Office of the Principal, Govt. College, Narnaul

The following Post Graduate Programs are running in this college in the academic session-2016-17

1. M.A. Geography
2. M.A. English
3. M.Sc. Geology
4. M.Sc. Chemistry
5. M.Sc. Botany
6. M.Sc. Zoology
7. M.Sc. Mathematics
8. M.Com

The Program outcomes (POs), Program Specific Outcomes & Course Outcomes are described program-wise for academic session: 2016-17 are attached herewith.

Principal
Govt. College
Narnaul

Program Name: M.A. English

POs, PSOs, COs of Syllabus Offered in session: 2016-17 to 2021-22

PROGRAMME OUTCOMES (POs):

PO1: Critical Thinking: Apply theoretical knowledge to make a critical analysis, intervene using innovative frameworks and evaluate and follow up.

PO2: Effective Communication: Engage in inter and intra personal communications, behavioural change communication and proficiency in information Communication Technology.

PO3: Scientific Temper: To build essential skills of life including questioning, observing, testing, hypothesizing, analysing and communicating.

PO4: Effective Citizenship: Demonstrate empathetic social concern and engage in service learning and community engagement programmes for contributing towards achieving of local, regional and national goals.

PO5: Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions and accept responsibility for them.

PO6: Environment and Sustainability: Participate and promote sustainable development goals.

PO7: Gender Sensitization and Social Commitment: To imbibe Gender sensitivity and the sense of social responsibility for self and community for the benefit of the society at large. PO8: Self-directed and Life-long learning: Engage in continuous learning for professional growth and development.

Programme Specific Outcomes (PSO's):

PSO1: To familiarise with the writers of English literature across different ages and continents, their theories, perspectives, models and methods.

PSO2: To be able to demonstrate competence in analysis and critically analyse scholarly work in the areas of English language teaching, literary research and translation.

PSO3: To enhance literary and critical thinking.

PSO4: Application of the knowledge of Literature, theories, research and skills in different fields of literary practice.

PSO5: To develop the technical skills and ethical decisions appropriate for the holistic professional development in the field.

Outcomes of the courses:

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1st Semester

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Course Details	Course Outcomes
Reading, Writing and Documentation Skills	▪ Students will be able to learn the basic documentation skills required for effective communication and research. ▪ They will develop critical ability to appreciate complexity and ambiguity of prose ▪ They will enhance their grammar skills
British Poetry	▪ The students will learn a historical overview of the developments in poetry ▪ The students will be able to engage themselves in critical reception of poetry ▪ They will enhance their critical ability to interpret poetry
British Drama	▪ The students will understand plays both as literary and performative texts ▪ They will learn the relation between literary texts and social environment. ▪ They will be able to think critically and rationally.
British Novel	▪ students will learn the historical development of the novel ▪ They develop a better understanding of the relationship between history, culture and literature through novels ▪ They will have an enhanced critical understanding of the novels and their technical aspects
British Prose	▪ The Students will be able to differentiate various types and techniques of prose writing. ▪ They will be able to examine the socio-historical issues discussed in the essays. ▪ They will be able to develop critical thinking by analyzing the cultural contexts of these texts.
Self Study	1. The students will be able to develop a flair for reading 2. They will also gain confidence for giving free expression to their ideas in speaking as well as writing 3. They will learn to organize their ideas and thoughts in a rational, logical and spontaneous manner while writing 4. On the whole, it will help students build tremendous confidence
Computer Application	1. Students will emerge more confident after learning computer applications 2. Knowledge of computer application will make them fit for variety of career options.

2ndSemester

Course Details	Course Outcomes
American Literature-I	▪ Students will be able to read critically and appreciate the genres of American Literature. ▪ Students will be able to understand the nature of problems in American society. ▪ Students will be able to understand and compare the literary movements of American with other movement in same time period across world. ▪ Students will be able to understand American culture and people etc.
Modern British Literature	▪ Students will be able to know the nature and genres of Modern British Literature. ▪ Students will be able to understand and appreciate the difference of pre-modern and modern period British literature. ▪ Students will be able to know the current social, economical, psychological and other problems.

Indian Writings in English	Students will be able to know the growth and development of Indian literature in English.
	⬜ Students will have an insight to locate Indian Writings in English in literature of different countries.
Diasporic Literature	Students will be able to understand the notion of diaspora.
	⬜ Students will be able to understand the problems of diaspora and the country they live in.
Self Study	The students will be able to develop a flair for reading
	6. They will also gain confidence for giving free expression to their ideas in speaking as well as writing
Seminar	The students will be inclined towards a habit of reading and widen their horizons of knowledge
	2. Their presentation skills,(Vocabulary, tonepatterns etc) will be improved

3rdSemester

Course Details	Course Outcomes
Literary Criticism & Theory - II	Comprehend a range of theoretical aspects and their progress in literary studies.
	2. Recognize and understand literary premises and the philosophical background of a particular theoretical approach.
American Literature - II	1. Get a good grasp of the historical, political, and cultural contexts of American literature.
	2. Recognize and explain distinct characteristics of American literature of a particular era and tradition.
Study of Language-I	1. Get an understanding of the contemporary approaches to the study of language.
	2. Understand the nuances of English speech sounds, word stress, intonation, and rhythm.
Literature and Gender	1. Theorize about gender in literary texts
	2. Build upon their knowledge of Gender theory and its evolution.
South Asian Literature	1. Demonstrate a deep understanding of the cultural, historical geopolitical contexts of South Asian literature.
	2. Gain an understanding of the principal thematic concerns of South Asian literature.

4thSemester

Course Details	Course Outcomes
Criticism & Literary Theory - III	Students will be able to apply theoretical approaches to the literary texts.
	⬜ It will enhance their knowledge on the major concepts given by different literary and cultural theorists
Non-Fictional Narratives	⬜ Familiarizing the students about major Non-fiction narratives
	⬜ Enabling critical thinking in students to appreciate these narratives in their cultural as well as personal contexts

Study of Language-II	⬛ To introduce the students to various types of communication and its regional variation. ⬛ To Make the students familiar to historicity of language, socio-linguistics and psycho- linguistics
Self Study	1. Improve their existing skills through independent reading, guided research, and analytical writing on specific texts. 2. Read critically literary works not discussed in class.
Seminar	1. The students will be inclined towards a habit of reading and widen their horizons of knowledge 2. Their presentation skills,(Vocabulary, tone patterns etc) will be improved
Dalit Literature	1. The students will get acquainted with a neglected social the history of the oppressed. 2. The students will get knowledge of the caste system and untouchability and social ramifications
Literature of Protest	⬛ Students will get familiar with the history and political analysis of protest and dissent in literary tests ⬛ It will make them reflect upon constraints and challenges culture or social structure poses. ⬛ It will improve their critical thinking skills

Program Name: M.Sc. in Geology

POs, PSOs, COs of Syllabus designed

PROGRAMME OUTCOMES(POs):

PO1: Capable of demonstrating comprehensive disciplinary knowledge gainedduring course of study

PO2: Capability to ask relevant/appropriate questions for identifying,formulating and analyzing the research problems and to draw conclusionfrom the analysis

PO3: Capability of applying knowledge to solve scientific and other problems

PO4: Capable to learn and work effectively as an individual, and as a memberOr leader in diverse teams, in multidisciplinary settings.

PO5: Ability of critical thinking, analytical reasoning and research basedknowledge including design of experiments, analysis and interpretation of data to provide conclusions

PO6: Ability to apply reasoning to assess the different issues related to Societyand the consequent responsibilities relevant to the professional scientificpractices

PO7: Capability to identity and apply ethical issues related to one's work, avoidunethical behavior such as fabrication of data, committing plagiarism and unbiased truthful actions in all aspects of work

Programme Specific Outcomes (PSO's):

PSO1: Basic understanding of fundamental concepts of Geology and applying it on the various natural processes occurring on and inside the Earth as a complete system.

PSO2: Clearly formulate and solve real life challenges with respect to human environment interactions.

PSO3: Applications of fundamental principles of Geology in finding out various minerals and other natural resources for the betterment of the human society.

PSO4: Acquisition of skills to effectively communicate the knowledge of Geology to the society for safeguarding the physical environment.

Outcomes of the courses designed for M.Sc. in Geology

The courses are designed in the semester system and options are given to select the course of interest of the learners. The following Courses, in syllabus for the above said program, with the given course outcomes statements:

1st Semester

Course Details	Course Outcomes
G111 Geomorphology	Students get acknowledged about different types of landforms and related processes.
G112 Structural Geology	Students will come to know about basic concepts of tectonic structures in rocks.
G113 Crystallography	Student will learn about concepts of crystallography
G114 Igneous Petrology	Students will be able to know about Igneous rocks, their origin, textures and structures. Student gets acknowledged about igneous rocks including their geochemical characteristics and petrogenesis.
G115 Practical on Structural Geology	Student acquires knowledge of how to observe the geological structure, drawing structural maps.
G116 Practical on Crystallography	Student will be able to understand the practical concepts of crystallography
G117 Practical on Igneous Petrology	Students will able to identify the Igneous rocks in hands-specimen as well as under microscope.

2nd Semester

Course Details	Course Outcomes
G211 Geomorphology & Remote Sensing	Students will come to know about various types of erosional and depositional features by various agents like Water, Wind, Glacier etc. They will also learn about the basic concepts of Remote Sensing technology.
G212 Structural Geology & Tectonics	Students get acknowledged about various types of Geological structures and the tectonic environments for their formation.
G213 Mineralogy	Students will be able to understand the formation of minerals, composition, processes occur in nature.
G214 Metamorphic	Student will learn about the basic concepts of geophysical methods and

Course Details	Course Outcomes
Petrology Geochemistry	their applications in solving geological problems and then we use concepts of geochemistry for using, exploring and exploiting the minerals, rocks and water etc.
G215 Practical on Structural Geology	Students will able to identify the various structures in the lab through models and field photographs.
G216 Practical on Petrology	Students will able to identify the Metamorphic rocks in hands-specimen as well as under microscope.
G217Dissertation	Students will get the exposure of earth material and structures in the field.

3rdSemester

Course Details	Course Outcomes
G 311 - Stratigraphy	Student gets acknowledged about basic principles of stratigraphy, stratigraphic contacts and stratigraphic sequences of India.
G 312 - Ore genesis and Indian Mineraldeposits	Students get knowledge about the formation and distribution of mineral deposits along with understanding of suitable environment for mineral deposition.
G313 - Engineering Geology	Introduction to Fundamental Concepts of Engineering Geology. Learn to apply these in various civil engineering projects.
G314 – (i) Sedimentology (ii)Advance tectonics &HimalayanGeology. (iii) Environmental Geology.	(i) The course will prepare the students to understand the basic and applied aspects of sedimentology. (ii) Student will get acknowledged about types of plate boundaries and different process at these boundaries. (iii) Student gets acknowledged about environmental problems and their mitigation and management, and current practices with examples.
G315 - Economic Geology Practical	The learners will be able to identify the hand-specimen for the Ores of important metals like Iron, copper, Lead, Zinc, Gold etc.
Paper 316 - Engineering Geology and Hydrogeology Practical	Students get knowledge about practical related to hydrogeology and Engineering Geology. They will learn about the determination of geotechnical strength of the earth material.

4thSemester

Course Details	Course Outcomes
G411 - Palaeontology	Students get knowledge about the Paleontolology, Micropaleontology, Palynology and their applications.
G412 - Ore genesis and Indian Mineral deposits-II	Students get knowledge about the formation and distribution of mineral deposits along with understanding of suitable environment for mineral deposition.
G413 - Hydrogeology	Students get acknowledged about the hydrogeological properties of water bearing formations and chemical parameters of water.
G414 –Petroleum / Mining Geology	Students come to know the role of a geologist in Mineral Exploration& Mining.
G415 - Economic Geology Practical	Students will be able to prepare the maps for the distribution of important economic deposits in india.
G416 - Practical	Students get knowledge about practical related to hydrogeology and Engineering Geology. They will learn about the determination of geotechnical strength of the earth material.

Paper 417 - Dissertation	The students will get the exposure of techniques and work culture of industries.

Program Name: M.Sc. & M.A (Pass Course) Geography

Program Outcomes (PO): Common for M.Sc. & M.A (Pass Course) Geography

PO1	Knowledge	Capable of demonstrating comprehensive disciplinary knowledge gained during course of study
PO2	Research Aptitude	Capability to ask relevant/appropriate questions for identifying, formulating and analyzing the research problems and to draw conclusion from the analysis
PO3	Communication	Ability to communicate effectively on general and scientific topics with the scientific community and with society at large
PO4	Problem Solving	Capability of applying knowledge to solve scientific and other problems
PO5	Individual and Team Work	Capable to learn and work effectively as an individual, and as a member or leader in diverse teams, in multidisciplinary settings.
PO6	Investigation of Problems	Ability of critical thinking, analytical reasoning and research-based knowledge including design of experiments, analysis and interpretation of data to provide conclusions
PO7	Modern Tool usage	Ability to use and learn techniques, skills and modern tools for scientific practices
PO8	Science and Society	Ability to apply reasoning to assess the different issues related to society and the consequent responsibilities relevant to the professional scientific practices
PO9	Life-Long Learning	Aptitude to apply knowledge and skills that are necessary for participating in learning activities throughout life
PO10	Ethics	Capability to identify and apply ethical issues related to one's work, avoid unethical behaviour such as fabrication of data, committing plagiarism and unbiased truthful actions in all aspects of work
PO11	Project Management	Ability to demonstrate knowledge and understanding of the scientific principles and apply these to manage projects

Program Specific Outcomes (PSO's):

- **PSO1:** Understanding the human and physical environmental phenomena using specialized knowledge pertaining to various sub-fields of geography.

- **PSO2:** Ability to use the state of art geospatial knowledge for resolving the social, economic, cultural and physical problems of the society.
- **PSO3:** Learning the techniques of data acquisition, data processing and interpretation of locational and spatial data.

- **PSO4:** Ability to demonstrate and communicate the geographical knowledge and inculcate analytical ability, research aptitude and relevant skills.

Core Course(cc)

Sr. No.	Course Code	Nomenclature of the course
1	GEOG101	Climatology
2	GEOG102	Geomorphology
3	GEOG103	Advance Geography of India
4	GEOG104	Computer Applications
5	GEOG105	Seminar/Journal Club
6	GEOG106	Self-Study Paper
7	GEOG107	Lab Course-I: Study and Interpretation of Topographical sheets
8	GEOG108	Lab Course-2: Climatology and Geomorphology

9	GEOG109	Urban Geography
10	GEOG110	Rural Geography
11	GEOG111	Resource Geography
12	GEOG112	Cultural Geography

M. Sc. Geography
Semester – II Core

Sr. No.	Course Code	Nomenclature of the course

1	GEOG201	Geographical Thought
2	GEOG202	Economic Geography
3	GEOG203	Population Geography
4	GEOG204	Statistical Methods in Geography
5	GEOG205	Seminar/Journal Club
6	GEOG206	Self-Study Paper
7	GEOG207	Lab Course-I: (Economic Geography & Population Geography)
8	GEOG208	Lab Course-2: Computer based data management and Cartography.
9	GEOG209	Oceanography
10	GEOG210	Soil Geography

Foundation Course (Compulsory)

11	GEOG211	Communication Skills & Personality Development

Semester – III Core Courses (CC)

Sr. No.	Course Code	Nomenclature of the course
1	GEOG301	Regional development and Planning with special reference to India
2	GEOG302	Environmental Geography
3	GEOG303	Remote Sensing (RS)
4	GEOG304	Geographical Information System (GIS)
5	GEOG305	Seminar/Journal Club
6	GEOG306	Self-Study Paper
7	GEOG307	Lab Course-I : Visual Interpretation of Aerial Photographs
8	GEOG308	Lab Course -2 (Field- Work): Socio- Economic Survey & Report Writing)
9	GEOG309	Agricultural Geography
10	GEOG310	Biogeography
11	GEOG311	Political Geography
12	GEOG312	Fundamentals of Geography

M. Sc. Geography
Semester – IV Core Courses (CC)

Sr.No.	Course Code	Nomenclature of the course

1	GEOG401	Research Methodology
2	GEOG402	Geography and Disaster Management
3	GEOG403	Application of Remote Sensing and Geographical Information system
4	GEOG404	Hydrology
5	GEOG405	Seminar/Journal Club
6	GEOG406	Self-Study Paper
7	GEOG407	Lab Course-I: Digital Image Processing Techniques
8	GEOG408	LabCourse-2: GIS Exercises

M. Sc. Botany Program and Coures Outcome

On completion of program students will be able to

1. Think Critically - Get ability to apply the process of science by formulating hypotheses and design experiments based on the scientific method.

2. Analyze and interpret results generated through studies in botany, taxonomical treatments, field studies, excursion tours and laboratory techniques used in the subject.

3. Use quantitative reasoning by using mathematical calculations and graphing skills tosolve problems in plant science (Botany)

4. Effective Communication and collaborate with other disciplines by effectively

communicating the fundamental concepts of Botany in written and oral format.

5. Identify credible scientific sources to interpret and evaluate the evidences

6. Understand the relationship between science and society by recognizing and discussing logical, scientific and ethical issues in Botany subject.

7. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development with respect to assessment, conservation and utilization of floral diversity

Program specific outcomes

On completion of program students will be specifically able to

1. Identify classify the plants by using the key characters.

2. Prepare and view specimens for examination using light microscopy

3. Use pure culture and selective techniques to isolate fungi, plant pathogens, algae andidentify them growing on media.

4. Qualitative and quantitative estimate the number of floral components by using enumeration and suitable sampling and techniques.

5. Use appropriate plant molecular techniques and use of instrumentation realated to it.

6. Practice safe laboratory procedures, using appropriate protective, biosafety and emergency procedures.

7. Documentation and report writing on experimental protocols, results and conclusions,study tours and filed visits etc.

BOT 101 CELL BIOLOGY

COURSE OBJECTIVES

The main objective of the course is to make students aware of -

- ➢ **Prokaryotic and eukaryotic Cell:** The ultra-structural details and comparative assessment.
- ➢ **Plasma membrane:** Molecular .organization, current models and functions. Cell wall architecture, biosynthesis, assembly, growth and cell expansion.
- ➢ **Plasmodesmata:** Structure and role in movement of molecules and macromolecules.
- ➢ **Cytoskeleton:** Organization and role of microtubules and microfilaments. Implications in flagellate and other movements.
- ➢ **Plant vacuole:** Tonoplast membrane, ATPases, transporters, as storageorganelle.
- ➢ **Chloroplast and Mitochondria:** Ultrastructure, function and biogenesis. Theorganization of genome and patterns of gene expression.
- ➢ **Nucleus:** Microscopic and submicroscopic organization. Structure and function of nuclear
- ➢ Envelope. The ultrastructure of nucleolus and its role in rRNA biosynthesis.
- ➢ **Ribosomes:** Structure and site of protein synthesis. Mechanism of translation,details of initiation, elongation and termination. The structure and role of RNA.

COURSE OUTCOMES

After successful completion of this course, students will be able to understand :

- ➢ The cell structures in relation to function of cells the fundamental unit of life, are concerned in this course along with molecules present in cells.

- ➢ Apply the principles of cell biology in designing experiment, statistical analysis, and interpretation of results

- ➢ Operate and solve exercise using computation statistics software.

- ➢ Get acquitted with basic approach in the research methodology.

BOT 102 MOLECULAR BIOLOGY

COURSE OBJECTIVES

- ➢ To understand the concepts in prokaryotic, eukaryotic Plant system with respect to-
- ➢ To study the central dogma of molecular biology (replication, transcription, and translation)
- ➢ **Cell signaling**
- ➢ **Protein sorting**
- ➢ **Cell Cycle and its molecular aspects**
- ➢ **Molecular Cytogenetics**
- ➢ **Restriction mapping**
- ➢ **Laboratory Techniques**:

COURSE OUTCOMES

- After successful completion of this course, students will be able to:
- Acquaint with concepts in prokaryotic, eukaryotic, and viral genetics
- Explain central dogma of molecular biology (replication, transcription, and translation)
- Enlist and explain types of mutation, gene regulation and transposable element
- **Conversant with Laboratory Techniques** *viz.* Microscopy, SEM & TEM, Ultracentrifugation, fractionation, Electrophoresis, PCR, GISH, FISH and Immunochemical techniques. The flow cytometry and confocal microscopy in karyotype analysis.
- Isolation of plant DNA and its quantification.
- Isolation of RNA and its quantitation
- Estimation of seed proteins

BOT 103 BIOLOGY AND DIVERSITY OF VIRUS, PHYTOPLASMA, BACTERIA, ALGAE AND FUNGI

COURSE OBJECTIVES

- To understand the phycology with special reference to Indian work.
- Algae in diversified habitats (Terrestrial, fresh water, marine) Criteria used in classification of algae, Role of algae in human welfare
- General account of thallus organization, reproduction and life history of algae.
- Study of important groups of algae **Cyanophyta , Chlorophyta, Xanthophyta , Bacillariopyta, Phaeophyta & Rhodophyta**
- **Fungi:** General Characters, Classification., Economic importance of fungi in medicine, Agriculture (Biopesticide an biofertilizer), food (SCP Mushrooms)
- Fungi as plant pathogen – General account of different groups and type study of fungi as pathogen**. Mastigomycotina , Zygomycotina, Ascomycotina, Basidiomycotina & Deuteromycotina**
- **Bacteria:** General characters, ultrastcture, classification, Role of bacterium in crop improvement and bacterial disease of plants.
- **Phytoplasma:** General characters, economic uses, classification, role and disease of plants.
- **Viruses:** General account, ultrasturcture and economic importance of viruses.

COURSE OUTCOMES

> Comprehend the diversity of lower cryptogams (Algae, Fungi, Bacteria, Phytoplasma and viruses. Collection and study of algae, fungi, bacteria from different localities, Identification up to generic level.

> Recognize the morphology, anatomy , physiology, reproduction and lifecycle pattern.

> Their diversification and familiarize with various ecological niche.

> Positive and negative values.

BOT 104 TAXONOMY OF ANGIOSPERMS

COURSE OBJECTIVES

> Deals with naming and classification of plants their interrelationships and evolution.
> Deals with recent developments in plant systematic and phylogenetics
> Criteria used for classification; phases of plant classification and brief history on account
> Botanical Nomenclature: Concept of nomenclature, Binomial nomenclature and its advantages.
> Taxonomic literatures and Use of computers in angiosperms taxonomy.
> Taxonomic evidences: Morphology, anatomy, embryology, palynology, cytology, phytochemistry and numerical taxonomy
> Angiosperm Families: Nymphaeaceae, Hydatellaceae, Magnoliaceae, Papaveraceae, Malvaceae, Sapotaceae, Apiaceae, Asteraceae, Arecaceae and Poaceae

COURSE OUTCOMES

After successful completion of this course, students will be able to:

> Study plant morphology

> Description of a plant specimen.

> Study of at least 20 locally available families of flowering plants.

> Identification of genus and species of locally available wild plants.

> Preparation of botanical keys at generic level by locating key characters.

> Knowledge of at least 10 medicinal plant species.

> Knowledge of secondary metabolites and its use in taxonomy.

BOT 105 CYTOLOGY AND GENETICS

COURSE OBJECTIVES

To understand the concepts and details of heredity and variation at molecular and cellular levels.

Deals with more recent development which have taken place in the field of genetics besides providing introduction to methods of plant breeding of improvement of crop plants with respect to --

- ➢ Genetics of prokaryotic and eukaryotic organelles

- ➢ Chromatin organization

- ➢ Structural and Numerical alterations in chromosomes

- ➢ Mutation

- ➢ DNA Damage and repair mechanism

- ➢ Cytogenetics of aneuploids and structural heterozygotes:

COURSE OUTCOMES

After successful completion of this course, students will be able to:

- ➢ Know about the induction of polyploidy in plants using colchicines, methods of application of colchicine.
- ➢ Isolation of biochemical mutants following physical and chemical mutagenic
- ➢ Isolation of chlorophyll mutants following physical and chemical mutagenic treatments.
- ➢ Isolation of morphological mutants following physical and chemical mutagenic treatments.
- ➢ Karyotype analysis , Meiosis of complex translocation heterozygotes.
- ➢ Meiotic behaviour of monosomy, trisomy in plants and its effect.
- ➢ Chromosomal behaviour in mutagen treated plants.
- ➢ Chromatin organization, Structural and Numerical alterations in chromosomes

BOT 201 PLANT DEVELOPMENT AND REPRODUCTION

COURSE OBJECTIVES

Deals with regulation of growth and development of plant as affected by various growth regulations, thus cross talk and extrinsic biotic and abiotic factors.

To know the various structural and anatomical components of plant tissue and reproductive parts *viz.*

- **Meristems:** Organization of shoot and root apical meristem its structure and function,
- **Tissue systems:** Differentiation and functions of epidermis, parenchyma, chlorenchyma, sclerenchyma, laticifers and glands.
- **Vascular tissues:** Origin, structure and functions its taxonomic significance, development of wood in relation to environment.
- **Leaf:** Growth and differentiation, differentiation of epidermis (with special reference to
- stomata and trichomes) and mesophyll.
- **Root:** Initiation and development
- **Structure and development of** Flower, Male gametophyte, Female gametophyte , Seed development and fruit growth
- Mechanism of pollination

COURSE OUTCOMES

After successful completion of this course, students will be able to:

- Know about plants anatomical structure, their developmental patterns.

- Plant reproductive parts development of male, female gametophytes and fruits.

- Vascular tissues and its constituents by sections and maceration, wood anatomy, TS, TLS and RLS

- Mechanical tissues (Collenchyma, Sclerenchyma, Stone cells and Xylem) , Secretary tissues (Mucilage Canals, Resin canals, Nectaries, and oil glands), laticifers (Latex cells and Vessels).

