1985.

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. Willhave 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 (15 hours)

ε-δ definition of limit of a real valued function; standard theorems; limit at infinity and infinite limits; ε-δ 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^{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 $(f: \mathbb{R}^2 \to \mathbb{R}, f: \mathbb{R}^3 \to \mathbb{R})$; 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 $(f: \mathbb{R} \to \mathbb{R}^2, f: \mathbb{R} \to \mathbb{R}^3)$; 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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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 it 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 abilitiy 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*, Oxfored 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, 1st order homogeneous linear differential equations and 2nd 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, Poiseulle'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. Upadyaya, 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, concetual and analytical skills of the students. The undergraduate Programme in PoliticalScience continues to be among the most sought-after and prestigious programmesoffered at the University. The course covers the entire spectrum of the major sub-discipline of Political Science, Multidisciplinary Courses (MDCs), SkillEnhancement Courses (SECs), Ability Enhancement Courses (AECs) and Value AddedCourses (VACs).

Programme Outcomes: The studentswill be able to understand the basic concepts,foundational, theoretical and advancedknowledge in Political Science. Courses on Multidisciplinary, SkillEnhancement, Ability Enhancement and Value Added Courses will broaden theirunderstanding 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 1: 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.
----------, *PoliticalTheory 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 Sate: 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 ContemporaryIndia*, New Delhi, Sage, 1994.

Bhambri, C.P., *The Indian State: Fifty Years*, New Delhi, Shipra, 1999.

Brass, P., *Politics of India since Independence, 2nd 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 Indi*a, 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.

Vanaik, A., *The Pointful Transition: Bourgeois Democracy in India*, London, Verso, 1990.

Warjri, Antarwell., *The Role of Political Parties in the Success and Failures of Coalition Governments in Meghalaya*, RI Khasi Book Agency, Shillong, Meghalaya, 2022

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.

Bottomore, T. B. 2014. *Sociology.* London: George Allen and Unwin.

Davis, K. 1949. *Human Society*. New Delhi. The Macmillan Co.

Giddens , A. 1989. *Sociology*. Cambridge: Polity Press.

Ginsberg, Morris. 1961. *Sociology*. California: OUP.

Gisbert, P. 2010. *Fundamentals of Sociology*. New Delhi: Orient Blackswan.

Haralambos, M. 1980. *Sociology: Themes and Perspectives*. New Delhi: OUP.

Fox, Robin. 1984. *Kinship and Marriage: An Anthropological Perspective* 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.

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 phyla.

Protozoa: Paramaecium - 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: *Ascarislumbricoides* –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, 7th Edition, Cengage Learning, India."
- For Chordate Classification, follow the scheme from "Kardong, Kenneth V. (2015). Vertebrates: Comparative Anatomy, Function, Evolution, 8th 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. Kolkota.
4. Chaki, K.K., Kundu, G., & Sarkar, S. (2021). Introduction to General Zoology Vol 2. (1st ed.). New Central Book Agency. Kolkota.
5. Ganguli, B.B., Adhikari, S., & Sinha, A.K. (2011). Biology of Animals: Volume I. (3rd ed.). New Central Book Agency. Kolkota.
6. Ghosh, K.C. and Manna, B. (2009). Practical Zoology. (3rd ed.). Central Book Agency, Kolkota.
7. Kardong, Kenneth V. (2015). Vertebrates: Comparative Anatomy, Function, Evolution, 8th 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.
10. Lal, S.S. (2011). Practical Zoology: Invertebrate. (10th ed.). Rastogi Publications. Meerut.
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. Kolkota.
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.

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*.

Pisces: Scales and fins in fishes; Accessory respiratory organs.

Unit-III: 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. Kolkota.

4. Ghosh, K.C. and Manna, B. (2009). Practical Zoology. (3rd ed.). Central Book Agency, Kolkota.
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. Kolkota.
15. Verma, P.S. (2010). A Manual of Practical Zoology: Chordates. (11th ed.). S. Chand & Co. New Delhi.
16. Verma, P.S. (2010). A Manual of Practical Zoology: Invertebrates. (15th ed.). S. Chand & Co. New Delhi.
17. Verma, P.S., & Jordan, E.L. (2013). Chordate Zoology. (14th ed.). S.Chand& Co. New Delhi.
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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