- Normal and abnormal secondary growth etc.

BOT 202 BIOTECHNOLOGY

COURSE OBJECTIVES

Provides a detailed view of the visualizing concepts and technique for genetic engineering and biotechnology.

Deals mainly with science, methodology and applications of plant tissue culture methods in

- Cell and organ culture
- Practical approaches of single cell culture
- Applications of tissue culture
- Somatic embryogenesis, protoplast isolation, regeneration of protoplasts and protoplasts fusion, Synthetic seeds, generation of cybrid and hybrids.
- Cryopreservation technique.
- Recombinant DNA technology Gene cloning, Vectors, Role of *Agrobacterium*, Gene cloning techniques.

COURSE OUTCOMES

After successful completion of this course, students will be able to:

- Know about Equipment's required in Tissue culture Lab
- Media preparation techniques for different plants
- Sterilization techniques for media as well as for explants
- Explant Culture.- Anther culture Pollen culture, Micropropagation. Embryo rescue technique.
- Somaclonal variation. *In vitro* mutation. Isolation of plant protoplasts and viability testing.
- Protoplast fusion techniques.
- Tissue culture of important Horticultural, medicinal plants

BOT 203 PLANT PHYSIOLOGY AND METABOLISM

COURSE OBJECTIVES

Deals with selected topics of high important plant Physiology and Biochemistry.

- ➢ Plant water relations
- ➢ Enzyme
- ➢ Photosynthesis
- ➢ Respiration
- ➢ Nitrogen Metabolism
- ➢ Lipid Metabolism
- ➢ Plant Growth
- ➢ Plant Development

COURSE OUTCOMES

- ➢ After completion of the course the students are familiar with various physiological aspects involved in the plant development.
- ➢ Also the role of enzymes in it and mechanism of photosynthesis, respiration, nitrogen and lipid metabolism.
- ➢ The students are able to isolate starch, pectine and various nutritive products from the plants.
- ➢ Qualitative and quantification of the plant contents and its biochemistry and mode /mechanism of synthesis etc.

BOT 301 BIOLOGY AND DIVERSITY OF BRYOPHYTES, PTERIDOPHYTES AND GYMNOSPERMS

COURSE OBJECTIVES

- ➢ Highlights advances made in diversity analysis, developmental biology, reproductive biology and phylogenetics of the lower plants with female organ being archegoniuous present in bryophytes, pteridophytes and some most gymnosperms.
- ➢ Adaptive mechanism of the lower plant.
- ➢ Economic importance of the bryophytes, pteridophytes and gymnosperms

COURSE OUTCOMES

After successful completion of this course, students will be able to:
- ➢ To know about morphological, anatomical and developmental patterns in the bryophytes, pteridophytes and gymnosperms.
- ➢ To know about the reproductive parts their development and mechanism of reproduction and life cycle pattern.
- ➢ Thallus and wood anatomy, Mechanical tissues (Collenchyma, Sclerenchyma, Stone cells and Xylem) , Secretary tissues (Mucilage Canals, Resin canals, Nectaries, and oil glands), laticifers (Latex cells and Vessels).
- ➢ Economic values of the lower plants.

BOT 302ECOLOGY AND CONSERVATION

COURSE OBJECTIVES

Strategies adopted by the organisms under clanging environment in relation to their biogeographic distribution. The students are made conversant with the following topics-

- **Structure of ecosystem:**
- **Functions of ecosystem:**
- **Community ecology:**
- **Biogeography:**
- Environmental pollution in relation to air, water and soil. Use of fertilizer, pesticides and other chemicals in agriculture and hygiene and their disposal.
- **Climate change:** Greenhouse gases, their sources, trends and role, Ozone layer and its depletion (Global warming, Sea level rise, UV radiation) acid rain, Bioindicator and biomarkers of environmental health.
- **Biodiversity:** Concept, types and situation in India. IUCN categories. Strategies of conservation: *In situ* conservation & *Ex situ* conservation measures.
- Various act related to Bio Diversity conservation and protection and international conventions.

Knowledge on ecology, and ecological dynamics CO2 Ability to correlate ecological dynamics and regulation of vital processes on earth as biogeochemical cycles CO3 Ability to interpret ecosystem services, ecological resilience, ecological economics, and landscape ecology CO4 Set up experiments to appreciate concepts of Ecology CO5 Critically examine the forces impacting ecosystems viz., climate change, stress, population, consumerism, globalization, land use change

COURSE OUTCOMES

- On completion of this course the students are able to analyze various types of ecosystems, correlate different ecosystems.
- To analyze the threat and suggest conservative measures.
- The students are also trained in the environmental impact analysis
- Students are able to analyze, monitor various physical, chemical and biological properties of soil water and air.

BOT 303 APPLIED MYCOLOGY –I

COURSE OBJECTIVES

- ➢ Understanding the concept of fermentation and various fermentation techniques.
- ➢ Use of fungi in food feed and various industrial products.
- ➢ Various types of Mushroom cultivation practices and its importance and economics.
- ➢ Screening techniques of the fungi for various industrial application.

COURSE OUTCOMES

- ➢ Describe the microorganisms that participate in fermentation – production & processes.
- ➢ Evaluate the impact of different types of microorganisms on the final characteristics of the product.
- ➢ Identify the origin of the principal microorganisms of importance in the industrial environment.
- ➢ Know procedures and strategies for mushroom cultivation.
- ➢ Know the role of microorganisms in different production processes in order to improve these processes and ensure their success.

BOT 304 APPLIED MYCOLOGY –II

COURSE OBJECTIVES

- ➢ Detection and assay of fermentation products
- ➢ Principal and working process of instruments used in fermentation industry.
- ➢ Role of fungi in cheese production, its types and process

COURSE OUTCOMES:

After completion of the course the students are able to –
- ➢ Handle instruments related to fermentation
- ➢ Conversant with Spectroscopic, Chromatographic, techniques, HPLC, HPTLC, and various techniques,
- ➢ Screening of fungi for acid, alcohol, cellulose, amylase and various organic acid production

BOT 401 BIODIVERSITY –I

COURSE OBJECTIVES

- Biodiversity concept, Origin and evolution of diversity, Types of biodiversity,Estimation of known floras and faunas, Importance of Biodiversity, Revision of ecosystem: organization, structure, function and energetics.
- **Genetic Diversity:** Definition, Concept and importance, Nuclear centre and regional centres of origin, Germ-plasm,
- **Species diversity:** Species concept and definition, estimation and plant global status and with India, taxonomic procedure, taxa delimitation.
- **Ecological Diversity:** Types ecosystem diversity(Terrestrial and aquatic), Forest eco-sytem types(Tropical, Subtropical, temperate and alpine).
- **Agricultural and cropland diversity:** Agricultural and cropland diversity concept, Crop domestication, India's status for primary and secondary agricultural crops.

COURSE OUTCOMES

- Systematically understand biodiversity and its vital role in ecosystem function
- Identify the importance of biodiversity in natural environments Critically examine biodiversity and human linkages, and help policy formulating for conservation Application of knowledge in general communication for public extension

BOT 401 BIODIVERSITY –II

COURSE OBJECTIVES

- **Diversity Distribution**: Mega diversity regions, Endemism concept and its types, World Hots spots, Western Ghats and Eastern Himalayas.
- **Modern methods in taxonomy:** Comparative morphology, Cytological methods, dermal studies, root and stem anatomy, vessel study, Chemotaxonomy, Embryology And Palynology.
- **Numerical Taxonomy:** Numerical treatment data generation: Similarity concept, matrix building, assessment, correlation, distance calculation duster method, dendrograms, computer programs.
- **Cladistics and Phenetics:** Introduction, definition of Cladistics and phenetics, methodology of genetics, diversity concept and importance of gene mapping, DNA finger printing and its applications.

COURSE OUTCOMES

- Appreciate the need of biodiversity conservation in the context of various developmental pathways and policy framework that the mankind has been undergoing
- Concepts of Hotspots, megadivsrsity regions of the world.
- Use of modern methods in plant taxonomy viz. Cytological, chemical, embryological pollen characters along with micromorphological features.
- Concept of numerical taxonomy
- Concept and use of cladistics, phonetics, and molecular tool in biodiversity studies.

BOT 402 BIOPROSPECTING AND PLANT RESOURCE UTILIZATION

COURSE OBJECTIVES

: Is to apprises students of conventional and non-conventional plant resources being used by human, their effective and sustainable utilization and improvement by biotechnological tools.

- **Medicinal Plants:** Bioprospecting/ Pharmaceutical Bioprospecting: for new drugs, assays in Bioprospecting, Antioxidant assay – NO free radical scavenging assay, Antigenotoxicity assay – MTT assay, Antiviral activities of plants – SRB assay.
- **Marine Bioprospecting**: Sources of marine planktons and their bioprospecting, Isolation and cultivation of marine bioresources, Isolation of Marine Yeast and its industrial applications, bioactive chemicals from seaweeds and their applications. Understand the common cultivation methods of microalgae including photobioreactors and open ponds.
- Analyze the major cultivation methods of seaweeds, along with detailed life history of selected high-value seaweed species from India
- **Microbial Bioprospecting**: Isolation of microbial metabolites and their bio-activity, endophytic microbial products as antibiotics.
- **Origin, evolution, cultivation and uses** - food, fodder, fibers, oil yielding crops, wood and timber (at least 5 examples each), Non-wood forest products (NWFPS): Bamboos, Gums, Dyes, Resins, Fruits etc.
- **Medicinal and Aromatic plants:** Morphological peculiarities, chemical properties and uses (at least 5 examples each)
- **Phytochemistry:** Separation techniques – column chromatography and HPLC technique, secondary metabolites, pharmacognostic procedures, authentication of specimens, Preservation of plants and plants products.

COURSE OUTCOMES

On completion of this course, the students will be able to:
- Understand core concepts of Economic Botany and relate with environment, populations, communities, and ecosystems
- Develop critical understanding on the evolution of concept of organization of apex new crops/varieties, importance of germplasm diversity, issues related to access and ownership.
- Develop a basic knowledge of taxonomic diversity and important families of useful plants.
- Understand the common cultivation methods of microalgae including photobioreactors and open ponds, Seaweed bioresources etc.
- Appreciate the diversity of plants and the plant products in human use.
- Understand the concept of IPR, various legal issues related to IPR.
- Exploring the potential of Marine bioresources, Microbial , medicinal plants etc.
- Varoius phytochemical techniques, industrial process, pharmacognostic procedures, authentication of specimens, Preservation of plants and plants products

BOT 403 GENETIC ENGINEERING AND BIOINFORMATICS

COURSE OBJECTIVES

Deals with fundamentals of bioinformatics tools, computational biology and statistical methods utmost necessary for contemporary research in plant science.

- ➢ To get introduced to the basic concepts of genetic engineering0
- ➢ To get introduces to Bioinformatics and its significance in Biological data analysis.
- ➢ Describe the history, scope and importance of Genetic Engineering, Bioinformatics and role of internet in Bioinformatics.
- ➢ Explain about the methods to characterize and manage the different types of Biological data.
- ➢ Classify different types of Biological Databases. Introduction to the basics of sequence alignment and analysis.
- ➢ Explain about different types of protein and other organism specific databases.

COURSE OUTCOMES

On completion of this course, the students will be able to:
- ➢ To use genetic engineering tools in crop improvement
- ➢ Use the Bioinformatics toll in Biological data analysis.
- ➢ Able to explain the methods used for characterizing and managing Biological data.
- ➢ Classify different types of Biological Databases.

Programme Name: M.Sc. Zoology

Program Outcomes, Program Specific Outcomes and Course Outcomes

Program Outcomes:

The primary objective of the program is to impart quality education in the subject of Zoology as a basic science and its applied branches to the students. The programme also works across related majors within the Bio Sciences. The programme is designed with following outcomes:

➢ Distinguish between the Structure, Function, Behaviour and evolution of different animals.

➢ For instance if you major in zoology, you can also still take courses from across the other complementary.

➢ Master of Science majors of conservation biology and ecology, giving you an in-depth knowledge of those most closely related programmes.

➢ Apply the wide range of subject based skills to various fields that provide a base for future career in disciplines such as Health Sciences, Agriculture, Environmental Management, Biotechnology, Publishing, Teaching and Research.

➢ Perform, Assess and implement practical techniques and procedure to solve biological problems and analyse and quantify data collected during any project.

➢ Understand the applications of Biological techniques to various fields of biology.

➢ When you graduate with a Master of Science (Zoology) you will have learned how to work at a high level of academic achievement.

Program Specific Outcomes (PSOs):

- Used the evidences of comparative biology to explain how the theory of evolution offers the only scientific explanation for the unity and diversity of life on earth.
- They are able to use specific examples to explicate how descent with modification has shaped animal morphology, physiology, life history, and behavior.
- Explicated the ecological interconnectedness of life on earth by tracing energy and nutrient flows through the environment. They are able to relate the physical features of the environment to the structure of populations, communities, and ecosystems.
- Subjects such as invasive or endangered species, embryonic development in mammals and ageing in social insects. Lead to advances in medicine to prevent disease amongst both animals and human beings.
- Developed knowledge and understood of living organisms at several levels of Zoological and Biological organization from the molecular, through to cells and whole organisms and ecosystems all organs of evolutionary perspectives.
- Understood how the chemistry and structure of the major biological macromolecules, including proteins and nucleic acids, determines their biological properties.

COURSE OUTCOMES (COs):

COURSE Title - ANIMAL DIVERSITY
- Understood the Classification and Phylogeny of Animals

- Described General characteristics, classification of invertebrates and vertebrates.

- Described General characteristics, classification and systematic portion of Minor phyla Described the general biology of few selected non-chordates and chordates which are useful to mankind?
- Enriched knowledge on ecology of some important fishes, amphibians, reptiles, birds and mammals

COURSE Title - BIOCHEMISTRY
- Identified the five classes of polymeric biomolecules and their monomeric building blocks.

- Explained the specificity of enzymes (biochemical catalysts), and the chemistry involved in enzyme action.

- Understood types, Structure, biochemical properties and functions of vitamins.

- Explained how the metabolism of organic compounds leads ultimately to the generation of large quantities of ATP.

- Described the structure and classification of hormones.

COURSE Title - CELL AND MOLECULAR BIOLOGY

- Described the ultra-structure and functions of cell organelles.

- Understood DNA replication, RNA and protein synthesis and came to know protein synthesis can be controlled at the level of transcription and translation.

- Understood cell signaling and cellular communication.

- Described the oncogenes

- Understood the types and applications of stem cells.
  ### COURSE Title - BIOSTATISTICS
- Came to know the data collection, tabulation and presentation.

- Described the mean, median, mode and SD.

- Understood the Analysis of Variance.

- Described Student 't' test and probability

- Understood the Correlation and Regression.

COURSE Title - LAB – ANIMAL DIVERSITY, BIOCHEMISTRY AND CELL AND MOLECULAR BIOLOGY

- Performed and understood the anatomy and physiology of animals by dissection.

- Performed by experiments to analyze the macromolecules in animals

- Understood the principles and types of PCR demonstration.

- Described the fine structure and functions of cell organelles.

- Performed a variety of molecular and cellular biology techniques.

COURSE OUTCOMES – ANIMAL PHYSIOLOGY

- An integrated Understanding of physiological mechanisms

➢ Described the physiology of digestive and respiratory system of human beings.

➢ Understood the blood composition, types, groups and circulatory system.

➢ Described the physiology of excretory system and nervous system of human beings.

➢ Came to know the physiology of sense organs, muscles and reproductive system.

COURSE OUTCOMES – GENETICS

➢ Described the fundamental molecular principles of genetics

➢ Understood the structure and function of DNA & RNA

➢ Understood about the transmission, distribution, arrangement, and alteration of genetic information and how it functions and is maintained in populations

➢ Described the basics of genetic mapping.

COURSE OUTCOMES – IMMUNOLOGY AND MICROBIOLOGY

➢ Outline the key components of the innate and adaptive immune responses.
➢ Described about cell types and organs which are involved in an immune response

➢ Described the Infectious diseases, hypersensitivity, autoimmune disorders, immunodeficiency diseases

➢ Understood the microbial diversity, ultra structure, culture techniques of microbes.

➢ Came to Came to knowing about the various pathogenic fungi and viruses and beneficial microbes.

COURSE OUTCOMES – LAB – ANIMAL PHYSIOLOGY, GENETICS, IMMUNOLOGY AND MICROBIOLOGY

➢ Biological chemistry and its importance in physiology by testing

➢ Performed an experiment to culture Drosophila, Identifications of sex & mutants.

➢ Observed ABO blood grouping and studied the lymphoid organs

➢ Performed an experiments about the immunodiffusion Immunoelectrophoresis and Immunoelectrophoresis

➢ Learnt about the microbial culture methods.

COURSE OUTCOMES – SERICULTURE

➢ Described the Taxonomy, Morphological sex differences in larva and adult of beneficial and harmful insects.

➢ Understood the culture of mulberry plants, mulberry silk and silk gland.

➢ Came to known the culture methods of *B.mori* and *Apis*

➢ Described the diseases and pests of *B.mori* and plants.

➢ Studied the quality of silk and marketing strategies of silk.

COURSE OUTCOMES – DEVELOPMENTAL BIOLOGY

➢ Understood and mastered on the basic concepts of developmental biology.

➢ Understood how fertilisation, cleavage and gastrulating occur.

➢ Understood the basic concepts of organogenesis.

➢ Understood about the basic concepts of growth, regeneration and ageing

➢ Described the test tube baby and placentation in mammals.

COURSE OUTCOMES – ECOLOGY

➢ Demonstrated an Understood of ecological relationships between organisms and their environment.

➢ Presented an overview of diversity of life forms in an ecosystem.

➢ Explained and identified the role of the organism in energy transfers

➢ Described the Habitat ecology and Resource ecology

➢ Understood the Environmental Pollution and their management

COURSE OUTCOMES – EVOLUTION

➢ By biological evolution we could understand that many of the organisms that inhabit the Earth today are different from those that inhabited it in the past

➢ Understood that the four propositions underlying Darwin's theory of evolution through natural selection are:

➢ more individuals are produced than can survive;

➢ There is therefore, a struggle for existence

➢ Individuals within a species show variation

➢ Offspring tend to inherit their parental characters

➢ Explained adaptation, providing examples from several different fields of biology

➢ Explained how the molecular record provides evidence for evolution

➢ Understood the Human origin and evolution.

COURSE OUTCOMES – LAB – DEVELOPMENTAL BIOLOGY, ECOLOGY AND EVOLUTION

➢ Performed to know the various embryonic stages of animals.

➢ Learnt that the mounting of chick blastoderm and observation of sperm motility

➢ Confirmed the role of iodine and thyroxin in Amphibian metamorphosis.

➢ Analysed various physicochemical parameters in environmental matrices.

➢ Came to Came to knowing the Animals of evolutionary importance, fossils, analogous and homologous organs, Mimicry and Colouration.

COURSE OUTCOMES – ANIMAL CELL CULTURE TECHNOLOGY

➢ Described the structure and Organisation of animal cell.

➢ Understood the preparation of the culture medium.

➢ came to knowing the basic techniques of mammalian cell culture *in vitro*.

➢ Understood about Cell cloning and micro manipulation

➢ Applications of cultured animal cells are known.

COURSE OUTCOMES – TRANSGENIC TECHNOLOGY

➢ Described the history and scope of transgenic animals.

➢ Understood Recombinant DNA technology.

➢ Described the Systems and strategies for improvement of livestock for milk, meat, wool production and drought and poultry for eggs and meat.

➢ Described the production of transgenic Cattle, pigs, sheep etc.

➢ Understood the History, definition, importance and application of cell technology

COURSE OUTCOMES – ANIMAL BIOTECHNOLOGY

➢ Understood animal cell structure, scope of biotechnology.

➢ Described the Gene cloning and gene transfer methods.

➢ Came to know the concept of PCR, Screening of recombinant clones – nucleic acid hybridisation, DNA sequencing, DNA fingerprinting.

➢ Described the Animal tissue culture techniques.

➢ Understood Embryo transfer & transgenic animal technology.

COURSE OUTCOMES – FISHERY BIOLOGY AND AQUACULTURE

➢ Learnt the general classification of fishes, economically important marine and freshwater fishes, migration and fishery products.

➢ Described recent concepts in fisheries management, endangered species management.

➢ Came to know the various aquaculture systems.

- ➤ Understood the type of hatchery, brood stock, larval production, feed management water quality and disease management in cultivable species, live feed production.

- ➤ Described the feed and disease management.

Program Name: M.Sc. Mathematics

Course Objective & Outcomes
Subject: Abstract Algebra-I   **Class: M.Sc. Maths 1st Sem.**
Course Objective

1. Present the relationships between abstract algebraic structures with familiar numbers systems such as the integers and real numbers.
2. Present concepts of and the relationships between operations satisfying various properties (e.g. commutative property).
3. Present concepts and properties of various algebraic structures.
4. Discuss the importance of algebraic properties relative to working within various number systems.
5. Develop the ability to form and evaluate conjectures.

Outcomes
After the completion of the course, Students will be able to
1. Generate groups given specific conditions.

2. Investigate symmetry using group theory.

3. Identify plane periodic patterns (lattices).

4. Understand the base of the coding theory as an application of finite fields.

5. Demonstrate knowledge that the rational numbers and real numbers can be ordered and that the complex numbers cannot be ordered, but that any polynomial equation with real coefficients can be solved in the complex field.

6. Discuss the three major concrete models of Boolean algebra: the algebra of sets, the algebra of electrical circuits, and the algebra of logic.

7. Describe other applications of abstract algebra such as in avoiding problems of round off in computations

DEPARTMENT OF MATHEMATICS
Course Objective & Outcomes

Subject: Ordinary Differential Equation   **Class: M.Sc. Maths 1st Sem.**

Course Objective

1. To aware the students about initial value and boundary value problems and their corresponding equivalent integral equations.

2. To aware the students about concepts of approximate solution and existence theorem.

3. To familiarize the students about Adjoint system in detail.

4. Detailed study of Fundamental Set and matrix.

5. To demonstrate knowledge and understanding of Critical points in Autonomous system and their stability.

Course Outcomes

After the completion of the course, Students will be able to
1. Solve problems in ordinary differential equations, dynamical systems, stability theory, and a number of applications to scientific and engineering problems.

2. Demonstrate their ability to write coherent mathematical proofs and scientific arguments needed to communicate the results obtained from differential equation models.

3. Demonstrate their understanding of how physical phenomena are modelled by differential equations and dynamical systems.

4. Implement solution methods using appropriate technology, and

5. Investigate the qualitative behavior of solutions of systems of differential equations

DEPARTMENT OF MATHEMATICS

Course Objective & Outcomes

Subject: Mathematical Statistics   **Class: M.Sc. Maths 2nd Sem.**
Course Objective
The objectives of this course are to:

1. Understand the theory of statistics and their applications.

2. Understand the concepts of Probability.

3. To analyse different distributions along with their properties.

4. Aware the students about mathematical expectation, variance, moment generating function and moment about mean & about origin.

5. To understand the concepts of testing hypothesis.

Course Outcomes

After the completion of the course, Students will be able to
1. Differentiate between discrete and continuous random variables.

2. Solve the problems related to Bay's theorem.

3. Calculate mean, variance, Standard deviation of different types of theoretical distribution.

4. Apply different types of tests of significance.

5. Differentiate between types of error.

6. Understand Null & alternative hypothesis for testing.

DEPARTMENT OF MATHEMATICS
Course Objective & Outcomes

Subject: Complex Analysis   **Class: M.Sc. Maths 1st Sem.**

Course Objective
1. To provide an introduction to the theories for functions of a complex variable.

2. To explore algebraic, geometric and topological structures of the complex number field.

3. To introduce the concepts of analyticity, Cauchy-Riemann relations and harmonic functions.

4. To present Complex integration and complex power series.

5. To discuss the classification of isolated singularities and examine the theory and illustrate the applications of the calculus of residues in the evaluation of integrals.

Course Outcomes

After the completion of the course,

1. Student will have introduced to the fundamental concepts of complex analysis and their role in modern mathematics and applied contexts.

2. Student will demonstrate to accurate and efficient use of complex analysis techniques.

3. Student will be able to understand capacity for mathematical reasoning through analyzing, proving and explaining concepts from complex analysis

4. Student will be able to apply problem-solving using complex analysis techniques applied to diverse situations in physics, engineering and other mathematical contexts.

5. Student will be able to apply problem-solving using evaluation of improper integral by Cauchy Residue Theorem.

DEPARTMENT OF MATHEMATICS
Course Objective & Outcomes

Subject: Measure & Integration   **Class: M.Sc. Maths 2ⁿᵈ Sem.**

Course Objective

1. Revision of basic tools, including in particular the concept of countable/uncountable sets.

2. Be able to describe at least one approach to the construction of Lebesgue measure, the Lebesgue integral of a function and measure spaces.

3. Know the principal theorems as treated and their proofs and be able to use them in the investigation of examples.

4. Be able to prove simple unseen propositions concerning measure spaces, Lebesgue measure and integration.

5. To gain understanding of the abstract measure theory and definition and main properties of the integral.

6. To construct Lebesgue's measure on the real line and in n-dimensional Euclidean space.

7. To explain the basic advanced directions of the theory.

Course Outcomes

After the completion of the course, Student will be able to

1. understand σ-algebras, measurable sets, measures, outer measures, Lebesgue measure and its properties, completion of measures.

2. understand measurable functions, approximation by simple functions.

3. understand Lebesgue integral, Monotone Convergence Theorem, Dominated Convergence Theorem, coincidence of Lebesgue and Riemann integral for Riemann integrable functions.

4. develop an appreciation of the basic concepts of measure theory. These methods will be useful for further study in a range of other fields, e.g. Stochastic calculus, Quantum Theory and Harmonic analysis.

5. establish relation to graduate attributes: The above outcomes are related to the development of the Science Faculty Graduate Attributes, in particular: Research, inquiry and analytical thinking abilities, Communication, and Information literacy

DEPARTMENT OF MATHEMATICS

Course Objective & Outcomes

Subject: Abstract Algebra-II   **Class: M.Sc. Maths 2nd Sem.**

Course Objective

1. Present the relationships between abstract algebraic structures with familiar numbers systems such as the integers and real numbers.
2. Present concepts of and the relationships between operations satisfying various properties (e.g. commutative property).
3. Present concepts and properties of various algebraic structures.
4. Discuss the importance of algebraic properties relative to working within various number systems.
5. Develop the ability to form and evaluate conjectures.

Course Outcomes

After the completion of the course,

1. Student will be able to understand the relationships between abstract algebraic structures with familiar numbers systems such as the integers and real numbers.

2. Student will be able to verify relationships between operations satisfying various properties (e.g. commutative property).

3. Student will be able to work within various algebraic structures.

4. Students will have a working knowledge of important mathematical concepts in abstract algebra such as definition of a module, properties of module and application of module.

5. Students will be knowledgeable of different types of modules such as noetherian module, artinian module and understand the structure and characteristics of these modules.

6. Students will be introduced to and have knowledge of many mathematical concepts studied in abstract mathematics such as Nil ideal and Nilpotent ideal.

DEPARTMENT OF MATHEMATICS

Course Objective & Outcomes
Subject: Elementary Topology   **Class: M.Sc. Maths 2nd Sem.**

Course Objective
1. Students will learn the fundamentals of point-set topology

2. Students will learn the fundamentals of algebraic topology

3. Students will be prepared to begin thesis research.

4. Have the knowledge of basic properties of the field of real numbers.

5. Studying Bolzano –Weirstrass theorem and Cauchy criteria.

6. Studying the basic topological properties of the real numbers

7. Studying the notion of continuous functions and their properties

Course Outcomes

After the completion of the course, Students will be able to
1. Define and recognize the basic topological properties of R

2. Students will know the definitions of standard terms in topology.

3. Students will know how to read and write proofs in topology.

4. Students will know a variety of examples and counter examples in topology.

5. Students will know about the fundamental group and covering spaces.

6. Define and recognize the continuity of real functions.

DEPARTMENT OF MATHEMATICS
Course Objective & Outcomes

Subject: Functional Analysis   **Class: M.Sc. Maths 3rd Sem.**
Course Objective

1. To know and be able to use the elementary properties of normed and inner product spaces.

2. To be able to check whether a linear operator is bounded, to find its adjoint and determine whether operators are normal, self adjoint, unitary or positive.

3. To determine whether a bounded operator is invertible and understand the importance of the spectrum of a bounded linear operator.

4. To study normed linear spaces and some of the linear operators between them and give some applications of their use.

5. To introduce the theory of Lebesgue integration with the aim of providing examples of complete normed linear spaces of integrable functions.

Course Outcomes

After the completion of the course, Students will be able to
1. improve abilities in mathematical reasoning and in expressing themselves accurately in writing by producing correct mathematical proofs.

2. use logical reasoning to prove theorems.

3. introduced to the concept of continuity and be familiar with the statements and proofs of the standard results about continuous real functions;

4. understand the concept of the differentiability of a real valued function and be familiar with the statements and proofs of the standard results about differentiable real functions.

5. understand the concept of Signed measure, Baire measure and continuous function with compact support.

DEPARTMENT OF MATHEMATICS
Course Objective & Outcomes

Subject: Fluid Dynamics   **Class: M.Sc. Maths 3rd Sem.**

Course Objectives

1. The student will learn analytical solution techniques for diverse fluid problems, including lubrication flows, boundary layers, and Stokes flow, in steady and unsteady conditions.

2. learn analytical techniques required to solve fluid flow equations for different geometries and flow conditions.

3. learn the fundamentals physics involved in modelling fluids and hydrodynamic phenomena .

4. Through learned analytical methods and basic numerical techniques presented in this course the students will be able to determine volumetric flow rates, shear and pressure drag, and lift forces for different geometric configurations.

5. The course provides fundamental tools for professional engineers working in fluid mechanics.

Course Outcomes

1. Identify the relevant parameters that govern a fluid system and use dimensional analysis to identify the fundamental variables that define flow [SO1].

2. Analyze microscopic continuum fluid mechanics where flow is governed by the continuity equation and Navier-Stokes equation (differential forms of conservation equations). Evaluate a problem and arrive at reasonable approximations to put the equations in a more soluble form [SO1].

3. Analyze systems using macroscopic fluid mechanics, using the integral form of the conservation equations (Bernoulli's equation) [SO1,SO3].

5. Evaluate pressure distributions in a static fluid, taking account of hydrostatic pressure, buoyancy force, and interfacial tension (Laplace pressure and capillary action).

DEPARTMENT OF MATHEMATICS
Course Objective & Outcomes

Subject: Inner Product Space & Measure Theory   **Class: M.Sc. Maths 4th Sem.**

Course Objective

1. To know and be able to use the elementary properties of normed and inner product spaces.

2. To be able to check whether a linear operator is bounded, to find its adjoint and determine whether operators are normal, self adjoint, unitary or positive.

3. To determine whether a bounded operator is invertible and understand the importance of the spectrum of a bounded linear operator.

4. To study normed linear spaces and some of the linear operators between them and give some applications of their use.

5. To introduce the theory of Lebesgue integration with the aim of providing examples of complete normed linear spaces of integrable functions.

Course Outcomes

After the completion of the course, Students will be able to
1. improve abilities in mathematical reasoning and in expressing themselves accurately in writing by producing correct mathematical proofs.

2. use logical reasoning to prove theorems.

3. introduced to the concept of continuity and be familiar with the statements and proofs of the standard results about continuous real functions;

4. understand the concept of the differentiability of a real valued function and be familiar with the statements and proofs of the standard results about differentiable real functions.

5. understand the concept of Signed measure, Baire measure and continuous function with compact support.

DEPARTMENT OF MATHEMATICS
Course Objective & Outcomes

Subject : Classical Mechanics   **Class: M.Sc. Maths 4th Sem.**

Course Objective

1. To demonstrate knowledge and understanding of the following fundamental concepts in the dynamics of system of particles,

2. To demonstrate knowledge and understanding of the following fundamental concepts in motion of rigid body,

3. To demonstrate knowledge and understanding of the following fundamental concepts in Lagrangian and Hamiltonian formulation of mechanics

4. To represent the equations of motion for complicated mechanical systems using the Lagrangian and Hamiltonian formulation of classical mechanics.

5. To develop math skills.

Course Outcomes

After the completion of the course, Students will be able to
1. define and understand basic mechanical concepts related to discrete and continuous mechanical systems,

2. describe and understand the vibrations of discrete and continuous mechanical systems,

3. describe and understand planar and spatial motion of a rigid body,

4. describe and understand the motion of a mechanical system using Lagrange-Hamilton formalism.

DEPARTMENT OF MATHEMATICS
Course Objective & Outcomes
Subject: Viscous Fluid Dynamics   **Class: M.Sc. Maths 4th Sem.**
Course Objectives:
1. Learn the fundamentals physics involved in modelling fluids and hydrodynamic phenomena.

2. Learn analytical techniques required to solve fluid flow equations for different geometries and flow conditions.

3. The student will learn analytical solution techniques for diverse fluid problems, including lubrication flows, boundary layers, and Stokes flow, in steady and unsteady conditions.

4. Through learned analytical methods and basic numerical techniques presented in this course the students will be able to determine volumetric flow rates, shear and pressure drag, and lift forces for different geometric configurations.

5. The course provides fundamental tools for professional engineers working in fluid mechanics.

Course Outcomes

1. Explain the fundamental properties of fluids, including viscosity, Newtonian and non-Newtonian rheology, and viscoelasticity [SO1].

2. Analyze microscopic continuum fluid mechanics where flow is governed by the continuity equation and Navier-Stokes equation (differential forms of conservation equations). Evaluate a problem and arrive at reasonable approximations to put the equations in a more soluble form [SO1].

3. Analyze systems using macroscopic fluid mechanics, using the integral form of the conservation equations (Bernoulli's equation) [SO1,SO3].

4. Identify the relevant parameters that govern a fluid system and use dimensional analysis to identify the fundamental variables that define flow [SO1].

5. Evaluate pressure distributions in a static fluid, taking account of hydrostatic pressure, buoyancy force, and interfacial tension (Laplace pressure and capillary action) [SO1].

6. Identify conditions under which flows are turbulent and derive equations that approximate its properties (time averages and fluctuations). Compare turbulent flow with those of laminar flow [SO1].

DEPARTMENT OF MATHEMATICS
Course Objective & Outcomes

Subject: Graph Theory   **Class: M.Sc. Maths 4th Sem.**
Course Objective

The objectives of this course are to
1. Introduce the concepts of Graph and their different types as well as the isomorphism between them.

2. Introduce the classes of Eulerian and Hamiltonian graphs, trees and weighted graphs.

3. Illustrate how to find minimal walks in graphs.

4. Introduce vertex and edge colourings of graphs.

5. Find out the different methods of searching tree.

Course Outcomes

After the completion of the course, Students will be able to
1. Understand the theoretical base of the subject.

2. Identify different types of the graphs and be able to apply different operations on them.

3. Identify Eulerian and Hamiltonian graphs.

4. Apply special algorithms to find minimal walks in weighted graphs.

5. Apply special algorithms to find spanning trees in graphs.

6. Find chromatic numbers and be able to find out planer graphs.

DEPARTMENT OF MATHEMATICS

Course Objective & Outcomes

Subject: Information and Communication Technology   **Class: M.Sc. Maths 4th Sem.**

Course Objective

This paper's scope is to propose one possible set of objectives that could realize above defined aim. For each objective a set of applications, change drivers, requirements and possible leaders will be identified.

Education processes differ among themselves because of the subject of Course, required Course outcomes, previous knowledge, Course styles, culture, industry and many other factors. On the other hand, ICT can be used in a variety of ways in any traditional or new activity.

These two factors combined derive numerous activities in educational process in which ICT is or can be implemented. In order to streamline them and to try to identify some common points and shared resources, it is proposed to group them in three sets of objectives:

1. Support functions: administrative, technical, and supportive functions.

2. Course assistance: assistance and support for Course and teaching,

3. New Course: new teaching and Course methods, techniques, and tools.

Course Outcomes

After the completion of the course, Students will be able to

1. understand the meaning of all the terms highlighted in the text

2. demonstrate an awareness of the main processes in an ICT system (sending, receiving, storing, retrieving, manipulating, conveying)

3. demonstrate an awareness of some of the hardware, software and communication components used in ICT systems

4. use a system map or a block diagram to identify the components of an ICT system

Name of the program: Master of Commerce (M.Com.)

Programme Outcomes

PURPOSE OF THE COURSE:

The commerce stream has witnessed a sea change over the past decades, with a range of specialisations and career options emerging in recent years. Commerce education is specialisation to develop the required knowledge, skills and attitudes for the successful handling of trade, commerce and industry.M.Com is the most exalted two year full time postgraduate programme in commerce. The 2-year course delves deeper into the functioning of the economy, capital, revenue, trade, taxes, etc. taught in B.Com.The course aims at providing specialization to the students in the field of Finance and Marketing. The course provides an extreme and rigorous base for teaching, research and allied business administration. The programme is well received in the industry and for years had been serving the needs of managerial cadre. The course serves the needs of academics and prepares students for research and teaching.

PROGRAMME OBJECTIVES:

The aim of this Programme is to develop Commerce professionals with specialised skills and applied competencies in theoretical and practical knowledge of Finance and Marketing that will cater the contemporary needs of industry and academia by providing student-centric learning ambience backed with critical thinking and problem solving capabilities. The main objective of this Programme is to train the student to develop conceptual, applied and research skills as well as competencies required for effective problem solving and right decision making in routine and special activities relevant to financial management, security market transactions, corporate governance practices, and marketing management of a business. The Programme will enable students:

• To acquaint with conventional as well as contemporary areas in the discipline ofCommerce.

• To well versed in national as well as international trends.

• For conducting business, accounting and research practices.

 • To understand role ofregulatory bodies in corporate and financial sectors.

SKILLS:

The students after completing the program should inculcate the following skills:

• The techniques of managing thebusiness with special focus on marketing and finance.

• Application oriented research through research forbusiness decisions.

• Effective use of Statistical methods for analysis of business data.

• Adopt a suitable corporate tax planning and management for the growth of business within the legal framework.

• Investment and portfolio management skill to examine different investment schemes with respect to risk and return and to construct optimum portfolio.

• Adopt a reflective approach to personal development and embrace thephilosophy of continual professional development.

• Plan and undertake independent research in a chosen discipline.

COURSESOUTCOME

Coursename	CourseObjectivesandOutcomes
Accounting and Finance: Financial Management, Accounting theory, Corporate Tax Planning, Management of Financial Services, Advanced Cost Accounting, Accounting for Managerial Decisions and Cost Management	• Know the developments in accounting theory, financial reporting and disclosure practices at the national and international level. • Explain terms such as incomes, revenues, expense, losses, and gains. • Computetaxliabilityofacompany. • Considertaximplicationswhiletaking business decisions. • Assessimpactoftaxationontradeoffoffinancialdecisions. • Computetaxliabilityofacompany. • Considertaximplicationswhiletaking business decisions. • Assessimpactoftaxationontradeoffoffinancialdecisions.
Management Group MC&OB, Portfolio Management, Investment Management and Strategic Management	• It provides the understanding about organisationalcultureanddevelopatechniqueto create a sound culture for the organisation • Theyunderstand theroleofthePower and politics in the organisation and develop the rational politicalbehaviours • To describe the role of strategic management and the strategic management process. • Tounderstandtheimportanceofstrategy

	formulationandstrategyimplementation. • Thestudentwillalsobeabletoappreciatethe principles, theories and models of corporate governance.
Business Research Methods and Statistical Technique	• To develop logical reasoning ability in decision making. • To apply various parametric and non- parametric tests in the real life case situation. • To make decisions under uncertain business situations. • To bring out clearly the importance of statistics in solving different research problems. • Thiscourseenablesthestudentstoknow the scientific approach to decision makingwhensolvingbusinessproblems. • Determiningthemostprofitable distribution pattern.
Human Resource Management	• Build an understanding, perspective and appreciationforHRDasdiscipline,process,and activity and come to know the competitive environment. • Studentscometoknowaftercompleting thisaboutthevariousaspectsofthepersonalas well as professional life and try to balance between these both. • Developthedecisionmakingskillsin different situations and enhances the skills regarding specific work. • Developthecompetencymappingskills, self,peers,superiorsandsubordinateappraisal skills.

DEPARTMENT OF CHEMISTRY
PROGRAM NAME-M.Sc (PASS COURSE) CHEMISTRY

Program Outcomes

1: Creative Thinking: Students will be able to think creatively (divergently and convergent) to propose novel ideas in explaining facts and figures or providing new solution to the problems in chemistry. The skills of observations and drawing logical inferences from the scientific experiments will also be developed.

2: Interdisciplinary Approach: Students will realize how developments in any science subject helps in the development of other science subjects and vice-versa and how interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments. Also the knowledge of subjects in other faculties such as humanities, performing arts, social sciences etc. can have greatly and effectively influence which inspires in evolving new scientific theories and inventions.

3: Personality Development: Students will imbibe ethical, moral and social values in personal and social life leading to highly cultured and civilized personality. They will also realize that pursuit of knowledge is a lifelong activity and in combination with untiring efforts and positive attitude and other necessary qualities leads towards a successful life.

4 Skills in research and industrial field: Students will build a scientific temper and will be able to learn the necessary skills to succeed in research or industrial field. In addition they will acquire the skills in handling scientific instruments, planning and performing in laboratory experiments.

5 Communication Skills: Students will develop various communication skills such as reading, listening, speaking, etc., which we will help in expressing ideas and views clearly and effectively.

6 Environmental monitoring: Students will be able to understand the **e**nvironmental issues Global warming, Climate change, Acid rain, Ozone depletion and will create awareness in society .

COURSE OUTCOMES

COURSE NAME: LIGAND FIELD THEORY
CLASS - M.Sc. Chemistry SEMESTER – I
Objectives: This course aims at acquainting students to concept of Crystal field and Ligand field theory. The symmetry, magnetic properties and spatial arrangements of molecules are studied in good detail.
Programme Learning Outcomes:
A. Knowledge and Understanding:

Students will be able to analyse the point group of chemical molecules. They will learn the relation of structure to magnetic properties.
B. Intellectual (Cognitive and Analytical) Skills:
Students will be able to understand the structure and arrangement of ligands around different oxidation state of metals.
C. Practical Skills

Students will learn the theoretical basis of stability of different electronic states.
D. Transferable Skills

Students will be able to make a correlation between structure and stability of different metal compounds.

COURSE NAME: ORGANIC REACTION MECHANISM-I
CLASS - M.Sc CHEMISTRY SEMESTER – I
Objectives of the Course ;
This course aims at acquainting students with the knowledge of organic reaction mechanisms of aromatic electrophilic substitution and aromatic nucleophilic substitution reactions. It provides an introduction to the synthesis of complex organic molecules. Transformations for C-X and C-C bond-formation, functional group reactivity, chemoselectivity, regioselectivity, and the strategy of multistep synthesis will be the core topics that are covered.
Program Learning Outcomes:
The aim is to help the students to study in detail the basics of very important substitution reactions in organic chemistry. Along with the revision of basic concepts of electrophilic and nucleophilic reactions, further applications in advanced fields of organic chemistry are aimed to be discussed. Concepts include strategy/retrosynthesis, advanced aromatic chemistry, protecting groups, stereochemistry, enolates and other carbonyl chemistry, alkene synthesis, reduction/oxidation (introductory), heterocycles, cross-coupling reactions and other modern methods of synthesis.

COURSE NAME: PHYSICAL CHEMISTRY – THERMODYNAMICS
CLASS - M.Sc CHEMISTRY SEMESTER – I
Objectives of the Course :
1. This course aims at to accustom the students the basic concepts of thermodynamics along with the Non-ideal systems including the basic Debye Huckel theory.

2.Students will be guided to apply phase rule to various systems (2 and 3 component systems) and introduction to the basic concepts of non equilibrium thermodynamics along with the applications is another purpose.
Program Learning Outcomes:
Knowledge and Understanding:
Students will explain statistical chemistry and thermodynamics as logical consequences of the postulates of statistical mechanics;
Intellectual (Cognitive and Analytical) Skills:
Apply the principles of statistical mechanics to selected problems;
Practical Skills
Apply techniques from statistical mechanics to a range of situations;
Transferable Skills
Use the tools, methodologies, language and conventions of chemistry to test and communicate ideas and explanations.
COURSE NAME: SPECTROSCOPY A: TECHNIQUES FOR STRUCTURE ELUCIDATION OF ORGANIC COMPOUNDS
CLASS - M.SC CHEMISTRY SEMESTER – I
Objectives of the Course:
Modern theoretical and experimental methods used to study problems of molecular structure and bonding; emphasis on spectroscopic techniques.
Program Learning Outcomes:
The student will learn :

1. To perform rigorous characterization of their compound using 1- and 2-dimensional NMR techniques (1 H and 13C),

2. Mass spectrometry, infrared spectroscopy and UV-Vis spectroscopy.

COURSE NAME: COMPUTER FOR CHEMISTS – THEORY

CLASS - M.SC CHEMISTRY SEMESTER – I

Objective of the Course:

This course aims at acquainting students with learn various concepts and basic techniques essential for conduct of practical in computers

Course Outcomes:

A. Knowledge and understanding:

Basic understanding about Computer

Understanding the basic concept associated with C- Language and program designing

Students will develop different programs, Run and Retrieve results.

B. Intellectual (Cognitive/Analytical) skills:

Design program in C-language on the basis of given query.

Use of data structures in C

C. Practical skills:

Use of standard input (scanf) and standard output (printf) functions

Use of variables, keywords, arithmetic operators, relational operators, logical operators, unary operators, assignment operator, arithmetic assignment operators and conditional operator.

Use of library functions and user defined functions.

Use of Looping Statement (like while, do-while, for loops) and branching statements (like if, if-then, if-then-else).

Create functions and to show different calls: Call by reference, Call by value.

In future student may be able to develop a big program(s)(Software) which may simulate the behavior of the chemical reaction/processes/events

COURSE NAME: ORGANOMETALLICS CHEMISTRY

CLASS - M.Sc CHEMISTRY SEMESTER – II

Objectives of the Course:

This course aims at acquainting students to complete knowledge of catalytic and industrial uses of organometallic compounds.

Course Outcomes:

A. Knowledge and Understanding:

Students will be able to understand the role of coordination number, coordination geometry and oxidation state of metal in catalytic cycles.

B. Intellectual (Cognitive and Analytical) Skills:

Students will be able to study the wide variety of organometallic compounds and the choice of hapticity in different conditions.

C. Practical Skills

Students will learn to go through some important emerging compounds especially multi-decker sandwich compounds.

D. Transferable Skills

Students will be able to study the reactions at coordinated ligands.

COURSE NAME: ORGANIC REACTION MECHANISM -II
CLASS - M.Sc CHEMISTRY SEMESTER – II
Objectives of the Course:
• The aim of the course is to provide the vast knowledge to the Students regarding various topics related to Organic Chemistry such as Free Radical reactions, Elimination Reactions and their Mechanisms, Addition to C-C and C- Hetero Multiple bonds etc.

Course Outcomes:
• The aim is to provide vast knowledge of Organic Reactions and their mechanisms along with their Stereo-chemical aspects.

COURSE NAME: PHYSICAL CHEMISTRY – QUANTUM CHEMISTRY
CLASS - M.Sc CHEMISTRY SEMESTER – II
Objectives of the Course ;
This course aims at to accustom the students the principles and applications of quantum mechanics in detail with further introduction of different types of operators later on used in the solution of conjugated systems.
Course Outcomes:
The aim is to help the students to revise the basic principles of quantum mechanics. Introduction to new operators such as Hermitian and Hamiltonian and their use in the solution of Hydrogen and Hydrogen like atoms.
Students will also be able to apply quantum postulates in solution of particles in one, two and three dimensional boxes.

COURSE NAME: REACTION MECHANISMS AND METAL CLUSTERS
CLASS - M.Sc CHEMISTRY SEMESTER – II
Objectives of the Course:
This course aims at acquainting students to reaction mechanisms of Inorganic complex ions. Inorganic reaction mechanisms are point of study due to variable coordination number and oxidation states of metal ions.
Programme Learning Outcomes:
A. Knowledge and Understanding:

Students will be able to interpret the different mechanisms of reactions based on rate constant data available.
B. Intellectual (Cognitive and Analytical) Skills:

Students will be able to predict whether reaction follows outer sphere path or inner sphere path in the reaction mechanisms under study.
C. Practical Skills

Students will learn to understand the preference of a metal ion to undergoing a particular pathway of reaction mechanism.
D. Transferable Skills

Students will be able to judge the relative stability of products in variety of reactions.

COURSE NAME: SPECTROSCOPY B: TECHNIQUES FOR STRUCTURE ELUCIDATION OF INORGANIC COMPOUNDS
CLASS - M.Sc CHEMISTRY SEMESTER – II

Objectives of the Course:
This course aims at acquainting students with techniques that measure the elemental composition at microscopic level, electronic state, chemical state of matter, binding energy, empirical formula and more of surface region of solids

Course Outcomes:
(Knowledge and Understanding of the fundamental concepts, Learning Outcomes:
Students will know how to define the various electronic energy levels in atoms and molecules ,excitations & ejection of electrons, understand and explain the basic concepts associated with Symmetry & molecular orbitals, Dissociation, Predissociation, change of shape on excitation.

COURSE NAME: MATHEMATICS FOR CHEMISTS
CLASS - M.Sc. CHEMISTRY SEMESTER – II
Course Objectives:
This course introduces the math content to chemistry students. It has been designed to compliment lecture material with particular focus on the application of math's in chemistry.

Course Outcomes:
A. Knowledge and Understanding:

Students will be able to know
1.Matrix and its types, Determinant and its properties.
2.Define the derivative and integral of the trigonometric, logarithmic and inverse trigonometric and rational functions
3.Recognize the different techniques of integration (by parts, trigonometric integrals, partial fractions).
4.definite integrals

B. Intellectual(cognitive/Analytical) skills:
1.Calculate the rank of matrix
2.Determine derivatives of function using different techniques.
3.Evaluate integrals by different methods of integration.
4.Calculate the areas of plane regions.

C. Practical skills:
1. Have the ability to carry out complex calculations orally and mentally.
2. Present mathematics to others in oral and written form clearly and in a well organized manner.

COURSE NAME: BIOLOGY FOR CHEMISTS
CLASS - M.Sc CHEMISTRY SEMESTER – II
Course Name: **Course–XIII BIOLOGY FOR CHEMISTS**
Class: M Sc. (Chemistry)
Semester - II
Objectives of the course:
1. To study the structure and organization of cell membrane and cell wall, process of membrane transport and membrane models.

2. To understand the DNA structural organization and biochemical composition of genetic material.

3. To understand the vascular tissues, structure of woods and anomalous secondary growth, anatomical variations and tissue systems in plant shoot system.

4. To know various tissue systems and understand the normal and anomalous secondary growth in plants

Course Outcomes:
(a) Knowledge and Understanding: Student will know about whittaker system of classification, plant and animal tissue systems, genetic principles, structure and functional aspects of biomolecules.

(b) Intellectual Cognitive /Analytical skills: Students will be able to understand the basic principles of biology and biomolecules.

(c) Transferable skills: communicate and interact about the biological principles applied to chemistry.
COURSE NAME: INORGANIC CHEMISTRY-II
CLASS - M.Sc CHEMISTRY SEMESTER – III
Objectives of the Course:
This course aims at acquainting students to concept of bio-inorganic chemistry. Due to ever increasing role of metals in medicine, these topics are of good concern in chemistry.
Course Outcomes:
A. Knowledge and Understanding:

Students will be able to analyse the relation between oxidation state of metals and their biological behaviour.
B. Intellectual (Cognitive and Analytical) Skills:

Students will be able to understand the role of metals and chemicals in biological systems.
C. Practical Skills

Students will learn the use of porphyrins of different metal ions in biological systems.
D. Transferable Skills

Students will be able to make a correlation between enzymatic functions and metals.
COURSE NAME: ORGANIC SYNTHESIS
CLASS - M.Sc CHEMISTRY SEMESTER – III
Objectives of the Course:
This course aims at acquainting students to concept of synthesis in organic chemistry. This will cover a wide area of synthesis including polynuclear compounds, heterocyclic compounds, reagents in organic synthesis,and basic concepts of supramolecular chemistry.
Course Outcomes:

A. Knowledge and Understanding:
Students will be able to analyse the difference in the basic types of synthetic approaches.
Intellectual (Cognitive and Analytical) Skills:
Students will be able to understand the role of reagents and catalysts in organic synthesis.
Transferable Skills
Students will be able to make a correlation between supramolecular and normal organic synthesis.
COURSE NAME: SURFACE AND POLYMER CHEMISTRY
CLASS - M.Sc CHEMISTRY SEMESTER – III
Objectives of the Course ;
This course aims at acquainting the students the knowledge of the basic concepts of polymers. A complete packet of knowledge of the kinetics, thermodynamics of polymerization, various techniques

of determination of molecular mass and applications of polymers in various fields of life will be provided to the students.

Various factors affecting the structure and properties of polymers will be discussed in detail which makes students aware of the things to be considered while preparing polymers commercially.

Program Learning Outcomes:

This course will equip the students with the necessary detailed chemical knowledge concerning the chemistry of macromolecules.

This will also help to develop skills to interpret and explain various factors affecting structure and property of macromolecules. The students will be able to pursue their career objectives in higher education, scientific research and teaching.

COURSE NAME: ELECTROCHEMISTRY AND CHEMICAL DYNAMICS
CLASS - M.Sc CHEMISTRY SEMESTER – III

Objectives of the Course ;

1.This course aims at acquainting students with the knowledge of various concepts and theories related to physical chemistry. The present syllabus has been framed as per the latest UGC guidelines and recent research trends in the subject.

2.To equip students with necessary chemical knowledge concerning the concept of reaction rates and electro analytical techniques and to bring forth the importance of academic and laboratory skill for the students.

Program Learning Outcomes:

Learning Outcomes(Knowledge and Understanding):

Students will understand the fundamentals of Chemical dynamics and Voltammetry and their applications.

B. Intellectual(Cognitive/ Analytical) Skills:

Students will be able to develop the academic and laboratory skills.

C. Practical Skills

Students will be able to explore new areas of research in both chemistry and allied fields of science and technology.

D.TransferableSkills :

Students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.

COURSE NAME: PHOTOCHEMISTRY AND PERICYCLIC REACTIONS
CLASS - M.Sc CHEMISTRY SEMESTER – III

Objectives of the Course ;

This course aims at acquainting students with the detailed knowledge of pericyclic as well as photochemical reactions. Starting from the very basic ideas, and moving towards the classification using different approaches, electrocyclic and sigmatropic rearrangements will be discussed.

Program learning outcomes:

Students will learn the basic diiference between photochemical and thermal reactions. Based on the different principles of photochemistry, they will be able to solve different pratical problems. Further some well known named reactions in this field will add on to the knowledge of the students.

COURSE NAME: ADVANCED INORGANIC CHEMISTRY
CLASS - M.Sc CHEMISTRY SEMESTER – IV

Objectives of the Course:

This course aims at acquainting students to the knowledge of transition metal compounds with bonds to hydrogen. Such compounds have wide synthetic applications from study point of view.

Course Outcomes:

A. Knowledge and Understanding:

Students will be able to characterise theoretically the type of bond of hydrogen with the transition metal.

B. Intellectual (Cognitive and Analytical) Skills:

Students will be able to understand the reducing properties of compounds and the chemical reactions.

C. Practical Skills

Students will learn to make difference of terminal and bridging hydrogen bonds.

D. Transferable Skills

Students will be able to think and devise new synthetic applications of such compounds.

COURSE NAME: NATURAL PRODUCTS
CLASS - M.Sc CHEMISTRY SEMESTER – IV
Objectives of the Course:

1. Recognize and draw particular carbohydrate structures

2. Know general structural elements of cyclic monosaccharides and disaccharides, and their implications for structure/function

3. Predict the products of condensation reactions and hydrolysis.

4. Knowledge of Sequence determination of amino acids

5. Familiarity with Enzymes, Kinetics, inhibition mechanism.

6. Know general structure of Nucleosides, nucleotides, DNA, RNA structure etc.

Course Outcomes:

➢ Students will able to Recognize and draw particular carbohydrate structures, general of cyclic monosaccharides and disaccharides, and their implications for structure/function.

➢ Students will able to predict the products of condensation reactions and hydrolysis.

➢ Students will capable of determining the Sequence of amino acids

Students will be Familiar with Enzymes, Kinetics, inhibition mechanism and structure of Nucleosides, nucleotides, DNA, RNA structure etc.

COURSE NAME: CHEMISTRY OF MATERIALS
CLASS - M.Sc CHEMISTRY SEMESTER – IV
Objectives of the Course ;

• This course aims at acquainting the students the knowledge of the factors affecting glass formation various thermodynamic, kinetic factors controlling the designing of glass materials, important compositions and different properties.

• A complete packet of knowledge of the preparation of smart materials and their applications as nano drug delivery agents and energy storage materials.

Program Learning Outcomes:

• The aim is to help the students to understand the basics of glass formation from different materials along with different kinetic and thermodynamic aspects discussing the applications also. Smart materials will be introduced while discussing different electrical and magnetic properties.

Program Specific Outcomes

1. Students will understand the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life. They will also be able to acquire knowledge about the fundamentals and applications of chemical and scientific theories.

2. Students will find that every branch of science and technology is related to Chemistry. They will develop scientific outlook not only with respect to science subjects but also in all aspects related to life.

3. Students will become familiar with the different branches of chemistry like analytical, organic, inorganic, physical, environmental, polymer and biochemistry. They will also learn to apply appropriate techniques for the qualitative and quantitative analysis of chemicals in laboratories and in industries.

4. The student will acquire knowledge of Chemical Thermodynamics, Kinetics, Electrochemistry, Atomic Structure, Organic Chemistry, Spectroscopy and Skill in Industrial Chemistry.

5. Viewing chemistry as a tool the developing mind and critical attitude and the faculty of logical reasoning that is prepared to serve in diverse fields.

6. Students will gain a thorough Knowledge in the subject to be able to work in projects at different research as well as academic institutions.

Govt. College, Narnaul

POs, PSOs, COs of Syllabus offered in Session: 2016-17

Program Name: B.Sc. (Pass Course) Medical, Non-Medical & Computer Science

Program Outcomes (PO): Common for B.Sc. (Pass Course) Medical, Non-Medical& Computer Science

The Three-year B.Sc. Program at Government College, Narnaul offers courses in the subjects of Physics, Chemistry, Mathematics, Zoology, Geology, Botany, Computer Science. All of these subjects are designed with a specific aim of introducing students to various learning methods thereby exposing them to several laboratory techniques in handling equipment, critical thinking and being independent as well as team learner. Under this program the students learn several approaches of data analysis and become confident in using computational methods to analyze and solve various problems. Although, the long term objectives of the program are quite varied as the courses taught here will be helpful in drawing many to careers that demand scientific and technical knowledge and strong logical reasoning abilities. The following are the key ProgramOutcomes that highlight important areas in which the students are expected to gain proficiency at the end of the tenure of their undergraduate program.

PO-1: The program enables the learners to demonstrate, solve and understanding of major concepts in different disciplines of Non-Medical Medical, Computer Science.

PO-2: The learners can think scientifically and draw a logical conclusion and solve problems independently.

PO-3: It will employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of the experiments.

PO-4: By the use of modern techniques &lab equipment they will have practical knowledge about courses opted.

PO-5: Students become eligible to join various positions like managers, scientific officers, medical representatives etc. in private sector as well as government sector.

PO-6: Students can join Post Graduate programs in Physics, Chemistry, Mathematics, Geology, Botany, Zoology, Computer Science etc.

PO-7: Program will develop empathy and love towards the biota.

Program Specific Outcomes & Course Outcomes are described subject-wise for all subjects offered in the B.Sc. Program are attached herewith.

Principal
Govt. College
Narnaul

Subject: Botany in B.Sc. Program

Program Specific Outcomes (PSO's)

PSO1. Critical evaluation of ideas and arguments by collecting relevant information about the plants, so as to recognize their position in the classification systems and at phylogenetic level.

PSO2. Students will be able to access the primary literature, identify relevant works for a particular topic, and evaluate the scientific content of these works.

PSO3. Students will be able to compare and contrast the characteristics of the different groups of plants such as algae, fungi, bryophytes, pteridophytes, gymnosperms and angiosperms.

PSO4. Students will be able to use the evidence of comparative biology to explain how the theory of evolution offers the only scientific explanation for the unity and diversity of life on earth.

PSO5. Students will be able to explain how Plants function at gene, genome, cellular and tissue level,

PSO6. Students will be will be able to relate the physical features of the environment to the structure of populations, communities, and ecosystems.

PSO7. Students will be able to conceive the idea of artificial propagation of plants via vegetative methods and to find a livelihood via establishing miniature plant nurseries.

Course Outcome (CO's)

Core course 1 Code: BOT1.1
METHODOLOGY OF SCIENCE AND AN INTRODUCTION TO BOTANY
(Theory 36 hrs; Practical 36 hrs; Credits 2 + 1)

CO 1– To understand the universal nature of science
CO 2– To demonstrate the use of scientific method
CO 3- To lay a strong foundation to the study in Botany
CO 4 - Impart an insight into the different types of classifications in the living kingdom.
CO 5- Appreciate the world of organisms and its course of evolution and diversity.
CO 6- Develop basic skills to study Botany in detail

Core course 2 Code: BOT1.2
MICROBIOLOGY, MYCOLOGY AND PLANT PATHOLOGY
(Theory 36 hrs; Practical 36 hrs; Credits 2 + 1)

CO 1- Understand the world of microbes, fungi and lichens
CO 2- Appreciate the adaptive strategies of the microbes, fungi and lichens
CO 3- To study the economic and pathological importance of microorganisms

Core course 3 Code: BOT2.1
PHYCOLOGY AND BRYOLOGY
(Theory 54 hrs; Practical 36 hrs; Credits 3 + 1)

CO1- To study the evolutionary importance of Algae as progenitors of land plants
CO2- Understand the unique and general features Algae and Bryophytes and familiarize it
CO3- To study the external morphology, internal structure and reproduction of different types of Algae and Bryophytes
CO4- Realize the application of Phycology in different fields

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Core course 4 Code: BOT2.2
PTERIDOLOGY, GYMNOSPERMS AND PALEOBOTANY
(Theory 54 hrs; Practical 36 hrs; Credits 3 + 1)

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CO1- Understand the diversity in habits, habitats and organization of various groups of plants.
CO2- To impart an insight into the modern classifications in lower forms of plants.
CO3- Understand the evolutionary trends in Pteridophytes and Gymnosperms.
CO4- Study the anatomical variations in vascular plants.
CO5- Understand the significance of Paleobotany and its applications.

<div align="center">

Core course 5 Code: BOT3.1
ANATOMY, REPRODUCTIVE BOTANY AND MICROTECHNIQUE
(Theory 54 hrs; Practical 36 hrs; Credits 3 + 1)

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CO1- Imparting an insight into the internal structure and reproduction of the most evolved group of plants, the Angiosperm.
CO2- Understand the individual cells and also tissues simultaneously
CO3- Understand the structural adaptations in plants growing in different environment.
CO4- Understand the morphology and development of reproductive parts.
CO5- Get an insight in to the fruit and seed development.
CO6- Understand the techniques used to preserve and study plant materials.

<div align="center">

Core course 6 Code: BOT3.2
RESEARCH METHODOLOGY, BIOPHYSICS AND BIOSTATISTICS
Theory: 54 hrs; Practical: 45 hrs; Credits: 3 + 1)

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CO1- To equip the students to conduct independent research and prepare research reports.
CO2- To make the students acquaint with different tools and techniques used in research work.
CO3- To equip the students with basic computer skills necessary for conducting research.
CO4- To enable the students to have enough numerical skills necessary to carry out research.

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Core course 7 Code: BOT4.1
PLANT PHYSIOLOGY AND BIOCHEMISTRY
(Theory 54 hrs; Practical 45 hrs; Credits 3 + 1)

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CO1- Acquire basic knowledge needed for proper understanding of plant functioning.
CO2- Familiarize with the basic skills and techniques related to plant physiology.
CO3- Understand the role, structure and importance of the bio molecules associated with plant life.

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Core course 8 Code: BOT4.2
ENVIRONMENTAL SCIENCE AND HUMAN RIGHTS
(Theory 54 hrs; Practical 36 hrs; Credits 3 + 1)

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CO1- Acquaint the student with the significance of Environmental Science.

CO2-Make the students aware about the extent of the total biodiversity and the importance of their conservation.

CO3- Help the student to design novel mechanisms for the sustainable utilization of natural resources.

CO4 -Enable the students to understand the structure and function of the ecosystems.

CO5- Enable the students to understand various kinds of pollution in the environment, their impacts on the ecosystem and their control measures

CO6- Make the students aware about various environmental laws in India and the role of various movements in the protection of nature and natural resources.

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Core course 9 Code: BOT5.1
GENETICS, PLANT BREEDING AND HORTICULTURE
(Theory 54 hrs; Practical 45 hrs; Credits 3 + 1)

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CO1- Imparting an insight into the principles of heredity

CO2- Understand the patterns of inheritance in different organisms

CO3- Understand the inheritance pattern of nuclear and extra nuclear genes

CO4- Understand the methods of crop improvement

CO5- Understand the importance of horticulture in human welfare

CO6- Develop skill in gardening technique among students

<div align="center">

Core course 10 Code: BOT5.2
CELL AND MOLECULAR BIOLOGY
(Theory 54 hrs; Practical 36 hrs; Credits 3 + 1)

</div>

CO1- Understand the ultra structure and functioning of cell in the sub-microscopic and molecular level.

CO2- Get an idea of origin, concept of continuity and complexity of life activities.

CO3- Familiarization of life processes.

CO4- Understand the basic and scientific aspect of diversity.

CO5- Understand the cytological aspects of growth and development.

CO6- Understand DNA as the basis of heredity and variation.

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Core course 11 Code: BOT6.1
ANGIOSPERM MORPHOLOGY, TAXONOMY AND ECONOMIC BOTANY
(Theory 72 hrs; Practical 45 hrs; Credits 3 + 1)

</div>

CO1- Acquaint with the aims, objectives and significance of taxonomy.

CO2- Identify the common species of plants growing in Kerala and their systematic position.

CO3- Develop inductive and deductive reasoning ability.

CO4- Acquaint with the basic technique in the preparation of herbarium.

CO5- Familiarizing with the plants having immense economic importance.

Core course 12 Code: BOT6.2 BIOTECHNOLOGY AND BIOINFORMATICS
          (Theory 54 hrs; Practical 36 hrs; Credits 3 + 1)

CO1- Understand the current developments in the field of Biotechnology and Bioinformatics.

CO2- Equip the students to carry out plant tissue culture.

CO3-Introduce the vast repositories of biological data knowledge.

CO4- Equip to access and analyze the data available in the databases.

Programme elective course 2 Code: BOT1,2,3,4
PLANT GENETIC RESOURCES MANAGEMENT
(Theory 54 hours; Credit 3)

CO1- Acquaint the student with the history and evolution of crop plants, and their diversity.
CO2- Familiarize the student with the available plant genetic wealth and the measures adopted for the conservation of these resources.
CO3- Help the student to identify the crop plants and their wild relatives.
CO4- Help the student to explore the potentialities of various underutilized plants to project as the future food prospects.
CO5- Understand the significance of modern technology to locate the distribution of endangered species.

Complementary course 1 Code: BOT01
CRYPTOGAMS, GYMNOSPERMS AND PLANT PATHOLOGY
(Theory 36 hrs; Practical 36 hrs; Credits 2 + 1)

CO1- Acquire fundamental knowledge in plant science and to make the student to understand that Botany is an integral part of the human life and developments.
CO2- Foster and encourage an attitude of curiosity, appreciation and enquiry of various life forms of plants.
CO3- Understand the identifying characters of the different types included in the syllabus.
CO4-Understand the diversity of plants with respect to Algae, Fungi, Lichens, Bryophytes, Pteridophytes and Gymnosperms.

Complementary course 2 Code: BOT02
PLANT PHYSIOLOGY
(Theory 36 hrs; Practical 36 hrs; Credits 2 + 1)

CO1- Make the students realize the importance of all physiological processes which take place in plants.
CO2- Understand the mechanism of various physiological processes related to plant life.

Complementary course 3 Code: BOT03
ANGIOSPERM TAXONOMY AND ECONOMIC BOTANY
(Theory 54 hrs; Practical 36 hrs; Credits 3 + 1)

CO1- Acquaint the student with the objectives and components of Taxonomy.
CO2- Help the student to understand the systems of classification of angiosperms.
CO3- Help the student to identify the common angiosperm species of Kerala.
CO4- Familiarize the student with plants of immense economic importance.

Complementary course 4 Code: BOT04
ANATOMY AND APPLIED BOTANY
(Theory 54 hrs; Practical 36 hrs; Credits 3 + 1)

CO1- Understand different types of plant tissues.
CO2- Understand the internal structure of different plant organs with reference to their functions.
CO3- Understand the process of normal and anomalous secondary thickening in plants.
CO4- Know the morphological and anatomical adaptations of plants growing in different habitats.
CO5- Understand how botanical knowledge could be applied for crop improvement.

Subject: Zoology under B.Sc. Pass Course

Program Specific Outcomes:

PSO1. Understand the nature and basic concepts of cell biology, genetics, taxonomy, physiology, biochemistry, ecology, evolutionary biology, developmental biology and applied and economic zoology.

PSO2. Analyse the relationships among animals, plants and microbes.

PSO3. Perform procedures as per laboratory standards in the areas of Taxonomy, Physiology, Ecology, Cell biology, Genetics, Applied Zoology, Clinical science, tools and techniques of Zoology, Toxicology, Entomology, Nematology, Sericulture, Biochemistry, Fish biology, Animal biotechnology.

PSO4. Understand the applications of biological sciences in Apiculture, Aquaculture, Sericulture, Animal Husbandry, Poultry Farm.

PSO5. Gains knowledge about effective communication and skills of problem solving methods.

PSO6. Contributes the knowledge for Nation building.

Course Outcomes:

Animal Diversity – Invertebrates & Vertebrates

CO1. Describe general taxonomic rules on animal classification.

CO2. Classify Phylum Protozoa to Echinodermata with taxonomic keys.

CO3. Imparts conceptual knowledge of vertebrates, their adaptations and associations in relation to their environment.

CO4. Classify phylum Protochordates to Mammalia.

CO5. Complex Vertebrate interactions.

Comparative Anatomy and Developmental Biology of Vertebrates:

CO1. Comparative knowledge of Integumentary, Digestive, Circulatory, Urinogenital, Nervous and Skeletal system of various classes of vertebrates.

CO2. Basic concepts of developmental biology.

CO3. Concept of hormonal regulation of reproduction.

Physiology and Biochemistry:

CO1. Students gain fundamental knowledge of animal physiology

CO2. Seeks to understand the mechanisms that work to keep the animal body alive and functioning.

CO3. Interactions and interdependence of physiological and biochemical processes.

CO4. Students are taught the detailed concepts of digestion, respiration, excretion, the functioning of nerves and muscles, cardiovascular system, endocrine system and reproductive system.

CO5. Physiological and biochemical understanding through scientific enquiry into the nature of mechanical, physical, and biochemical functions of animals, their organs, and the cells of which they are composed.

CO6. Students learn the concepts of endocrine systems and homeostasis.

Genetics and Evolutionary Biology:

CO1. Division aspects of basic unit of life i.e. cell.

CO2. Mendelian and non-mandilion inheritance.

CO3. Understanding of basic concepts of genetics and laws of inheritance.

CO3. Concept behind genetic disorder, gene mutations- various causes associated with inborn errors of metabolism.

CO4. Theories of evolution and knowledge of evolution of species CO5. Knowledge about

eras and population genetics.

CO6. Understanding of genetic basis of evolution, human karyotyping and speciation **Applied Zoology**

CO1. Understands concepts of fisheries, fishing tools and site selection.

CO2. Understands about parasites and epidemiology of parasites in human and animals.

CO3. Use of recombinant DNA technology in genetic manipulations and in a variety of industrial processes.

CO4. Understanding of in vitro culturing of organisms and production of transgenic animals.

CO5. Types of breeds in animal farming and poultry farming along with their management.

CO6. Aqua culture systems, induced breeding techniques and post harvesting techniques.

Insect Vectors and Diseases

CO1. Imparts knowledge of non-beneficial insects.

CO2 Interaction of insect vectors with humans and spread of diseases.

CO3. Managements and control of vector and vector born diseases.

Apiculture:

CO1. Knowledge about honey bee and bee rearing.

CO2. Knowing beehives, bee keeping equipment, methods of extraction of honey and processing of honey.

CO3. Bee enemies and diseases.

CO4. Bee economy and entrepreneurship in apiculture

Sericulture:

CO1. Gives knowledge of silk worm rearing.

CO2. Mulberry cultivation.

CO3. Pests and diseases associated with silk worm and mulberry.

CO4. Various process involved in silk production **Aquarium Fish Keeping:**

CO1. Provides knowledge of ornamental fish breeding which is highly professional and attractive avenue for youth.

CO2. Aquarium fish keeping, aquarium setup and accessories.

CO3. Aquarium fishes, their food and feeding.

CO4. Fish transportation and management.

CO5. Maintenance of aquarium.

Public Health and Hygiene

CO1. Knowledge about medical care, nutrition, health and major nutritional deficiency diseases.

CO2. National Health Policy, National Rural Health Mission (NRHM) and National Urban Health Mission (NUHM).

CO3. Concept of environment degradation, issues and health hazards like personal and mental hygiene, addiction etc.

CO4. General concept of communicable diseases, mechanism of pathogenesis and their control measures.

CO5. Life Style Related Non-Communicable Diseases, their causes and prevention through dietary and lifestyle modifications.

CO6. Concept of Mental Health diseases and their management.

CO7. Social health problems like smoking, alcoholism, drug dependence and their deaddiction.

Subject: Geology under B.Sc. (Medical & Non Medical) Pass Course

Sr. No	Program Specific Outcomes
PSO-1	The 1st year of Geology at UG level enables the students to understand the scope and application of Geology. It aims to provide adequate basic knowledge about General Geology, Crystallography & Mineralogy as well as Physical Geology so that an interest of learner may develop and gives them the confidence to go to the next level of learning in the subject.
PSO-2	The 2nd year curriculum enables the students to understand Geo-science through basic domains like Petrology, Optical Mineralogy and Paleontology so that learners will have the overview of all basic branches of Geology.
PSO-3	The 3rd Year of B.Sc. Geology inculcate the knowledge of applied aspects like economic Geology, Mineral Exploration and Environment Geology so that learners will be able to apply the basic geo-scientific knowledge for the better management of Earth resources.
PSO-4	After the completion of all 6 semester course in Geology the learners will gain understanding about Earth system and various processes responsible for Geo-morphological changes on the earth.
PSO-5	The learners will be able to crack the competitive examinations of UG level as well as entrance test for M.Sc. Geology in various Universities.
PSO-6	The successful candidates will be eligible for positions like mining Inspector, Scientific Officer and Sectional Officer in the related professional fields.

Course Outcomes for Geology subject under B.Sc. Geology (Medical & Non Medical) Pass Course

The courses are designed in the semester system and each semester consists 2 courses of Geology subject with the following course outcomes:

1st Semester

Course Details	Course Outcomes
Paper-101- General Geology	This course enable the students to understand the General aspects of Earth like size, shape, mass, density etc. it also emphasis on the various branches of Geology and their relationships. It will also help the students to understand the weathering of earth material and elementary idea about the basic geological structures like fold faults and unconformities.
Paper-102 Crystallography	This course provide the basic understanding about Crystallography so the learners can understand the earth material in a better manner as most of it is in crystalline form.
Paper-103 Practical	Course covers demonstration of various equipments like Brunton Compass, Clinometer and models to understand the Geological processes and structure of the Earth along with Geological Field Work.

2nd Semester

Course Details	Course Outcomes
Paper-201- Physical Geology	This course is designed to make learners well equipped with adequate knowledge of various processes and features developed by the geological action of Wind, Water, Glacier, lakes etc.
Paper-202 Mineralogy	After learning this course students will come to know the processes of formation of minerals, physical & chemical properties of minerals and uses of various minerals.
Paper- 203 Practical	Demonstration of various processes through Models and identification of Minerals in hand-specimen. The learners will be able to differentiate and identify the various minerals.

3rd Semester

Course Details	Course Outcomes
Paper-301 Petrology & Optical Mineralogy	After reading this course learners will be able to understand the processes of formation of various rock types. They will be able to identify the igneous rocks in the hand specimen and field. The will know "How to interpret the texture and structures of Igneous Rocks?".
Paper-302 Paleontology	The Paleontology course will help the student to understand the mode of preservation of fossils and Geological history of earth based on paleontological record. The course also emphasis on the morphology and geological history of particular species like trilobites, Gastropods, Lamellibranchia etc.
Paper-303 Practical and Field Work	The students of this course will be able to identify the common Igneous, Sedimentary and Metamorphic rocks in the hand specimen. They will also familiar with petrological microscope and basic optical properties on Minerals.

4th Semester

Course Details	Course Outcomes
Paper-401 Petrology & Optical Mineralogy	This course is designed in the continuity of previous semester to complete the remaining portion of petrology and mineralogy so after the completion of this course students will be able to understand the transformation of one type of rock into another through rock cycle and processes of formation of sedimentary and metamorphic rocks.
Paper-402 Palaeontology	In the continuity of course titled same in the previous semester this course will enhance the understanding of learner's about classification, evolution and distribution of various invertebrate, vertebrate and plant fossils.
Paper-403 Practical and Field Work	Students will be able to learn about identification of various rocks in the lab and field on the basis of their physical properties. They also get idea about optical observations of earth material in thin section under petro-logical microscope. They will also learn about the identification of fossil in handspecimen.

5th Semester

Course Details	Course Outcomes
Paper-501 Structural Geology	This course emphasis on the deeper concepts of structural Geology and hence enable the students to understand the behaviors of earth material under different tectonic environment and mechanism of rock deformation.
Paper-502 Economic Geology	Course deals with origin, occurrence, formation process and distribution in the Indian Subcontinent of various economic minerals. So learners will be able to explore the economic prospects in an area. They will also got skill for the identification of Ores of important metals like Iron, copper, Lead, Zinc, Gold etc.
Paper-503 Practical and Field Work	The practical study of this course will help the learners to visualize the important Geological structures and deformation indicators. At the same time, they will be able to identify the hand-specimen for the Ores of important metals like Iron, copper, Lead, Zinc, Gold etc.

6th Semester

Course Details	Course Outcomes
Paper-601 Stratigraphy	This course will enable the students to appreciate the stratigraphic principles, distribution of rocks in geological time scale in the Indian Subcontinent and their correlation in global geology.
Paper-602 Indian minerals & Environmental Geology	In this particular course try to touch the applied aspects of domains like mineral exploration, mining and environment. It will make candidates prepare for interpretation of Geological maps for mineral prospecting and Exploration. The learners will be able to understand the environmental effects of Geo-science related activities such as mining.
Practical and Field Work	This practical course will enable the learners to apply the Geo-scientific knowledge into applied fields such as Mineral Exploration & Mining. It will also enhance their understanding about actual work culture and conditions in mining.

Subject: Chemistry under B.Sc. Geology (Pass Course)

Program Specific Outcomes

1: Scientific Problem solving skill

Sound knowledge of fundamentals can develop the problem solving skills using chemical principles.

2: Analytical skills:

Develop analytical skills such as synthesizing, separating, characterizing chemical compounds and chemical reaction with the help of sophisticated instruments.

3: Skills related to employability:

Develop deep knowledge in some applied areas of chemistry such as pesticides chemistry, pharmaceutical chemistry etc. which helps in employability.

4: Learning on life processes:

Develop basic understanding the role of chemistry in natural products as well as biological system.

COURSE OUTCOMES

Semester-I

Paper: Inorganic Chemistry Theory

Inorganic Chemistry is the branch of chemistry that deals with the synthesis and behavior of inorganic and organ metallic compounds. This diverse field covers all the extensive chemical compounds except the myriad organic i.e. carbon based compounds, usually containing C-H bonds. The branch has amplified applications in every aspect of the chemical industry, including catalysis, materials science, pigments, surfactants, coatings, medications, fuels, and agriculture. It helps in laying the foundations of fundamental chemistry. From this course the students will

1: Have a deep understanding of the structure of atom and the particles constituting it.

2: Will be familiar with the periodic table in which how different elements are placed according to their unique properties.

3.Understand the concept of bonding and how the theories of bonding govern the structures of different compounds. Further on the basis of basic information will develop skills to analyse compounds in unknown compounds.

4: Draw structure of ionic solids and understand its properties.

Paper: Physical Chemistry Theory

Physical Chemistry deals with the study of macroscopic, atomic, subatomic and particulate phenomena in chemical systems in relation of the principles, practices, and concepts of physics like motion, energy, force, time, thermodynamics, quantum chemistry, statistical mechanics, analytical dynamics and chemical equilibrium. Upon the successful completion of this course, the students will be able to:

1: Differentiate between the states of matter based on the interactions existing amongst their particulates.

2: Understand the simultaneous relationship between pressure, temperature and volume persuading amongst different states of matter.

3: Inculcate the numerical ability.

4: Amalgamate the theoretical knowledge into the practical world by understanding the basic concepts of matter.

5: Learn why different substances display a characteristic melting or boiling points.

Paper: Organic Chemistry Theory

Organic chemistry is the scientific study of structure, properties, and reactions of organic compounds and organic materials (materials that contain carbon atoms). By the end of this course, students will:

1: Understand the different kinds of bonds existing in organic compounds.

2: Learn how to name different compounds according to IUPAC nomenclature.

3: Be able to visualize the 3D-structures of organic compounds.

4: Recognize and draw constitutional isomers, stereoisomers, including enantiomers and diasteromers, racemic mixture and meso compounds.

5: Perceive different kind of reactions occurring amongst the organic compounds.

6: Be able to differentiate between reactant and reagents.

7: Be able to differentiate between cyclic and acyclic compounds and study their specific reactions.

Paper: Practical

This course deals with the practical aspects of physical and inorganic chemistry. From this course, students will be benefitted in the following ways:

1: Will be able to apply the theoretical concepts while performing experiments.

2: Will be able to design, carry out, record and analyze the results of chemical experiments.

3: Will be able to titrate different mixtures.

4: Will acquire the habit of working safely with the chemicals and handling of equipments.

5: Will learn, how to make solutions of different concentrations generalizing the concept of normality, molarity and molality.

6: Design experiments that can be applied in everyday life based on the parameters of viscosity, surface tension and specific refractivity.

7: Learn the basics of precipitation.

8: Acknowledge experimental errors and their possible sources.

9: Learn statistical approach for evaluating data.

Semester-II

Paper: Inorganic Chemistry-Theory

This course deals with the advance knowledge of inorganic chemistry, in which the applications of fundamental inorganic chemistry will be seen. The course will benefit the students in the following ways:

1: Knowledge enhancement to understand the geometry of molecules.

2: Understanding of the classification of periodic table.

3: Recognition of various factors on which the elements are categorized in the periodic table.

4: Analysis of the formation and structure of various compounds by varying the chemical composition thereby enhancing their skillfull growth.

Paper: Physical Chemistry Theory

This course of physical chemistry is inclined towards kinetics and electrochemistry, in which the topics are gradually divided on the basis of complexity. With this course students will be able to:

1: Understand that every reaction has a unique time of occurrence due to the involvement of different chemical species and with effect of various parameters under observation.

2: Apply the kinetic concept in the interdisciplinary field of science and also in the real world.

3: Relate to the concept about half-life.

4: Enhance their numerical ability by solving numerical from different parameters of these two branches.

5: Differentiate between conductance and resistance and how both the terms are related to

each other.

6: Correlate the factors of acidity and basicity with pH and pKa and apply this knowledge with daily edible products.

7: Realize the importance of buffer solutions and which all buffer solutions are used by them on daily basis.

Paper: Organic Chemistry Theory

This course of organic chemistry nurtures more than the introduction of organic compounds. Following outcomes are expected from this course:

1: Students will be able to analyse the route of formation of certain products.

2: Students will be able to differentiate between the aromatic, antiaromatic and non aromatic compounds and how Huckel rules govern the phenomenon of aromaticity amongst different organic compounds.

3: Students will be able to clearly access the basic difference between alkyl and aryl compounds.

4: Students will be able to relate the concept of stability of compounds with the phenomenon of conjugation and conditions necessary for a system to be a conjugating system.

5: Students will be able to clearly identify the role of hybridization and how the physical and chemical reactivity of these compounds are affected because of different hybridization.

Paper: Practical

Students will be able to:

1: Design, carry out, record and analyze the results of chemical experiments.

2: Understand the principle and applications of chromatography.

3: Skillfully perform synthesis of organic compounds.

4: Perform different methods and learn the importance of purification.

Semester-III

Paper: Inorganic Chemistry Theory

1: Students will have the ability to demonstrate knowledge and understanding of essential facts, concepts and principles of inorganic chemistry.

1: Students will be able to relate the basic difference amongst transition metals. Metal

complexes itself covers a broad expect of chemistry and has a wide applicability in quantification of analysis and metal extraction.

2: Students will have an insight idea of spectral properties of different inorganic compounds based on their electronic properties.

3: Students will be able to understand the urge of development of co-ordination chemistry and its integration with d- block elements.

4: Students will be able to relate with the basic nature of solvents and how different solvents act differently.

Paper: Physical Chemistry Theory

1: Students will be able to relate the basic concept of thermodynamics with their every day world and will understand that how the stability of whole universe is effected with different laws of thermodynamics.

2: Students will cater the basic difference between path and state functions.

3: Students will understand the concept of entropy and how the whole universe is related to it.

4: Students will inculcate the importance of equilibria and how different forms of equilibrium are different from each other and are affected by various external parameters

5: Students will be able to calculate thermal efficiency of heat energies and solve problems based on laws of thermodynamics.

6: Students will be able to determine the Nernst distribution law and can relate to various factors causing its deviation.

Paper: Organic Chemistry Theory

1: Students will understand the need for introducing IUPAC nomenclature for organic compounds and will also be able to write IUPAC nomenclature for different functional groups.

2: Students will be able to differentiate between different chemical and physical reactivity amongst organic compounds based on presence of different functional groups.

3: Students will be able to learn how alcohols and phenols are two different classes.

4: Student will get a thorough learning of the basic concept of UV spectroscopy and how it can be used in organic chemistry to identify the type of electronic transitions, cause for the colour of compounds and their stability.

Paper: Practical

1: Experimentation enhances the skills of managing the resources, time and team work.

2: Students will be able to function as a member of an interdisciplinary problem solving team.

3: Students will be skilled enough to perform gravimetric analysis.

4: Students will be forced to think in an inclined manner via performing chemistry experiments.

5: Students will be able to detect the presence of extra elements in any given unknown sample, thereby inculcating the concept of logical thinking.

Semester-IV

Paper: Inorganic Chemistry Theory

1: Enables to describe the chemical and physical properties of f-block elements including lanthanides and actinides specifically reasoning for anomalous electronic configuration.

2: Enables to differentiate between acidic and basic radicals and how they can be further useful in research as well as day to day life.

3: Enables to individuate qualitative analysis from qualitative analysis.

4: Enables to understand different theories of precipitation and how they are unique from each other.

Paper: Physical Chemistry Theory

1: Enables to understand the advance domain of thermodynamics.

2: Enables to conceptualize the second law of thermodynamics and how it is related to entropy.

3: Enables to clearly distinct entropy and enthalpy

4: Students will acquire knowledge of how to apply third law in calculating entropy associated with various phases of matter and pure crystalline solid.

5: Students have advance knowledge of work function, Gibb's energy and their significance for criteria of spontaneous reactions.

6: Students understand the essential conditions for a system to be spontaneous or nonspontaneous.

Paper: Organic Chemistry Theory

1: Enables to familiarize with the concept of IR spectroscopy and how it can be applied in day to day life.

2: Enables to differentiate between compounds containing oxygen and nitrogen functional groups.

3: Enables to understand the effect of different reagents like LiAlH4, NaBH4 etc. in presence of different functional groups.

4: Inculcate the understanding of mechanisms prevailing in organic synthesis.

Paper: Practical

1: Enables to determine the methods for calibration to quantitative analysis.

2: Enables to perform graphical analysis for determining experimental results in the laboratory.

3: Enables to analyse that how the colour of solution varies its absorption properties.

4: Enables to expertly handle the apparatus used in calorimetric experiments.

Semester-V

Paper: Inorganic Chemistry Theory

1: Students will understand the limitations of Valence bond theory (VBT) and how the structures of different compounds were not satisfied with the help of VBT.

2: Students will have an idea why crystal field theory (CFT) was introduced.

3: Students will know the difference in CFT of octahedral and tetrahedral complexes.

4: Students will have a detailed knowledge on magnetic and electronic properties of transition metal complexes.

5: Students will have a thorough understanding of stability in metal complexes governed by kinetic and thermodynamic parameter.

Paper: Physical Chemistry Theory

1: Students understand the need of quantum mechanics and shortcomings of classical mechanics.

2: Students acquire quantitative knowledge of operators in quantum mechanics corresponding to classical observables.

3: Students acquire adhere descriptive attitude for probabilities, postulates, wave functions and expectation values.

4: Students acquire extensive knowledge about spectral information.

5: Students acquire skills of understanding molecular spectroscopy, qualitative and quantitative description of vibrational, rotational and Raman spectra that plays key role

in research.

Paper: Organic Chemistry Theory

1: Students will have the knowledge of principles of spectroscopy.

2: Will have hands on training on structure determination of organic compounds using spectroscopic techniques.

3: Will be able to understand that how NMR spectroscopy can be used to identify unknown compounds

4: Will be able to classify different carbohydrates based on their structural and positional composition.

5: Will understand the nature of metal-carbon bond present in organic compounds.

6: Will understand the mode of action of different organic reagents because of the presence of different metals in them.

7: Will understand the nature of action of reagents depend on the nature of metal-carbon bond.

8: Will be able to acknowledge the use of organometallc compounds in biological systems and chemical reactions.

Paper: Practical

1: Students will have a comparative knowledge of different types of chromatography.

2: Students can relate that how Rf values determine separation.

3: Students will have a vast idea of different types of salts and the factors on which they are categorized into different groups.

4: Students will be able to categorize and maintain a detailed record differentiating different radicals on the basis of different factors.

5: Students will be able to apply the theory of common ion effect in the precipitation of compounds.

Semester-VI

Paper: CH-601 (Inorganic Chemistry Theory)

1: Students will be able to relate the basic difference between acids and bases.

2: Students will be able to cater this theoretical knowledge of acid-bases into practical world.

3: Students will have an insight idea of the composition of biomolecules.

4: Students will learn about the roles of metal ions in different physiological processes.

5: Students will be able to relate to the compounds of silicon and phosphorous and applications of these compounds specially in greases.

Paper: Physical Chemistry Theory

1: Students will be familiarized with the electronic spectral properties of different compounds and how these properties affect the nature of compounds.

2: Students will have a detailed idea of interaction of electromagnetic radiations with matter.

3: Students will have a thorough knowledge of different types of solutions, on what factors the miscibility of different solutions depend, how colligative properties are related to different solutions, difference between ideal and non-ideal solutions.

4: Will learn about the concept of phase equilibria and how phase equilibrias of two components are related.

5: Will possess the skills to solve problems within broader context related to field of photochemistry.

6: Will be capable of analyzing the impact of photochemistry in sustainable development to help society.

Paper: Organic Chemistry Theory

1: Students will be introduced about heterocyclic compounds in organic chemistry.

2: Will be explained that how introduction of heteroatom amongst cyclic hydrocarbons change the properties of entire compounds.

3: Will be given an idea of the application part of organic chemistry i.e. how they can use their theoretical knowledge into the real world.

4: Will be taught about proteins, how they are formed from their smallest monomers amino acids and how arrangement of different amino acids changes the basic composition of proteins and peptides.

5: Will be able to differentiate between primary and secondary structure of proteins.

6: Will be able to describe the advantages of heterocyclic compounds in materials and pharmaceutical chemistry.

7: Will be able to explain the synthesis and applications of industrially important polymers that find use in everyday life.

Paper: Practical

1: Students will be skilled to perform conductometry experiments.

2: Students will be having hands on experience on pH meter and potentiometer.

3: Students will be able to perform different synthetic reactions.

4: Students will be able to analyse that how different processes are used for a single

synthesis.

5: Students will be able to carry out and record these experiments in a skilful manner.

6: Students will be able to show competence in obtaining and interpreting data.

Subject: Mathematics under B.Sc. Pass Course

Program Specific Outcomes (PSOs)

After study the mathematics in B.Sc. Program Students will be able to

1. Appear for master program in various universities.

 2. They will get the understanding of mathematical application to solve project specific problems.

3. The learners will efficient in the mathematical calculations in daily works.

4. They may identify and design problem statement for further research.

Course Objective & Outcomes

Subject: Algebra   **Class: B.Sc. 1st Sem.**

              Course Objective

1. learn to find inverse and rank of matrices using elementary operation.

2. Learn to solve systems of linear equations and application problems.

3. Learn to compute determinants and know their properties.

4. Learn to find and use eigenvalues and eigenvectors of a matrix.

5. Learn to find roots of polynomial equations up to fourth-degree .

After the completion of the course, Students will be able to

1. Find the inverse of a square matrix.

2. Solve the matrix equation Ax = b using row operations and matrix operations.

3. Find the determinant of a product of square matrices, the transpose of a square matrix, and the inverse of an invertible matrix

4. Find the characteristic equation, eigenvalues and corresponding eigenvectors of a given matrix.

5. find roots of polynomial equations up to fourth-degree.

Course Objective & Outcomes

Subject: Calculus   **Class: B.Sc. 1st Sem.**

Course Outcomes

After the completion of the course, Students will be able to

1. understand the relationship between the derivative and the definite integral as expressed in both parts of the Fundamental Theorem of Calculus.

2. locate the x and y intercepts, any undefined points, and any asymptotes.

3. determine asymptotes for rational expressions (we will not go into these graphs in much detail)

4. apply the techniques from the previous section to graph a fourth-degree polynomial or higher.

5. determine if there is any symmetry to aid in the graphing process.

6. determine the point(s) of intersection of pairs of curves.

Subject: Solid Geometry   **Class: B.Sc. 1st Sem.**

Course Outcomes

After completion of the course, Students will be able to

1. Trace conic.

 2. Solve problem of sphere through a given circle, Intersection of two spheres

3. find equation of tangent of central conicoid

4. Solve problem related generating line.

5. Understand polar equations of conic.

Subject: Number Theory And Trigonometry   **Class: B.Sc. 2nd Sem.**

Course Outcomes

After the completion of the course, Students will be able to

1. Demonstrate knowledge and understanding of topics including, but not limited to divisibility, prime numbers, congruences, quadratic reciprocity, Diophantine equations.

2. Learn methods and techniques used in number theory.

3. Write programs/functions to compute number theoretic functions.

4. Use mathematical induction and other types of proof writing techniques.

5. Evaluate trigonometric and inverse trigonometric functions

6. Solve trigonometric equations and applications.

7. Apply and prove trigonometric identities.

Subject: Ordinary Differential Equations   **Class: B.Sc. 2nd Sem.**

Course Outcomes

After the completion of the course, Students will be able to

1. Student will be able to solve first order differential equations utilizing the standard techniques for separable, exact, linear, homogeneous, or Bernoulli cases.

2. Student will be able to find the complete solution of a nonhomogeneous differential equation as a linear combination of the complementary function and a particular solution.

3. Student will be introduced to the complete solution of a nonhomogeneous differential equation with constant coefficients by the method of undetermined coefficients.

4. Student will be able to find the complete solution of a differential equation with constant coefficients by variation of parameters.

5. Student will have a working knowledge of basic application problems described by second order linear differential equations with constant coefficients.

Subject: Vector Calculus   **Class: B.Sc. 2nd Sem.**

Course Outcomes

1. Memorize definition of directional derivative and gradient and illustrate geometric meanings with the aid of sketches.

2. Memorize theorem relating directional derivative to gradient and reproduce proof.

3. Calculate directional derivatives and gradients.

4. Apply gradient to solve problems involving normal vectors to level surfaces.

5. Explain the concept of a vector integration a plane and in space.

Subject: Advanced Calculus   **Class: B.Sc. 3rd Sem.**

Course Outcomes

1. The student is expected to learn about the basic principles of multi-variable calculus with proofs.

2. To have full knowledge of calculus involving the fundamental tools such as continuity and differentiability.

3. Students are able to reason rigorously in mathematical arguments. They can follow abstract mathematical arguments and write their own proofs.

4. Students are able to effectively communicate mathematics: reading, writing, listening, and speaking. Students make effective use of the library, conduct research and make oral and written presentations of their findings.

5. To know Relationship between the increasing and decreasing behavior of f and the sign of f

Subject: Partial Differential Equation   **Class: B.Sc. 3rd Sem.**

Course Outcomes

After the completion of the course, Students will be able to

1. classify partial differential equations and transform into canonical form

2. solve linear partial differential equations of both first and second order

3. apply partial derivative equation techniques to predict the behaviour of certain phenomena.

4. apply specific methodologies, techniques and resources to conduct research and produce innovative results in the area of specialisation.

5. extract information from partial derivative models in order to interpret reality.

6. identify real phenomena as models of partial derivative equations.

Subject: Statics   **Class: B.Sc. 3rd Sem.**

Course Outcomes

After the completion of the course, Students will be able to

1. An ability to construct free-body diagrams and to calculate the reactions necessary to ensure static equilibrium.

2. An understanding of the analysis of distributed loads.

3. A knowledge of internal forces and moments in members.

4. An ability to calculate centroids and moments of inertia.

Subject : Sequences And Series   **Class: B.Sc. 4th Sem.**

Course Outcomes

After the completion of the course, Students will be able to

1. Determine if an infinite sequence is bounded.

2. Determine if an infinite sequence is monotonic.

3. Determine if an infinite sequence is convergent or divergent.

4. Find the sequence of partial sums of an infinite series.

5. Determine if a geometric series is convergent or divergent.

6. Find the sum of a convergent geometric series.

7. Determine if an infinite series is convergent or divergent by selecting the appropriate test from the following: (a) test for divergence; (b) integral test; (c) p-series test; (d) the comparison tests; (e) alternating series test; (f) absolute convergence test; (g) ratio test; and (h) root test.

8. Determine if an infinite series converges absolutely or conditionally.

Subject: Special Function & Integral Transforms   **Class: B.Sc. 4th Sem.**

Course Outcomes

After the completion of the course, Students will be able to

1. understand integral calculus and special functions of various engineering problem and to know the application of some basic mathematical methods via all these special functions.

2. explain the applications and the usefulness of these special functions.

3. classify and explain the functions of different types of differential equations.

4. understand purpose and functions of the gamma and beta functions, Fourier series and Transformation.

5. use the gamma function, beta function and special functions to: evaluate different types of integral calculus problems and Fourier series to solve differential equations.

Subject: Programming in C & Numerical Methods   **Class: B.Sc. 4th Sem.**

Course Outcomes

After the completion of the course, Students will be able to

1. Read, understand, and trace the execution of programs written in C language.

2. Write the C code for a given algorithm.

3. Write programs that perform operations using derived data types.

4. Solve an algebraic or transcendental equation using an appropriate numerical method.

5. Solve a linear system of equations using an appropriate numerical method.

6. Perform an error analysis for a given numerical method.

Subject: Real Analysis   **Class: B.Sc. 5th Sem.**

Course Outcomes

After the completion of the course, Students will be able to

1. describe fundamental properties of the real numbers that lead to the formal development of real analysis.

2. comprehend rigorous arguments developing the theory underpinning real analysis.

3. demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration.

4. construct rigorous mathematical proofs of basic results in real analysis.

5. appreciate how abstract ideas and rigorous methods in mathematical analysis can be applied to important practical problems.

Subject: Groups & Rings   **Class: B.Sc. 5th Sem.**

Course Outcomes

After the completion of the course, Students will be able to

1. understand the importance of algebraic properties with regard to working within various number systems.

2. extend group structure to finite permutation groups (Cayley's Theorem).

3. understand Sylow's Theorems.

4. generate groups given specific conditions.

5. investigate symmetry using group theory.

6. understand the three major concrete models of Boolean algebra: the algebra of sets, the algebra of electrical circuits, and the algebra of logic.

Subject: Dynamics   **Class: B.Sc. 5th Sem.**

Course Outcomes

After the completion of the course, Students will be able to

1. An ability to construct free-body diagrams.

2. An understanding of the analysis of distributed loads.

3. A knowledge of internal forces and moments in members.

4. Apply Keplers laws to solve the problems.

Subject: Real & Complex Analysis   **Class: B.Sc. 6th Sem.**

Course Outcomes

After the completion of the course, Students will be able to

1. Students will be able to understand the concept of limit for real functions and be able to calculate limits of standard functions and construct simple proofs involving this concept;

2. Student will be introduced to the concept of continuity and be familiar with the statements and proofs of the standard results about continuous real functions;

3. Student will understand the concept of the differentiability of a real valued function and be familiar with the statements and proofs of the standard results about differentiable real functions.

4. Student will have a working knowledge of differentiability for complex functions and be familiar with the Cauchy-Riemann equations;

Subject: Linear Algebra   **Class: B.Sc. 6th Sem.**

Course Outcomes

After the completion of the course, Students will be able to

1. Identify and construct linear transformations of a matrix.

2. Characterize linear transformations as onto, one-to-one.

3. Solve linear systems represented as linear transforms.

4. Express linear transforms in other forms, such as as matrix equations, and vector equations.

5. Characterize a set of vectors and linear systems using the concept of linear independence.

Subject: Numerical Analysis   **Class: B.Sc. 6th Sem.**

Course Outcomes

After the completion of the course, Students will be able to

1. understand the theoretical and practical aspects of the use of numerical analysis.

2. proficient in implementing numerical methods for a variety of multidisciplinary applications.

3. establish the limitations, advantages, and disadvantages of numerical analysis.

4. derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.

5. understand of common numerical analysis and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.

Subject: Physics in B.Sc. Pass Course Program

Program Specific Outcomes

▢ Students get acquainted with techniques which are useful in industry.

▢ Students get conceptual knowledge of entrepreneurships through the co-curricular activities

▢ learn the organizational skills and working in group.

▢ Students will be well versed with use of computers

Course Outcomes
Semester-I
Paper: Mechanics (Phy-101)
  - ➢ This course helps student to understand the basic and fundamental concepts of classical
  - ➢ mechanics.
  - ➢ This course helps students to have a deep understanding of Newton's laws and get the
  - ➢ knowledge about forces which help them in their daily life.The velocity and acceleration
  - ➢ parameters give the knowledge about how the vehicles move.
  - ➢ This course helps students to understand the rolling concept and concept of inertia which
  - ➢ helps them in their daily life.
  - ➢ This course helps students to understand the concept of Lagrangian which further helps
  - ➢ them to solve problems related to simple physical systems.
Paper: Electricity and Magnetism (Phy 102)
  - ➢ Study the electric field using coloumbs inverse square law in electrostatics of current
  - ➢ Analyse the relations between b, h and m
  - ➢ Understand the faradays laws of electromagnetic induction by rayleigh's method
  - ➢ Analyse he value of maxwell equation- boundary conditions.
Paper: Physics Practical (PHY – 103)
  - · The set of experiments is framed so as to understand the meaning of minute observations
  - ➢ and measurements. These experiments are first lesson to the learners that how imperative
  - ➢ is the role of measurement in the practical world.
  - · Experiments based on moment of inertia provide a technical hand to the students and
  - ➢ opens a pathway to the industrial world related to machinery and vehicles.
  - · Experiments related to the measurement of acceleration due to gravity and elastic
  - ➢ constants would put up a clear picture of universal constants to the mind of students.
  - ➢ Therefore besides increasing the conceptual clarity, these experiments would further
  - ➢ raise the imagination power of the learner.
Semester-II
Paper: Properties of Matters, Kinetic Theory and Relativity (PHY - 201)
  - ➢ The Students are able to understand the fundamental concepts related to Hook's law and
  - ➢ elastic properties of materials that have many useful applications in daily life.
  - ➢ Proper understanding of bending of beam phenomena, cantilever as well as the concept
  - ➢ of twisting couple could open up industrial doors to the students.
  - ➢ The concepts of energy distribution, specific heats and Maxwell laws of distribution have
  - ➢ interesting statistical and experimental verifications. It helps students to closely realize
  - ➢ the theoretical part of the curriculum.
Paper: Electromagnetic Induction and Electronic Devices (Phy-202)
  - · Would be able to understand the role of a semiconductor elements in controlling the

- ➤ applied source of voltage and current and how these elements have brought up a big
- ➤ change after the discovery of transistor as a semiconductor device.
- · would be able to meet the course objectives in all respects by orienting teaching and
- ➤ other academic processes adopted by the faculty to facilitate the students to do what they
- ➤ are expected to do.

Paper: Physics Practical (PHY−203)
- ➤ The experiments of this course are framed so as to understand comprehensively the
- ➤ meaning of minute observations and measurements. These experiments are primary
- ➤ lesson to the learners that how essential is the role of measurement in the practical world.
- ➤ These experiments have foundation in the theory course of the students in the same year.
- ➤ Therefore, these laboratory experiments are elemental part of the curriculum and helps
- ➤ in improving the widespread knowledge to the students.
- ➤ Experiments based on special type of diode provide scientific temperament and an
- ➤ industrial hand to the students and opens a pathway to the manufacturing world related to
- ➤ machinery and vehicles.
- ➤ The students by performing the experiments based on current and electricity, learner
- ➤ could realize the many theoretical concepts solenoid, magnetism, frequency of A.C.
- ➤ mains. These experiments provide answer to many queries of the students which is the
- ➤ part of their thoughts so far.

Semester-III
- ➤ **Paper: Computer Programming and Thermodynamics (Phy-301)**
- · This course will help to understand the concept of heat and its conversion from one form
- ➤ to another. Thermodynamics can be used in our daily life Laws of thermodynamics are
- ➤ used in refrigerators, air-conditioners, heat pumps etc.
- · The laws of thermodynamics dictate energy behavior, for example, how and why heat,
- ➤ which is a form of energy, transfers between different objects.
- · The Maxwell relations allow us to relate changes in one set of thermodynamic variable to
- ➤ other variables.

Paper: Optics − I (Phy-302)
- ➤ The Students are able to understand and correlate various optical phenomena related to
- ➤ light with practical problems/applications in day-to-day life.
- ➤ Analytical treatment of Fourier analysis would establish a bridge that link mathematical
- ➤ equations with their physical aspects and comprehensive recognition with conceptual
- ➤ clarity.
- ➤ A different dimension of laws of reflection, refraction and other equations based on them
- ➤ is shown in Matrix methods. These methods results in simplification/alternate of
- ➤ complicated and lengthy equations studied in twelfth class.
- ➤ Wave nature of light is described by interference of light and it answers many
- ➤ observations in our daily life. For e.g. : coloration in the soap bubble, fringe patterns
- ➤ observed somewhere and laser phenomena based on coherence of light. Thus, students
- ➤ are able to observe and analyze various naturally occurring phenomena.

Paper: Physics Practical (PHY−303)
- ➤ The experiments of the Optics branch would assist students to understand and verify the
- ➤ various laws related to the light and optical event which is just a part of theory for them
- ➤ till now.
- ➤ By performing the experiments based on current and electricity, learner could realize the
- ➤ many theoretical concepts solenoid, magnetism, frequency of A.C. mains. These
- ➤ experiments provide answer to many queries of the students which is the part of their
- ➤ thoughts so far.
- ➤ Use and handling of the sophisticated instruments of the optical phenomena such as
- ➤ telescope and microscope would provide make learner an expert in the field on
- ➤ measurements.

Semester-IV
Paper: Statistical Mechanics (Phy-401)
- ➤ This course helps the students to understand the methods of statistical mechanics used to
- ➤ develop the statistics for Bose-Einstein, Fermi-Dirac and photon gases.
- ➤ This course helps the students to understand the concept of microstates and macrostates

- ➢ and how the particles are distributed in the system in different states.
- ➢ This course helps the students to understand the macroscopic and microscopic
- ➢ description of temperature, entropy and free energy and their descriptions in terms of
- ➢ probabilities.
- ➢ This course helps the students to understand the concept of canonical and microcanonical
- ➢ ensemble.

Paper: Optics - II (Phy- 402)
- ➢ The description of wave nature of light by interference of light answers many
- ➢ observations in our daily life.
- ➢ The concept of polarization would comprehensively describe the bifurcation between
- ➢ longitudinal and transverse waves. Along with it, students can learn the practical aspect
- ➢ to distinguish between polarized and unpolarized light.
- ➢ The Students are able to understand and correlate various optical phenomena related to
- ➢ light with practical problems/applications in day-to-day life.

Paper: Physics Practical (Phy‒403)
- ➢ To make use of and handling of the sophisticated optical instruments such as Bi -prism
- ➢ arrangement, telescope and microscope would provide learner an expertise in the field of
- ➢ measurements.
- ➢ In addition to realize the fundamental concepts of theory, the laboratory experiments
- ➢ could make available learner a potential candidate to be absorbed in the industrial world.
- ➢ CO 4: The computer programming would help students to get familiar with software skills. It
- ➢ not only develops a skill in the students but also opens up another way to the students
- ➢ after completing their graduation course.

Semester-V
Paper: Solid State Physics (Phy-501)
- ➢ This course (solid state physics) gives an extended knowledge of the principles and
- ➢ techniques of solid state physics.
- ➢ It helps us in determining the structures by diffraction (X-rays method)
- ➢ Graduates may pursue careers in applied research or education and work in a variety of
- ➢ industries such as aerospace, engineering and in government laboratories.

Paper: Quantum Mechanics (Phy-502)
- ➢ This course helps student to understand the basic and fundamental concepts of quantum
- ➢ mechanics in terms of its evolution and its applications
- ➢ It also throws light on the co-existence of particle and wave nature of matter particles and
- ➢ their applications in photoelectric effect and Compton effect (particle nature) and
- ➢ interference, diffraction, polarisation (wave nature)
- ➢ It also explains the meaning of uncertainty in Physics and how it can be applied to
- ➢ explain various phenomenon of nuclear physics i.e. existence of protons and neutrons
- ➢ and non-existence of electrons in nucleus, how to find the radius of Hydrogen atom
- ➢ This course also explains the behaviour of a free and bound particle in terms of
- ➢ Schrodinger equation and explains the role of potential by way of its applications such as
- ➢ potential barrier, particle in a box. It makes student to understand the concept ot
- ➢ tunnelling, reflection and transmission probabilities at different energies of the particle.

Paper: Physics Practical Paper (Phy-503)
- ➢ This course helps students in gaining practical knowledge of CB, CE amplifiers & in
- ➢ determining their various parameters. It also helps in gaining knowledge of Hartley
- ➢ Oscillator.
- ➢ This course helps students to gain practical knowledge of FORTRAN programming.
- ➢ This course helps students in gaining practical knowledge of resolving power of prism &
- ➢ plane transmission grating & in determining their various parameters.

Semester-VI
Paper: Atomic, Molecular & Laser Physics (601)
- ➢ After studying this course students are able to analysis different spectrums of alkali
- ➢ atoms.

- ➢ The effect of electric and magnetic fields on alkali atoms spectrums is also analyzed and
- ➢ studied.
- ➢ Students are also able to analyze the Raman Effect which gives insight into irrational
- ➢ and rotational energies.
- ➢ The students get in-depth knowledge of He-Ne and RUBY laser, different type of
- ➢ coherence. They can design simple lasers after studying this course.

Paper: Nuclear Physics (PHY-602)
- ➢ Nuclear Physics is a wonderful course having a great relevance to current scenario in
- ➢ terms of research, be it the material science or nuclear science or polymer or nuclear
- ➢ energy etc. all around the world, because this course helps students to have a deep
- ➢ understanding of basic and fundamental concepts of nucleus in terms of its composition
- ➢ (i.e. mass, charge and size), its stability (i.e. binding energy) and various properties
- ➢ (nuclear spin, parity, magnetic and electric dipole moment etc.) and various nuclear
- ➢ reactions.
- ➢ This course enables the students to study the various experimental methods for the
- ➢ acceleration of charged particles (LINAC, Cyclotron, Betatron, etc.), interaction of
- ➢ charged particles (such as Alpha and Beta particles) and Gamma radiations with matter
- ➢ and their detection (G.M. Counter, semi-conductor detector, etc.) and understand the
- ➢ energy loss mechanism of various particles which is most useful when the student goes
- ➢ for higher studies and opt for research.

Paper: Physics Practical (PHY-603)
- ➢ The computer programming would help students to get familiar with software skills. It
- ➢ not only develops a skill in the students but also opens up another way to the students
- ➢ after completing their graduation course.
- ➢ The experiments of electricity such as Transistor, Amplifier, Oscillator would assist
- ➢ students to recognize and verify the various laws related to the electricity which is just a
- ➢ part of their imagination till now.
- ➢ In addition to realize the fundamental concepts of theory, the laboratory experiments
- ➢ could make available learner a potential candidate to be absorbed in the industrial world.

B.Sc. (Computer Science)

Program Specific Outcomes

PSO1: Students get knowledge and training of technical subjects so that they will be technical professional by learning C/C++, Visual Basic programming, Database Management, Data Structure, Software Engineering, Computer Architecture, Theoretical Computer Science, Web Technology using HTML.

PSO2: Students understand the concepts of software application and projects.

PSO3: Students understand the computer subjects with demonstration of all programming and theoretical concepts with the use of ICT.

PSO4: Development of in-house applications in terms of projects

PSO5: Students will build up programming, analytical and logical thinking abilities.

PS06: Aware them to publish their work in reputed journals

PS07: To make them employable according to current demand of IT Industry and responsible citizen.

Course Outcomes

Computer Science Paper-1.1 Computer Fundamentals & MS-Office

- Give students an in-depth understanding of why computers are essential components in business, education and society.
- Introduce the fundamentals of computing devices and reinforce computer vocabulary, particularly with respect to personal use of computer hardware and software, the Internet, networking and mobile computing.
- Provide hands-on use of Microsoft Office applications Word, Excel and PowerPoint. Completion of the assignments will result in MS Office applications knowledge and skills.
- Understand the fundamental hardware components that make up a computer's hardware and the role of each of these components
- Understand the difference between an operating system and an application program, and what each is used for in a computer
- Describe some examples of computers and state the effect that the use of computer technology has had on some common products
- Identify the applications of computer in daily life

Computer Science Paper-1.2 Computer Architecture

- To understand the organization and design of basic digital computer.
- To understand the procedure for implementing the arithmetic algorithm in digital hardware.
- To discuss the techniques that computers use to communicate with I/O devices and Memory
- Outline the structure of a basic computer system and explain the role of functional units
- Design the control logic circuit for various digital circuits such as registers, memory and adder - logic circuit of a basic computer system
- To understand the working of different Sequential logic circuits
- To understand working operations of different types of Flip flops as a basic building block.
- To know the operations of shift registers and BinaryCounters
- To understand the basic Computer System and general organization of different blocks

Computer Science Paper-2.1Programming in C

- Identify the basic concepts needed for program development
- Apply the basic concepts and develop program to find solutions for simple problems
- Design programs to solve complex problems by using suitable control statements
- Analyze the problem and design efficient program using functions
- Use array and structure to handle volume of data

Computer Science Paper-2.2Structured Systems Analysis and Design

- To provide adequate understanding of systems concept, system analysis, and systems design which would help them in having efficient and workable information system for management.
- To provide an understanding the role of Hardware and Software for realizing organizational Objectives and automation.
- To provide an understanding of the role of systems analyst and software development firms for their role in distributing meaningful ERP modules and other business intelligent system.
- To provide an understanding of the role of system analysis and design within various systems development stages.
- To develop an awareness of the different approaches that might be taken to systems design.
- To understand the activities of the management and systems analyst, and in the overall development of system.
- To develop an understanding of Testing software and complying the various software quality parameters.
- To develop an understanding of how to migrate old data within newly developed system with the help of various techniques.

Computer Science Paper-1.3&2.3Practical Lab on MS –Office and Programming in C

- Able to perform documentation and presenting skills.
- Proficient in using Windows, Word Processing Applications, Spreadsheet Applications, Database Applications and Presentation Graphics Applications.
- Develop algorithms to find solutions for simple problems
- Analyze the source code and rectify errors if any and bring out necessary solution
- Utilize proper control statements to find solution for a given problem
- Able to devise pseudo code and flowchart for computational problems.
- Understand how to write, debug and execute simple programs in C.

Computer Science Paper-3.1   Data Communication and Networking

- To understand the basics of data communicating systems.
- To provide knowledge about the concepts of internet.
- To learn the various protocols used in the internet
- Explain the local, metropolitan and wide area networks using the Standard OSI reference model.
- Explain the concepts of protocols, network interfaces and design of performance issues in local area networks and wide area networks.
- Describe about wireless networking concepts, contemporary issues in networking technologies, network tools and network programming.
- Explain the analysis of different types of protocol and the comparison of number of data link, network and transport layer protocols.

Computer Science Paper-3.2Object-Oriented Design and C++

- Knowledge about the top-down and bottom-up programming approach and apply bottom up approach to solve real world problems.
- Knowledge about the difference between static and dynamic binding. Apply both techniques to solve problems.
- Describe the concept of inheritance and apply real world problems.
- Discuss the generic data type for the data type independent programming which relates it to reusability.
- Explain to design of handling large data set using File I/O.

Computer Science Paper-4.1 Data Structure with C/C++

- Identify data structures needed to solve specific problems
- Analyze the data structures for effective use in problem solving
- Design and develop efficient algorithms in terms of Space and Time
- Troubleshoot algorithms,analyze time complexity of algorithms
- To build the necessary skill set and analytical abilities for developing computer based solutions for real life problems.
- To imbibe quality software development practices. To create awareness about process and product standards.

Computer Science Paper-4.2Operating System

- To develop critical thinking, inquiring, technology skills to describe and to paraphrase what operating systems are, what they do and how they are designed & construct.
- To identify, infer and summarize the resource management utility.
- To develop collaborative and soft skills to compare the structure & basic organization of different operating system.
- Describe the basic components of an operating system and their role in implementations for general purpose, real-time and embedded applications.
- Discuss mutual exclusion principles and their use in concurrent programming including semaphore construction and resource allocation.

Computer Science Paper-3.3& 4.3Practical based on paper 3.2 & 4.1

- Programs using Object oriented programming paradigm – Encapsulation (Classes and objects), Polymorphism and Inheritance.
- Apply various features like constructors and destructors, overloading- function and operators.
- Able to acquire in depth knowledge and develop software in C/C++
- Utilize different types of inheritance to suit different applications.
- Write efficient programs consuming less memory.
- Compile and Execute programs using required data structures.
- Implement the algorithms using C/C++.
- Debug programs.

Computer Science Paper-5.1Database Management System

- The key goal is to prepare students for a professional career in the field of data administration and database design.
- To get acquaint students with good knowledge of DBMS. During the course, students will learn about database design and database handling activities.
- To get acquaint students with basics of database security and administration.
- Knowledge & Understanding : Databases and their design & development
- Intellectual Cognitive/ analytical skills: Normalization of Databases.
- Transferable skills: Usage of DBMS design and administration.

Computer Science Paper-5.2Introduction to Internet & Web Technologies

- Knowledge about the concepts of markup languages, unorder list, table, formatting, liking and frames.
- Understanding about the creation of cascading style sheets, backgrounds, media types and building a dropdown menu.
- To explain the JavaScript, control structure, if structure, switch, do-while and logical operators.
- To describe the javascript functions, javascript arrays and javascript objects.

Computer Science Paper-6.1Visual Basic Programming

- Basic Concepts of Program building block control statements and the basic concepts of function and procedure.

- Knowledge of the functionality and properties of GUI based ActiveX Control with example programs.
- About graphics handling related control and properties.
- About the fundamental functions and properties of Advanced ActiveX Control.

Computer Science Paper-6.2Software Engineering

- Fundamental knowledge in science, mathematics, fundamentals of computer science, software engineering and multidisciplinary engineering to begin in practice as a software engineer.
- To understand several SDLC models for software development that can be consistent to produce high quality software at low cost.
- To obtain knowledge about the improvement in design specification and software testing.
- To design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, manufacturability, sustainability, ethical, health and safety.
- Describe the techniques, skills, and modern engineering tools necessary for engineering practice.
- Analyze, design and manage the development of a computingbased system, component or process to meet desired needs within realistic constraints in one or more application domains.

Computer Science Paper-5.3& 6.3Practical based on paper 5.1, 5.2 & 6.1

- Students will get to know how to apply DML/DDL commands on database.
- To apply knowledge of Programming in PL/SQL including stored function, cursor, trigger, designing the normalized database.
- Understanding the practical knowledge of exception handling.
- Understanding the fundamental tags used in HTML.
- Develop the web page in various applications and web page using various ordered and unordered listing commands.
- Understanding the simple programs using basic control statement, GUI based program using Basic ActiveX Control.
- Knowledge about different advanced ActiveX control with example application programs.
- Knowledge about various types of data base handling with MS-Access and Oracle
- Describe the concepts of data report for an organization.

Govt. College, Narnaul

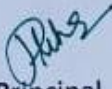## POs, PSOs, COs of Syllabus offered in Session: 2016-17

Name of the program: BBA

Program outcomes:-

- Upon completion of the BBA program, the individual must demonstrate maturity, professionalism and team working skills.
- Upon completion of the BBA program the student will have general idea of operations in business.
- Upon completion of the BBA program, the individual will have specialized issues of concern.
- Upon completion of the BBA program, the individual will be able to apply technological know-how for business advancements.
- After BBA,the individual will be capable of analysing, investigating and solving critical business issues.

Program specific outcomes:-

- Acquire practical learning through summer training, industrial visit and business plan etc.
- Demonstrate analytical and problem solving skills through core elective of finance /account , human resource , marketing IT etc. solve the business issues
- Understand and develop the new dimensions of knowledge through open electives to cater the need of the industry.

Course Outcomes for each course in the program are described and attached herewith.

Principal

BBA Program and course outcomes

Program outcomes:-

1. Upon completion of the BBA program, the individual must demonstrate maturity, professionalism and team working skills.
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3. Understand and develop the new dimensions of knowledge through open electives to cater the need of the industry.

Course outcomes:-

(a) General management group :-
It comprise organisational behaviour, business environment , human resource management , business law, capital market , production material management , consumer protection , environment science , disaster management, business organisation , business communication, principles of management research business subject ,
After completions of these course the individual will be capable of :-
1. Applying the concepts related to ecology for sustainable life on earth

2. Determine the managerial roles and skill with special attention to managerial roles and skills, with special attention to managerial responsibility for affective and efficient achievement of goals .

3. Understand group behaviour in organizations, including communication, leadership, power and policies, RBI role process of economic reforms.

4. Develop insights of economics policies, RBI role, process of economic reforms.

5. Understand the concept, process design tools and techniques ofRM .

6. Develop an understand of the concept of HRM and its importance in the organization

(B) Account & mathematics group:-

This group comprise statistics for business decisions financial accounting, company law , cost accounting, financial management m accounts income tax etc.

Course outcomes

1. Analyses statistical statistics for using measures of central tendency dispersion and skewness, construct index number and its use.

2. Apply critical thenking and problem solving skill for preparation of trading and profit& loss account , balance sheet of sole trader .

3. Student s will understand of the concepts company law.

4. Familiarize the concept of cost accounting and analysis material cost by various methods of pricing material issues.

5. Determine optimum capital structure and cost of capital of various source like equity, debt, preference and retained earnings.

6. Will become aware of Law related to sales of goods, the unpaid seller and understand Consumer protection measures available in India.

7. Will become aware of taxation process, rebates, provision etc.

8. Analyse the Network Design and logistics Management of a firm.

(b) IT & other group

This group Consists Personality Development & Communication skills, Macro & Micro EconomicsAnalysis, Fundamental of Computers,

Marketing Management, E-commerce System Analysis& Networking etc. subjects.

Outcomes of course:-

1. Demonstrate an in depth knowledge of the roots, concepts and evolution of E-Business and E-commerce along with its benefits &limitations.
2. Enhancing confidence articulation skills (to listen, speak and write in English at workplace.
3. The students will understand the Basic working of computers and about hardware & software.
4. Understanding of different school of thought of Micro and Macro Economies
5. Understand the basics concepts, importance of marketing and marketing environment.
6. Understand the Concept of Networking.

Govt. College, Narnaul

POs, PSOs, COs of Syllabus offered in Session: 2016-17

Name of the program: Bachelor of Commerce

Program Outcomes (POs)

PO-1: Understand the role of business and its implications on society

PO-2: Understand the conceptual knowledge of accounting and acquire skills of maintaining Accounts

PO-3: Acquire entrepreneurial, legal and managerial skills

PO-4: Identify the avenues of marketing and banking both traditional and modern

PO-5: Develop the skills and techniques of communication to be successful in business and personal life

PO-6: Improve competency to make eligible and employable in the job market

PO-7: Recognize different value systems and ethics, understand the moral dimensions and accept responsibility

Program Specific Outcomes & Course Outcomes are described subject-wise for all subjects of Commerce stream and are attached herewith.

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Subject: Core Groups of Commerce

Program Specific Outcomes (PSOs) & Course Outcomes (COs):

Accounting Group Financial Accounting, Corporate Accounting, Cost Accounting and Accounting for Financial Management	• Impart conceptual knowledge of various accounting concepts, convention and policies • Helps in ascertaining the cost of material and labour. • Provides knowledge of long term investment decisions, planning and risk of investment projected with it.
Statistics and Mathematics	Introduce mathematics and statistics to undergraduate students of commerce so that they can use them in the field of commerce and industries to solve the real life problems
Banking and Insurance	Provide knowledge of e-banking services and e-banking techniques in the competitive IT Environment
Taxation Law and GST	Provide practical knowledge which will be beneficial to the students in their lifetime
Management and others Economics , BRF ,Corporate law, Computer	• Enhances the use of IT Services at all aspects • Identifies

Subject: Mathematics

Program Specific Outcomes (PSOs)

After the completion of the B.Com. With math Students will be able to

1. Appear for master program in various universities.

2. They will get the understanding of mathematical application to solve project specific problems.

3. The learners will efficient in the mathematical calculations in daily works.

4. They may identify and design problem statement for further research.

Subject: Business Mathematics I Class: B.Com. 1st Sem.

Course Objectives

1. To understand basics of integration and its uses in the areas of mathematics.

2. Independently solving of business problems.

3. Use percentages, ratios, and proportions for business applications such as discounts, markups, and markdowns, and be able to differentiate which math methods should be used for different problems.

4. Use simple and compound interest to do business calculations such as value of money, maturity value, promissory notes, present value, and future value and be able to differentiate which math method should be used for different problems.

5. Use business statistics for central measurements, frequency distributions, graphs, and measure of dispersion and be able to select which math method should be used for different problems.

Course Outcomes

1. To apply basic terms of integration in solving practical problems field of as of business.

2. To explain basic methods of business calculus, types and methods of interest account and their basic applications in practice.

3. To solve problems in the areas of business calculus, simple and compound interest account, use of compound interest account, loan and consumer credit.

4. To discuss effects of various types and methods of interest account.

5. connect acquired knowledge and skills with practical problems in economic practice.

Subject: Business Mathematics Class: B.Com. 2nd Sem.

Course Objectives
1. Understanding basic terms in the areas of business calculus and financial mathematics.

2. Independently solving of business problems.

3. Use percentages, ratios, and proportions for business applications such as discounts, markups, and markdowns, and be able to differentiate which math methods should be used for different problems.

4. Use simple and compound interest to do business calculations such as value of money, maturity value, promissory notes, present value, and future value and be able to differentiate which math method should be used for different problems.

5. Use business statistics for central measurements, frequency distributions, graphs, and measure of dispersion and be able to select which math method should be used for different problems.

Course Outcomes

After the successful completion of the syllabus, students will be able to
1. define basic terms in the areas of business calculus and financial mathematics.

2. explain basic methods of business calculus, types and methods of interest account and their basic applications in practice.

3. solve problems in the areas of business calculus, simple and compound interest account, use of compound interest account, loan and consumer credit.

4. discern effects of various types and methods of interest account.

5. connect acquired knowledge and skills with practical problems in economic practice

Subject: Economics

PROGRAMME SPECIFIC OUTCOMES (PSOs)

On successful completion of the B.Com. Economics program, the students are able to

PSO1   Have the Capability to demonstrate comprehensive knowledge and understanding on the basic concepts and theories that form a part of this programme.

PSO2   Have the Capacity to analyse and evaluate the current events from an economic perspective.

PSO3 Expand skills in practical application of economic theory.

PSO4   Possess an ability to offer alternative solution on policy issues.

PSO5   Demonstrate the ability to analyse, interpret and draw valid conclusions from quantitative and qualitative data.

PSO6   Communicate effectively on specific economic issues and present complex information in a clear and concise manner.

PSO7   Kindle the interest to use ICT in learning environment.

PSO8   Nurture the spirit of leadership qualities and readiness to work and learn.

PSO9   Boost the spirit of self confidence and inculcate the spirit of moral values.

PSO10   Build strong foundation for pursuing continuous learning

Course Outcomes:

Course Name: Micro Economics –II

S. NO.	COURSE OUTCOME
CO1	Explain how economists use economic models and able to Understand the Utility concepts.
CO2	Analyse the indifference curves and also understand its uses.
CO3	Explain the Elasticity of demand and supply.
CO4	Understand how factors of production can be used optimally to produce goods and services as they are the building blocks of the economy. Differentiate between short run and long run cost, interpret the relationship between short run and long run cost.

Course Name: Micro Economics II

S. NO.	COURSE OUTCOME
CO1	Gain analytical skills for understanding Market structure.
CO2	Analyse the characteristics and pricing methods under monopoly, Monopolistic competition, duopoly and duopoly.
CO3	Demonstrate the theory of interest and profits.
CO4	Analyse the marginal productivity theory of distribution.

S. NO.	COURSE OUTCOME
CO5	Understand how factor market works, illustrate basic tools in welfare economics and understand the concept of social welfare functions.

Course Name: MACRO ECONOMICS – 1

S. NO.	COURSE OUTCOME
CO1	Understanding nature of macro economics and various sectors interrelationship.
CO2	Gaining knowledge on classical and Keynesian theory of employment their relevance.
CO3	Preparing to understand various factors of consumption function.
CO4	Acculumlate knowledge on saving and investment function in an economy.

Course Name: Macro Economics – II

S. NO.	COURSE OUTCOME
CO1	Gaining the concept of multiplier and its effects in an economy.
CO2	Acculumlate knowledge on operation of accelerator multiplier in an economy.
CO3	Demonstrate the general equilibrium model with various sectors.
CO4	Sketch the various theories of trade cycle and its relevance.
CO5	Framing the macro economic policies through various theories.

Course Name: BUSINESS ECONOMICS 1

S. NO.	COURSE OUTCOME
CO1	Gain knowledge of Basic concepts and Nature of Principles of Business Economics to apply in Business decision making.

CO2	Grasp the ideas on Demand and supply and influence on determination of Price in the market.
CO3	Illustrate the short run and Long run cost and their relationship with output and examine the Revenue concepts.
CO4	Demonstrate the Equilibrium price output determination under perfect and imperfect market conditions.
CO5	Understand the Economists arguments concerning profit policy and acquaint the Knowledge on features of factors of production inflation, deflation and business cycle and its impact on Economy.

Course Name: BUSINESS ECONOMICS   ll

S. NO.	COURSE OUTCOME
CO1	Gain knowledge of Basic concepts and Nature of Principles of Business Economics to apply in Business decision making.
CO2	Grasp the ideas on Demand and supply and influence on determination of Price in the market.
CO3	Illustrate the short run and Long run cost and their relationship with output and examine the Revenue concepts.
CO4	Demonstrate the Equilibrium price output determination under perfect and imperfect market conditions.

Course Name – Development Economics

S. NO.	COURSE OUTCOME
CO1	Understanding the basic requirement of economic development and growth.
CO2	Extract the knowledge on planning techniques for economic development.
CO3	Appraise the various planning models and achievements.
CO4	Diagrammatize the various growth models on balanced growth and unbalanced growth.
CO5	Identify the best models of growth can implemented in India.

Course Name : INTERNATIONAL ECONOMICS

S. NO.	COURSE OUTCOME
CO1	Distinguishing the internal trade and external trade with policy of free trade and production.
CO2	Accumulate knowledge on various theory of international trade and its effects.
CO3	Preparing the BOP with various transition in India.
CO4	Analysing need, importance and effects of tariff and dumping.
CO5	Understanding the basic rate of foreign exchange and their importance in economic de3velopment.

Govt. College, Narnaul

POs, PSOs, COs of Syllabus Offered for B.A. Pass course in session: 2016-17

Program Name: B.A. Pass course

The B.A. program in Govt. College, Narnaul college is follows the syllabus prescribed by the affiliating university. Our students are allowed to choose from any of the two optional subjects from the cluster of History, Economics, Political Science, Sociology, Geography, Defence Studies, Mathematics and Sanskrit. B.A. program in our college meets the standards prescribed by general humanities education. Some program outcomes given below:

PO 1. The students acquire knowledge in the field of social sciences, literature and humanities which make them sensitive and sensible enough.

PO 2. The B.A. graduates will be acquainted with the social, economical, historical, geographical, political, ideological and philosophical tradition and thinking.

PO 3. The program also empowers the graduates to appear for various competitive examinations or choose the post graduate program of their choice.

PO 4. The B. A. program enables the students to aquire the knowledge with human values framing the base to deal with various problems in life with courage, humanity and develop civic culture.

PO 5. The students will be ignited enough to think and act over for the solution of various issues prevailed in the human life to make this world better than ever.

PO 6. Program provides the base to be the responsible citizen.

Program Specific Outcomes & Course Outcomes are described subject-wise for all subjects of B.A. Program and are attached herewith.

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Subject: English

Sr. No	Program Specific Outcomes
PSO-1	The 1st 2nd& 3rd year of English compulsoryat UG level enables the students to understand the scope and application of English. It aims to provide adequate basic knowledge about General English & Literature so that an interest of learner may develop and gives them the confidence to go to the next level of learning in the subjecti.e PG level
PSO-2	After the completion of all 6 semester course in English the learners will gain understanding about English language, which will make them skillful for jobs as translators as well as good speakers.
PSO-3	The learners will be able to crack the competitive examinations of UG level as well as entrance test for M.A. English in various Universities.
PSO-4	After learning the language and literature the students become eligible and confident in clearing competitive examinations as English language is indispensable in maximum of the examinations.

Course Outcomes of English compulsory subject under B.A.

Under 3 year B.A. Program the courses are designed with the following outcomes:

Course Details	Course Outcomes
Literature Language-I & II	This course will enable the students to understand the General aspects of Literature & Language. It also emphasis on the various methods of understanding the English language through literature.
Literature Language	This course will enable the students to understand the General aspects of Litrature& Language. It also emphasis on the various methods of understanging English language through literature.
Interpreting a play & Developing composition Skills	This course will enhance the skill of learners to understand the one specific branch of literature and composition skills as General learners of English.

Subject: Political Science under B.A. Program

Program Specific Outcomes:-

Political Science is a branch of Social Sciences that teaches a student about the State, Global Politics and Government. Not only in India, but this course is one of the most opted course around the World as well. The Political Science deals with the working of the state government and various agencies. It helps

the learner to know about the duties and responsibilities as well as their rights, the power and responsibilities of the government.

Greek philosopher Aristotle defined Political Science as "It is the course that deals with the study of the State".

Political Scientists have become so important today that they can be seen participating in every political debate.

A Graduate degree in Political Science prepares students for careers in research as well as managerial role in government or politics sectors. The various field/sectors are available to choose their careers:--

1. Understand the world, country, society and have awareness of ethical problems , social rights , values and responsibility to the self and to others.

 2. Understand and follow changes in patterns of political behaviour, ideas and structures. Develop the ability to make logical inferences about social and political issues on the basis of comparative and historical knowledge.

 3. Take individual and team responsibility, function effectively as an individual and a member or leader of a team ; and have the skills to work effectively in multi-disciplinary teams.

 4. Know how to access and evaluate data from various sources of information.

 5. Jobs :-- civil services, journalism, political scientists, bank manager, election campaign manager, Teacher , policy analyst, NGO, political content developer, legislative assistant, social media manager, political consultant, Human rights activists, legal advisor to political parties, political opinion analyst.

Course Outcomes for Political Science subject in B.A. Program:

Semester	Course Details	Course Outcomes
1	Indian Constitution	After completion of this course students will be able to understand about making and framing of Indian constitution along with various resources, constitutional values, rights and duties as well as centre and state constitutional structure.
2	Indian Politics	This course will enable the students to understand the Indian PoliticsIndian Politics federal structure, election procedure, Political parties, voting behaviour pattern and emerging trends in Indian politics.
3	Principles of political science-I	Students get acknowledged about the development of political science as discipline, concept of state, origin and functioning.
4	Principles of political science-II	This course will enable the students to understand the rights and duties at Universal level, liberty, equality, development and social

		changes, RTI & Consumer protection.
5	International Organizations-I	After completion of this course students will be able to understand about historical development of International organization, to maintain cooperation and making of peace toward nations.
6	International Organizations-II	Students get acknowledged about regional organizations i.e. SAARC, ASIAN, EEC etc. Decoloninization, International agencies: UNESCO, WTO, Social and trust-ship Council, Role of India in security council & International organizations.

Program Specific Outcomes(POs): Sociology under B.A. Program

समाजशास्त्रमेंकलास्नातकया BA
सोशियोलॉजीतीनवर्षीयस्नातककार्यक्रमहैजहांछात्रोंकोसमाजशास्त्रऔरसमाजशास्त्रकीसभीबेसिककॉन्सेप्टसेपरिचित करायाजाताहै।अगरमोटेतौरपरकहाजाएतोबीएसमाजशास्त्रसंस्कृति, सामाजिकसंपर्क,
सामाजिकस्तरीकरणऔरसामाजिकसंबंधोंकाअध्ययनहै।यहसमाजकाअध्ययनहै।समाजशास्त्रकेस्नातकडिग्रीकार्यक्रम मेंसमुदायऔरजनसांख्यिकी, अपराधऔरअपराध, सामूहिकव्यवहार, सांस्कृतिकसमाजशास्त्र,
तुलनात्मकसमाजशास्त्र, अनुप्रयुक्तसमाजशास्त्रआदिसमाजशास्त्रस्नातकपढ़ाईपूरीकरनेकेबादनिम्नपेशेकियेजासकतेहै
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प्रशिक्षणसलाहकार, सोशियोलॉजिस्ट, पुनर्वाससलाहकार, सामाजिकआलोचक, अनुसंधानसहायक,
सामुदायिकसेवाकार्यकर्ता, बाजारसर्वेक्षणशोधकर्ता, सोशलवर्कर, पारिवारिकपरामर्शदाता, जनगणनाकार्यकर्ता

Course Outcomes

CO-1: बी. ए. प्रथमसेमेस्टरसमाजशास्त्रमेंमूलभूतअवधारणाजैसेसमाजशास्त्रकीप्रकृति, क्षेत्र, समाज, समुदाय, संरचना, प्रस्थिति, भूमिका, आदर्श, मूल्य, समूह, परिवार, विवाह, नातेदारीधर्मआदिकेबारेमेंसिखाजाताहैं।

CO-2: दूसरेसेमेस्टरमेंजनजातीय, ग्रामीण, नगरीय, औधोगिक, उत्तरऔधोगिकसमाज, समजीकरण, सामाजिकनियंत्रण, संस्कृति, आधुनिकीकरण, सेकुलिरिज़्म, वैश्वीकरण, जाति, वर्ग, शक्तिआदि।

CO-3: इससेमेस्टरमेंसामाजिकशोधकीविधियाँ, सर्वेक्षण, अनुसूची, साक्षात्कार, अवलोकन, निदर्शन, उपकल्पना, माध्य, बहुलक, मध्यांकआदिकेबारेमेंसिखायाजाताहैं

CO-4: भारतमेंसामाजिकसमस्याएंजैसेविचलन, विघटन, पथभ्रष्टा, अपराध, कन्याभ्रूणहत्या, दहेज, एड्स, मद्यपान, भ्रष्टाचार, जाति, वर्ग, लैंगिकअसमानता, तलाक़, आदि

CO-5: इससेमेस्टरमेंविभिन्नसामाजिकविचारकोकेबारेमेंहैजैसेकाम्टेकाप्रत्यक्षवाद, स्पेंसरकाउद्विकासवाद, दुर्खीमकासामाजिकतथ्य, कार्लकावर्गसंघर्ष, कोजरकासामाजिकसंघर्ष,
वेबरकासामाजिकक्रियावकूलेकाप्रतीकात्मकसिद्धांत।

PSO-6: इसमेग्रामीणसमाजकेबारेमेंहैग्रामीणपरिवार, समाज, जाति, वर्ग, लैंगिकभेदभाव, जजमानीप्रथा, भूमिसुधार, हरितक्रांति, प्रवासीमजदूर, बंधूआमजदूर, पंचायतीराजआदिसिखाजारहाहै

Subject: History under B.A. Pass Course Program

PSO for History at Graduation level

History helps us understand how the world we live in today came into being. By studying the past, we can understand the Rounds of current events, Political systems, and social structures. History also Provides insights into the origins of cultural Practices, tradition and beliefs that have shaped our society.

These are important things about history

1. Learn about our culture

2. Learn about our identity

3. History builds citizenship

4. Understand Human Behavior

5. Warning signs of future events

6. Learn about the great leaders

7. Politicize history

History subject is more useful today's time be competition &master degree/ Archaeological degree.

The course is designed in the semester system comes each semester following course outcomes.

Course Outcomes:

Paper Istsem

History of (from Earliest times 1200 A.D.)

In this paper students get information about social , Religions, economic, political, cultural

history of India form Earliest time /initial call of human life till 1200 A.D.

IIndsem Paper

HISTORY OF INDIA (12:00 AD To 1707 AD.)

The syllables of this paper, we get information about the social, religious, economic, political,

cultural History of sultanate period and Mughal's period in medieval India.

IIIrdsem

History of India (1707 to1947)

The syllables of this paper is about the decline of the Mughals Empire and rise of the Marathas

and local kings, British rule, Freedom movement and British administrative system.

Ivthsem

History of Haryana (Earliest time to 1947 AD

In this paper we get information about ancient, medieval, modern time of social economic,

religious, Political arrangements has been done many historical wars happened in Haryana.

Vthsem

Ancient & medieval world.

In this paper we are taught in the ancient & medieval world civilizations and origin of Islam and

Christian Dharma and Feudalism & Trade of the world.

VIthsem

Modern world

In this paper we are thought the mercantilism, capitalism, Imperialism, agricultural, Technological, French

passion Revaluation. Ist&IInd world wars and all worlds events.

Subject: Sanskrit under B.A. Program

ProgrammeSpecificOutcomes(PSO):

PSO1. Develop a strong concept of ancient Indian history, philosophy and

literature.PSO2.Enhance communicationskills-

Listening,Speaking,Reading,Writing.

PSO3.Students will be able to write Devnagari scripts which provide them the paleographical knowledgetoreadoutthescriptofmodernlanguageslikeHindiandMarathi.

PSO4.Students will demonstrate the skill needed to participate in conversation that builds knowledgewith collaboration.

PSO5. Students will gain knowledge of the major traditions of literatures written in

Sanskrit.PSO6.Tomakethemeligibleforhigher education.

PSO7.Prepare studentsfortheprofessionofteacher,WBCS, UPSCetc.

CourseOutcomes(CO):

After becoming successful completion of all undergraduate general degree students should be able toachievethefollowingobjectives.

CO1.Studentswillbeableto knowancientIndianhistoryofliteratureandliterarycriticism.

CO2. Grammar is very important part of this language to make a sentence, to know appropriatemeaning of texts, oral communication and perfection. Grammar is the only way to know this languagewell.

CO3. They will learn about the Indian Philosophy, Religion and Culture in Sanskrit

tradition.CO4.ThroughGitatheyalsodeveloptheir personality.

CO5.Ayurveda will help them to know the Indian medical

tradition.CO6.They will also know Nation and Nationalism through

Sanskrit literature.CO7.Thestudentswillableto learntheyoga,theirconcept,

featuresetc.

DEFENCE STUDIES- under B.A. Program
Programme Specific Outcomes

Defence Studies students should be able to:
1. Differentiate among multiple Defence Studies perspectives (Ideologies, Theories) from a range of written or spoken genres.
2. Evaluate contemporary issues in light of different research methods and theories of Comparative International geo-politics.
3. Demonstrate the ability to outline and defend a vision of policies in areas such as defence, nuclear, foreign, cyber, science & technology in security purposes.
4. Critically assess the actions of actors in the Indian Ocean region.
5. Demonstrate the ability to interpret, locate, evaluate, generate, and use sociologically relevant data to test hypotheses and draw evidence-based conclusions.
6. After the completion of the course, students will be able to demonstrate knowledge of a range of pedagogical approaches for teaching Defence Studies.
7. Implement lesson sequences, assessment activities, and other requirements during a period of supervised professional experience.
8. Student will be able to understand the links between defence sector and economic models of demand. It will also help in understanding the efficiency and equity implications of arms market interference, including government policy.
9. Student will be able to understand govt. policies and programs related military affairs.
10. It will help students in understanding the behaviour of individuals and small organizations in making decisions on the small arms trade.
11. It will help students in understanding war finance.
12. It will help students in understanding civil-military relations, civil defence and military aid to civil administration.

DEFENCE STUDIES- Course outcomes		
BA First Year Semester 1st Paper 1st	World Military History (Earliest Time to 1789 A.D.)	**1. Influence of Armament on the History of World.:** Inter-Relationship of weapons and tactics, Wintringham's Theory and Fuller's Classification, Constant Tactical Factor. **2. The Age of Valour:** Comparative Study of Greek Phalanx and Roman Legion with special reference to the Battle of Pydna (168 B.C.), Detailed Study of the Battle of Arbella (331 B.C.)**,** Battle of Cannae (216 B.C.)**,** Reforms made by Alexander the Great in the Art of Warfare. **3. The Age of Chivalry: (378 AD-1346 AD)** Decline of Infantry and Emergence of Cavalry with special reference to the battle of Adrianople (378 A.D.) , Study of Battle of Hastings (1068 A.D.) , Study of Battle of Crecy (1346 A.D.) Causes of the Decline of Cavalry, Influence o Feudalism, Church and Chivalry, Medieval Warfare. **4. The Age of Gun-Powder:**Advent of Fire Arms and re-emergence of Infantry, Impact of Science and Technology on Warfare, Military reforms and contributions of GustavusAdophus and Frederick the Great. **5. The Age of Steam:** Revolution in Tactics, French Revolution 1789 A.D.**,** Napolionic Art of War., Battle of Waterloo 1815 A.D. **6. Contemporary Military Thinkers:** a) Suntzu. b) Kautilya. c) Machiavelli. d) Clausewitz. e) Jomini.
BA First Year Semester 2nd Paper 2nd	Military Psychology	**Military Psychology: Development; Functions and Problems, Significance.** **1. Human Factor in Fighting Forces:** i) Individual Differences, its importance for fighting forces. ii) Vocational Fitness, right soldier for a right job; Placement. iii) Methods of Selection: Job analysis, Interview: its merits and demerits. 2**. Fatigue: Causes and remedy**. **3. Motivation: Kinds, motivation during war.** **4. Aptitude and Morale :** Factors influencing Morale, Maintenance of Morale during War and Peace. **5. Tools of Psychological Warfare**: Brain Washing, Rumour. Technique of Propaganda,Indoctrination and Coercive persuation. **6. Military Leadership:**Triats, Types and Qualities. **7. Discipline and man-Management.**
BA Second Year Semester 3rd	WORLD MILITARY HISTORY (MODERN)	**1. Industrial Revolution and its Impact on Military Power.** **2. American Civil War (1862-65):** Introduction **,** Causes, Main

Paper 3rd		Events (in brief), Effects on warfare
		3. Russo-Japanese War (1904-1905): Introduction , Causes, Events (in Brief), Political Consequences
		4. World War 1st and its Origin:
		a) Causes of the World War-I
		b) Trench warfare and Armour with special reference to the battle of Somme.
		c) Naval Warfare; (i) Element of Sea Power, (ii) Naval Strategy and Tactics during world War-1.
		d) Air Warfare i) Birth and concept of Air Power and its development ii) Role of Air Craft during World War-1
		5. Second World War:
		a) Causes and Origin of World War-II.
		b) Armoured Warfare; Concepts of J.F.C.Fuller, Guderian and Liddell Hart.
		c) Air Warfare: Concepts of Douhet, Mitchell.
		d) Sea Power; Contribution of A.T.Mahan on Naval Warfare.
		6. Nuclear Warfare:
		i) Beginning of Nuclear Era.
		ii) Main destructive effects of nuclear energy. Flash, heat, thermal radiation, blast and nuclear radiation.
		iii) Theories of Nuclear Warfare: Deterrence and Massive Retaliation.

Subject: Economics

PROGRAMME SPECIFIC OUTCOMES (PSOs)

On successful completion of the B.A. Economics program, the students are able to

PSO1   Have the Capability to demonstrate comprehensive knowledge and understanding on the basic concepts and theories that form a part of this programme.

PSO2   Have the Capacity to analyse and evaluate the current events from an economic perspective.

PSO3 Expand skills in practical application of economic theory.

PSO4   Possess an ability to offer alternative solution on policy issues.

PSO5   Demonstrate the ability to analyse, interpret and draw valid conclusions from quantitative and qualitative data.

PSO6   Communicate effectively on specific economic issues and present complex information in a clear and concise manner.

PSO7   Kindle the interest to use ICT in learning environment.

PSO8   Nurture the spirit of leadership qualities and readiness to work and learn.

PSO9   Boost the spirit of self confidence and inculcate the spirit of moral values.

PSO10   Build strong foundation for pursuing continuous learning

Course Outcomes:

Course Name: Micro Economics –II

S. NO.	COURSE OUTCOME
CO1	Explain how economists use economic models and able to Understand the Utility concepts.
CO2	Analyse the indifference curves and also understand its uses.
CO3	Explain the Elasticity of demand and supply.
CO4	Understand how factors of production can be used optimally to produce goods and services as they are the building blocks of the economy. Differentiate between short run and long run cost, interpret the relationship between short run and long run cost.

Course Name: Micro Economics II

S. NO.	COURSE OUTCOME
CO1	Gain analytical skills for understanding Market structure.
CO2	Analyse the characteristics and pricing methods under monopoly, Monopolistic competition, duopoly and duopoly.
CO3	Demonstrate the theory of interest and profits.
CO4	Analyse the marginal productivity theory of distribution.
CO5	Understand how factor market works, illustrate basic tools in welfare economics and understand the concept of social welfare functions.

Course Name: MACRO ECONOMICS – 1

S. NO.	COURSE OUTCOME
CO1	Understanding nature of macro economics and various sectors interrelationship.
CO2	Gaining knowledge on classical and Keynesian theory of employment their relevance.
CO3	Preparing to understand various factors of consumption function.
CO4	Acculumlate knowledge on saving and investment function in an economy.

Course Name: Macro Economics – II

S. NO.	COURSE OUTCOME
CO1	Gaining the concept of multiplier and its effects in an economy.
CO2	Acculumlate knowledge on operation of accelerator multiplier in an economy.
CO3	Demonstrate the general equilibrium model with various sectors.
CO4	Sketch the various theories of trade cycle and its relevance.
CO5	Framing the macro economic policies through various theories.

Course Name: BUSINESS ECONOMICS 1

S. NO.	COURSE OUTCOME
CO1	Gain knowledge of Basic concepts and Nature of Principles of Business Economics to apply in Business decision making.
CO2	Grasp the ideas on Demand and supply and influence on determination of Price in the market.

CO3	Illustrate the short run and Long run cost and their relationship with output and examine the Revenue concepts.
CO4	Demonstrate the Equilibrium price output determination under perfect and imperfect market conditions.
CO5	Understand the Economists arguments concerning profit policy and acquaint the Knowledge on features of factors of production inflation, deflation and business cycle and its impact on Economy.

Course Name: BUSINESS ECONOMICS   ll

S. NO.	COURSE OUTCOME
CO1	Gain knowledge of Basic concepts and Nature of Principles of Business Economics to apply in Business decision making.
CO2	Grasp the ideas on Demand and supply and influence on determination of Price in the market.
CO3	Illustrate the short run and Long run cost and their relationship with output and examine the Revenue concepts.
CO4	Demonstrate the Equilibrium price output determination under perfect and imperfect market conditions.

Course Name – Development Economics

S. NO.	COURSE OUTCOME
CO1	Understanding the basic requirement of economic development and growth.
CO2	Extract the knowledge on planning techniques for economic development.
CO3	Appraise the various planning models and achievements.
CO4	Diagrammatize the various growth models on balanced growth and unbalanced growth.
CO5	Identify the best models of growth can implemented in India.

Course Name : INTERNATIONAL ECONOMICS

S. NO.	COURSE OUTCOME
CO1	Distinguishing the internal trade and external trade with policy of free trade and production.
CO2	Accumulate knowledge on various theory of international trade and its effects.
CO3	Preparing the BOP with various transition in India.
CO4	Analysing need, importance and effects of tariff and dumping.
CO5	Understanding the basic rate of foreign exchange and their importance in economic de3velopment.

Subject: Mathematics

Program Specific Outcomes (PSOs)

After the completion of the B.A. with math Students will be able to

1. Appear for master program in various universities.

2. They will get the understanding of mathematical application to solve project specific problems.

3. The learners will efficient in the mathematical calculations in daily works.

4. They may identify and design problem statement for further research.

Subject: Calculus   **Class: B.A. 1st Sem.**

Course Objective

1. Use the fact that the derivative is the slope of the tangent line to the curve at a given point to help determine the derivatives of simple linear functions.

2. Determine whether the equation of a function given is differentiable or continuous at a particular value of x.

3. Determine the information from a graph that when the second derivative is positive the graph is concave upward, when the second derivative is negative the graph is concave downward, and when there is a switch in sign there is an inflection point.

4. Understand the curvature and asymptotes of curve.

5. Calculate definiteintegrals.

Course Outcomes

After the completion of the course, Students will be able to

1. understand the relationship between the derivative and the definite integral as expressed in both parts of the Fundamental Theorem of Calculus.

2. locate the x and y intercepts, any undefined points, and any asymptotes.

3. determine asymptotes for rational expressions (we will not go into these graphs in much detail)

4. apply the techniques from the previous section to graph a fourth-degree polynomial or higher.

5. determine if there is any symmetry to aid in the graphing process.

6. determine the point(s) of intersection of pairs of curves.

Course Objective

1. To get basic knowledge about Circle, Cone, Parabola, Hyperbola, Ellipse etc.

2. To understand the concepts & advance topics related to two- & three-dimensional geometry.

3. To study the applications of conics.

4. To study the application of Sphere, cone and cylinder.

5. To study null lines, reduction of degree of second degree equations and conicoid.

Course Outcomes

After the completion of the course, Students will be able to

1. Trace conic.

2. Solve problem of sphere through a given circle, Intersection of two spheres

3. find equation of tangent of central conicoid

4. Solve problem related generating line.

5. Understand polar equations of conic.

Subject: Number Theory And Trigonometry   **Class: B.A. 2nd Sem.**

Course Objective

1. Define and interpret the concepts of divisibility, congruence, greatest common divisor, prime, and prime-factorization.

2. Formulate and prove conjectures about numeric patterns.

3. Produce rigorous arguments (proofs) centered on the material of number theory, most notably in the use of Mathematical Induction and/or the Well Ordering Principal in the proof of theorems.

4. Evaluate trigonometric and inverse trigonometric functions.

5. Solve trigonometric equations and applications.

6. Apply and prove trigonometric identities.

Course Outcomes

After the completion of the course, Students will be able to
1. Demonstrate knowledge and understanding of topics including, but not limited to divisibility, prime numbers, congruences, quadratic reciprocity, Diophantine equations.

2. Learn methods and techniques used in number theory.

3. Write programs/functions to compute number theoretic functions.

4. Use mathematical induction and other types of proof writing techniques.

5. Evaluate trigonometric and inverse trigonometric functions
.
6. Solve trigonometric equations and applications.

7. Apply and prove trigonometric identities.

Subject: Ordinary Differential Equations   **Class: B.A. 2nd Sem.**

Course Objective
1. Evaluate first order differential equations including separable, homogeneous, exact, and linear.

2. Show existence and uniqueness of solutions.

3. Solve second order and higher order linear differential equations.

4. Create and analyze mathematical models using higher order differential equations to solve application problems such as harmonic oscillator and circuits.

5. Solve differential equations using variation of parameters

6. Solve linear systems of ordinary differential equations

Course Outcomes

After the completion of the course, Students will be able to

1. Student will be able to solve first order differential equations utilizing the standard techniques for separable, exact, linear, homogeneous, or Bernoulli cases.

2. Student will be able to find the complete solution of a nonhomogeneous differential equation as a linear combination of the complementary function and a particular solution.

3. Student will be introduced to the complete solution of a nonhomogeneous differential equation with constant coefficients by the method of undetermined coefficients.

4. Student will be able to find the complete solution of a differential equation with constant coefficients by variation of parameters.

5. Student will have a working knowledge of basic application problems described by second order linear differential equations with constant coefficients.

Subject: Vector Calculus   **Class: B.A. 2nd Sem.**
Course Objectives

1. Define vector fields.

2. Calculate line integrals along piecewise smooth paths; interpret such quantities as work done by a force.

3. Use the fundamental theorem of line integrals.

4. Use Green's theorem to evaluate line integrals along simple closed contours on the plane.

5. Compute the curl and the divergence of vector fields.

6. Apply Stokes' theorem to compute line integrals along the boundary of a surface.

7. Use Stokes' theorem to give a physical interpretation of the curl of a vector field.

8. Use the divergence theorem to give a physical interpretation of the divergence of a vector field.

Course Outcomes

1. Memorize definition of directional derivative and gradient and illustrate geometric meanings with the aid of sketches.

2. Memorize theorem relating directional derivative to gradient and reproduce proof.

3. Calculate directional derivatives and gradients.

4. Apply gradient to solve problems involving normal vectors to level surfaces.

5. Explain the concept of a vector integration a plane and in space.

Subject : Advanced Calculus Class: B.A. 3rd Sem.

Course Objectives

1. To understand Different indeterminate forms of limit.

2. Calculate functional value in neighbourhood of some point using expansions.

3. To understand the behaviour of curve in space.

4. Continuity and Limits - Prove convergence and divergence of limits using the ϵ-δ definition.

5. Differentiation - Identify and prove basic facts about derivatives and their properties.

6. To understand the maximum and minimum behaviour of a function of two variables.

Course Outcomes

1. The student is expected to learn about the basic principles of multi-variable calculus with proofs.

2. To have full knowledge of calculus involving the fundamental tools such as continuity and differentiability.

3. Students are able to reason rigorously in mathematical arguments. They can follow abstract mathematical arguments and write their own proofs.

4. Students are able to effectively communicate mathematics: reading, writing, listening, and speaking. Students make effective use of the library, conduct research and make oral and written presentations of their findings.

5. To know Relationship between the increasing and decreasing behavior of f and the sign of f

Subject: Partial Differential Equation Class: B.A. 3rd Sem.

Course Objective
1. Introduce students to partial differential equations.

2. Introduce students to how to solve linear Partial Differential with different methods.

3. To derive heat and wave equations in 2D and 3D.

4. Find the solutions of PDEs are determined by conditions at the boundary of the spatial domain and initial conditions at time zero.

5. Technique of separation of variables to solve PDEs and analyze the behavior of solutions in terms of eigen function expansions.

Course Outcomes
After the completion of the course, Students will be able to
1. classify partial differential equations and transform into canonical form

2. solve linear partial differential equations of both first and second order

3. apply partial derivative equation techniques to predict the behaviour of certain phenomena.

4. apply specific methodologies, techniques and resources to conduct research and produce innovative results in the area of specialisation.

5. extract information from partial derivative models in order to interpret reality.

6. identify real phenomena as models of partial derivative equations.

Subject: Statics Class: B.A. 3rd Sem.

Course Objective
1. Develop an understanding of the principles of statics
2. Develop an ability to analyze problems in a systematic and logical manner, including the ability to draw free-body diagrams.
3. Ability to analyze the statics of trusses, frames and machine.
4. Ability to apply laws of statics.
5. To know the knowledge of equilibrium conditions of a static body.

Course Outcomes

After the completion of the course, Students will be able to
1. An ability to construct free-body diagrams and to calculate the reactions necessary to ensure static equilibrium.

2. An understanding of the analysis of distributed loads.

3. A knowledge of internal forces and moments in members.

4. An ability to calculate centroids and moments of inertia.

Subject : Sequences And Series Class: B.A. 4th Sem.

Course Objective

1. Learn to work with logarithmic, exponential, and inverse trigonometric functions.

2. Learn to work with infinite sequences and series.

3. Learn to work with infinite sequence is bounded.

4. Learn to work with an infinite sequence is monotonic.

5. Learn to work with an infinite sequence is convergent or divergent.

6. Find the sequence of partial sums of an infinite series.

7. Determine if a geometric series is convergent or divergent.

8. Find the sum of a convergent geometric series.

Course Outcomes

After the completion of the course, Students will be able to
1. Determine if an infinite sequence is bounded.

2. Determine if an infinite sequence is monotonic.

3. Determine if an infinite sequence is convergent or divergent.

4. Find the sequence of partial sums of an infinite series.

5. Determine if a geometric series is convergent or divergent.

6. Find the sum of a convergent geometric series.

7. Determine if an infinite series is convergent or divergent by selecting the appropriate test from the following: (a) test for divergence; (b) integral test; (c) p-series test; (d) the comparison tests; (e) alternating series test; (f) absolute convergence test; (g) ratio test; and (h) root test.
8. Determine if an infinite series converges absolutely or conditionally.

Subject: Special Function & Integral Transforms Class: B.A. 4th Sem.
Course Objective

1. To analyze properties of special functions by their integral representations and symmetries.

2. To determine properties of Fourier Transform which may be solved by application of special functions.

3. To determine properties of Laplace Transform which may be solved by application of special functions.

4. To determine properties of Legendre Polynomial which may be solved by application of special functions.

Course Outcomes

After the completion of the course, Students will be able to
1. understand integral calculus and special functions of various engineering problem and to known the application of some basic mathematical methods via all these special functions.

2. explain the applications and the usefulness of these special functions.

3. classify and explain the functions of different types of differential equations.

4. understand purpose and functions of the gamma and beta functions, Fourier series and Transformation.

5. use the gamma function, beta function and special functions to: evaluate different types of integral calculus problems and Fourier series to solve differential equations.

Subject: Programming in C & Numerical Methods Class: B.A. 4th Sem.

Course Objective

1. To develop programming skills using the fundamentals and basics of C language.

2. To study the advantages of user defined data type that provides flexibility for application development.

3. To enable effective usage of arrays, structures, functions and pointers.

4. Derive appropriate numerical methods to solve algebraic and transcendental equations.

5. Derive appropriate numerical methods to solve a linear system of equations.

6. Prove results for various numerical root finding methods.

Course Outcomes

After the completion of the course, Students will be able to
1. Read, understand, and trace the execution of programs written in C language.

2. Write the C code for a given algorithm.

3. Write programs that perform operations using derived data types.

4. Solve an algebraic or transcendental equation using an appropriate numerical method.

5. Solve a linear system of equations using an appropriate numerical method.

6. Perform an error analysis for a given numerical method.

Subject: Real Analysis Class: B.A. 5th Sem.

Course Objective

The student will:
1. Define the real numbers, least upper bounds, and the triangle inequality.

2. Define functions between sets; equivalent sets; finite, countable and uncountable sets. Recognize convergent, divergent, bounded, Cauchy and monotone sequences.

3. Calculate the limit superior, limit inferior, and the limit of a sequence.

4. Recognize alternating, convergent, conditionally and absolutely convergent series.

5. Determine if subsets of a metric space are open, closed, connected, bounded, totally bounded and/or compact.

6. Determine if a function on a metric space is discontinuous, continuous, or uniformly continuous.

Course Outcomes

After the completion of the course, Students will be able to

1. describe fundamental properties of the real numbers that lead to the formal development of real analysis.

2. comprehend rigorous arguments developing the theory underpinning real analysis.

3. demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration.

4. construct rigorous mathematical proofs of basic results in real analysis.

5. appreciate how abstract ideas and rigorous methods in mathematical analysis can be applied to important practical problems.

Subject: Groups & Rings Class: B.A. 5th Sem.

Course Objective
1. Present the relationships between abstract algebraic structures with familiar numbers systems such as the integers and real numbers.

2. Present concepts of and the relationships between operations satisfying various properties (e.g. commutative property).

3. Present concepts and properties of various algebraic structures.

4. Discuss the importance of algebraic properties relative to working within various number systems.

5. Develop the ability to form and evaluate conjectures.

Course Outcomes

After the completion of the course, Students will be able to
1. understand the importance of algebraic properties with regard to working within various number systems.

2. extend group structure to finite permutation groups (Cayley's Theorem).

3. understandSylow's Theorems.

4. generate groups given specific conditions.

5. investigate symmetry using group theory.

6. understand the three major concrete models of Boolean algebra: the algebra of sets, the algebra of electrical circuits, and the algebra of logic.

Subject: Dynamics Class: B.A. 5th Sem.

Course Objective
1. Develop an understanding of the principles of dynamics.
2. Develop an ability to analyze problems in a systematic and logical manner, including the ability to draw free-body diagrams of rigid body.
3. Ability to analyze the dynamics of rigid body.
4. Discuss the motion on smooth and rough planes.

5. Discuss general motion of rigid body, Keplers laws.

Course Outcomes

After the completion of the course, Students will be able to
1. An ability to construct free-body diagrams.

2. An understanding of the analysis of distributed loads.

3. A knowledge of internal forces and moments in members.

4. Apply Keplers laws to solve the problems.

Subject: Real & Complex Analysis Class: B.A. 6th Sem.

Course Objective
1. Understand how complex numbers provide a satisfying extension of the real numbers;

2. Learn techniques of complex analysis that make practical problems easy (e.g. graphical rotation and scaling as an example of complex multiplication);

3. Appreciate how mathematics is used in design (e.g. conformal mapping);

4. Unlearn (if ever learned) the notion that mathematics is all about getting "the right answer";

5. To understand signals and systems in terms of both the time and transform domains, taking advantage of the complementary insights and tools that these different perspectives provide.

6. Development of the mathematical skills to solve problems involving convolution, filtering, modulation and sampling.

Course Outcomes

After the completion of the course, Students will be able to

1. Students will be able to understand the concept of limit for real functions and be able to calculate limits of standard functions and construct simple proofs involving this concept;

2. Student will be introduced to the concept of continuity and be familiar with the statements and proofs of the standard results about continuous real functions;

3. Student will understand the concept of the differentiability of a real valued function and be familiar with the statements and proofs of the standard results about differentiable real functions.

4. Student will have a working knowledge of differentiability for complex functions and be familiar with the Cauchy-Riemann equations;

5. Student will evaluate integrals along a path in the complex plane and understand the statement of Cauchy's Theorem.

Subject: Geography

Program Specific Outcomes (PSOs):

PSO-1   The 1st semester of Geography at UG level enables the students to understand the Geography of India. It enables the students to understand the resourses available in India. The 2nd semester of Geography curriculum enables the students to understand the concept of physical geography and Geomorphology

PSO-2   The 3rd semester of geography at UG level enables the students to understand the concept of climatology. The 4th semester of B.A Geography provide the knowledge of human Geography like nature and scope of human geography,distribution and density of world population

PSO-3   The 5th semester of Geography inculcate the knowledge of economic condition and classification economic activities. The 6th semester of Geography provide the knoeledge about latest technology of mapping,remote sensing and Geographical information system

PSO-4   After the completion of all 6 semester course in geography the learner will gain understanding about latest technology of survey

PSO-5   The learner will be able to qualify compitative examination of UG level as well as entrance test for M.Sc Geography in various universities.

PSO-6   Students will be prepared to apply the skills in professional carrier

PSO-7   after completion the course successful condidates will be eligible for position like Geographer, Surveyer,scientist in Remote sensing

Course Outcomes:

Geography of India-Paper-101: Students will be able to understand the natural hazards,disasters and land resources

Physical Geography -Paper-102: After the completion of the course students will be able to gain the knowledge of interior structure of the earth,earthquakes and volcanoes

Climatology-Paper-201: After the completion of the course students will able to understand the concept of climatology.

Human Geography-Paper-202: Students will have a general understanding of distribution of race of india, distribution of density of world population, rural settlements.

Economic Geography-Paper-301After the completion of the course students will be able to understand economic activities and their impacts on environment, world natural resources

Remote Sensing and GIS Paper-303   After the completion of the course students will be able to use the tools and methods of GIS. Students will be familiar with modern techniquues in Geography

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3-   Nk=ksa dks lkfgfR;d vkSj lkaLd`ferd
xzFkksa esa fn[kkbZ nsus ohys egRoiq.kZ
fopkjksa] ewY;ksa vksj fo"k;ksa dh igpku
fo'ys"k.k.k o o.kZu djus esa l{ke gksrs gSAbu
foikjksa ewY;ksa vksj fo"k;ksa dks laLd`fr
vksj lekt dks lqfpr djus o çHkkfor djus esa
l{ke cukrk gS

4-   Hkkjjh; lkfgR; ds xzUFkksa ls voxr djrk
gsa o Nk=ksa ds O;fDrxr foikjksa dks fodflr
djrk gSA

HND 3123

1- e/;dkyhu dk thou lkEçnkf;drk vkSj
lkEçnkf;d jktuhfr ij pksV djrk gSA
2- vpusa le; ds ik[k.M vkSj vU/fo'okl ij djkjh
pksj lUr dfo us dh gS

3- dchj lekos'kh fodkl dk u;k ekWMy is'k djrs gsa vfgalk] eulk okpk deZ.kk ,d dh igpku jke esa djrs gSA

4- dchj vkt lokZf/kd çkalkfxd gS D;ksafd nqfu;k ckdn ds <sj ij cS<+h gsa vr% dchj dks ;kn djuk t:jh gSA

HNd-4119 ¼vkfndkyhu vkSj e/;dkfyu dfork ,e-,-prqFkZ lseSLVj 2019-2023½

1- fganh lkfgR; ds bfrgkl dks ij Hkkxksa esa ckaVk x;k gSA blesa vkfndky e/;dkfyu dfork ds ek/;e ls fo|kfFkZ;ksa esa rkIdkfyu lekftd O;oLFkk ls voxr djok;k rk ldrk gSA

2- bl isij ds ek/;e ,e-, fgznh ds fo|kfFh;ks dks rkIrdkyhu jkts& egkjkts ,ao lkearoknh O;oLFkkk ls :c: djok;k tk ldrk gSA

3- vkfndkyhu vkSj e/;dkfyu dfork ds ek/;e ls rkIrdkyhu lekt eas dksbZ çFkk, & dqçFkk,a tks Hkh lekt esa O;kIr FkhA muds ek/;e ls dforkvksa ds }kjk lekt dks js[kkafdr fd;k tkuk ,ao ,ao lekt dks Hkzfer djus okys ik[kaM+ks dk fojks/k rks u ds cjkcj Fkk D;ksafd lekt esa ftldk ^^ [k.kk mlh dk xk.kk^^ çFkk O;kir FkhA

4-   bl isij ds }kjk rkIrkdkyhu thou dh :i
js[kk dks js[kkafr djuk ,ao fo|kfFkZ;ksa dks
clls :c: djokuk bl isij dk çeq[k mns'; vusd
gks ldrs gSA

1-bl ikBØe ls Nk] lkfgR; fopkjk/kkjk] dyk
bfrgkl& ys[ku vkn :iks ls vfHko;DR gksrs gs ;g
,d ,sllk nk;jk gS ftlds rgr O;fdr vkSj leqnk;
;g crkrs gs d os [kqn dks D;k le>rs gSA

2-vfLerk foe'kZ ls mRiUu Nk=ksa esa lkfgfR;d
vfHkO;fDr dk cks/k fodlhr djuk gSA

3- nfyr fparu ls ysdj L=h vkSj vkfnoklh fparu
rd lHkh lkfgR; vksj dyk ds lekt'kkL=h; v/;;u
vuqal/kku ij cy fn;k gSA

4-Nk=ks dks lekt vkSj ns'k dh ukM+h dks ij[ks
vkSj mldh /kM+du dks le>s Hkk"k ckyus dh igpku
gksaA

4th sem

r`rh; ç'u i= ¼ik'pkR; dkO; 'kkL=½

HND-4121

1- Ikk'pkR; dkO;'kkL=h;ksa ls fon~;kFkhZ
   ik'ikR;dkO; ys[ku dks le>rs gSa
2- Ikk'pkR; laLd`fr dks le>us dk volj feyrk gS
3- dkO;'kkL= esa Hkkjrh; vkSj ik'pkR; ds chp
   varj dks le>rs gS vksj tks mi;ksxh gS mls
   xzg.k djrs gSA
4- Ikk'ikR; fopkjk/kjk ls fon~;kFkhZ voxr
   gksrs gS

HND- 4124
           ¼çseapn½
   1.çsepUn ds thou eqY;ksa ls voxr djkukA
   2- çsepUn sd vkn'kZokn o ;FkkZFkokn dks le>
   o vUrj dj ik,xsA
   3- lekt esa çsepUn ds le; dk ik:i le>
   ik,sxs

4 nfyr foe'kZ] fdl;ku /ksfcu] ukbZu vkfn
fuEu tkfr ds çfr i<+dj lerkewyd jk"Vª ds
fuek.kZ esa ;ksxnku gSA

5- eqa'kh çseapn dk lkfgR; vit Hkh gekjs
lekt esa ifjorZu ds fy, çsj.kk dk v{k; L=ksr
gsSA

Course out come ,e-,-fgUnh

lesLVj &lv   paper code- HND-4122

            ¼fgUnh vkykspuk½

1-   fgUnh vkykspuk
  dk mn~Hko dSls gqvk vkSj dfl çdkj ls bldh
  oSpkfjd fodlhr gqbZ bldk v/;;u t:jh gSA
2-   HkkjrrsUnq
  fgUnh vkykspuk ds çorZd ds :i esa lkeus
  vkrs gSA
3-   ekDlZoknh vkSj
  ¼vferkewyd vkykspuk dk fodkl vkt mls
  vkxs cM+k jgk gSSA

4-   jpukHkkjksa

jpuk ds vykok vkykspuk dk xq.k fdl çdkj
ls fodflr gksrk gSA ;g Hkh çseapn çlkn]
v'kksd o eqfFrDrcks/k dh vkykspuk esa
ns[kus dks feyrk gSA

Course out come ,e-,-fgUnh

lesLVj &Iv   paper HND-4123

        ledkyhu lkfgR; fparu ¼ekddZokn
fo[k.Muokn rd½
 1-   Xk¡k/khoknh dk
   fganh lkfgd ij çHkko ,d vafglk vkfn ds
   lanHkZ esa A
 2-   vEcsMjdkjh lfVd
   fparu dk lkfgd ij D;k çHkko iM+k vkSj
   fdl çdkj nfyr fodflr gksrh gSDA ;g
   mYysaduhZ; gSA
 3-
   Ekuksfojys"koknh vkSj vkdrRoknh lkfgd
   fprsu fganh lkfgd dks ubZ fn'kkka, gsa
   nfgr] vkfnoknh] foe"kZ blh nkSj esa
   'kq: gqvkA
 4-   Lajp;oknh vkSj
   mRrsjpukvksa lkfgd dk fgUnh ij çHkko ml
   iqoZ Hkh fo'ks"krk gSA

ch-,- f}rh; o"kZ ¼r`rh; lsesLVj½¼vk/kqfud fganh dfork ½

1-vk/kqfud fganh dfork ds ek/;e ls fo|kFkh;ks dks gfjvkS/k eSfFkyh'kj.k xqIr fujkyk th vusd çeq[k jpukdjksa dh jpukvksa ls voxr djk;k x;k gSa

2-jhfrdky ,d Jaxkjh dkO; gSa fleas dyk o ckSf}drk ds ckjs esa fo|kfFkZ;ksa dks crk;k tkrk gSaA ‘kq} dfork,a ml nkSj esa jph xbZ Fkh vkpk;Z jkepUn us e/; dky dh u;k ukedj.k fn;k blh ds ckjs esa cPpksa dh jhfrdky ls voxr djk;k x;k

3-bl dky esa D;k ifjorZu vk, fo|kFkhZ;ksa dks dkO; jpus dh vaydkj jl vkfn fo"k;ksa ls voxr djk;k tkrk gSa

4-Nk= vius }kjk vk, lekt esa u,s ifjorZu dks le>s bZesly baVjusV vkfn e'khuh dj.k dks viuk,s vkSj blds ykHk mBk,A

¼prqFkkZ lsesLVj½

1-fo|kFkhZ;ksa esa miU;kl dk v/;;u djus ls Kku çkIr djrs gSA thou dk lkj le>us esa lkg;d gSA

2- dgkuh ukVd]fuac/k vkfn vusd x/k fo/kkka, fon~;kFkhZ Loa; fu[kus yx tkrk gSA

3] fo/kkkFkhZ dk ckSf)d fodkl gksrk gSA ikfjHkkf"kd 'kCnksa dk I;u dj ikrk gSA

4- vUrjjk"Vªh;rkoknh]leUo;oknh] jk"Vªh;rkoknh
xq.kksa dk fodkl gksrk gSA

çFke lesLVsj e/;dkyhu dkO; dqat ,ao vkfndky dk egRo 2016-2023

1-   fo|kfFkZ;ksa esa
e/;dkyhu dfo% dchj]lqj ehjkckbZ] ?kukuan
fcgkjh ,ao jl[kku vkfn ds :i ls
fo|kfFkZ;sads gn; esa v/;kfReedrk dk lekos'k
djuk A

2- fo|kfFkZ;sadks jl fu"ifr vkfn Hkksksa ls
voxr djsaukk A

3-fo|kfFkZ;ksa esa vkfndkyhu lekt dh :i& js[k
dh >kadh dks çLrqr dj lekt dks iq.kZ:is.k çLrqr
djukA

4 fo|kfFkZ;ks esa 'kCn & 'kfDr;ksa dk fodkl
djuk ,ao rhuksa 'kCn 'kfDr;ksa ¼vfHkk/kk] y{k.kk]
O;atuk½ ds ckjs esa crukA

5-   fo|kfFkZ;ksa eas
ekuorkoknh ,ao lektokuh n`f"Vdks.k dks
fodflr djukA

programme specific outcome importance- B.S.C : (2016-2023)

1- fganh Hkk”kk ds ek/;e ls
fo|kfFkZ;ksa esa ekuorkoknh
n`f”Vdks.k dks fodflr fd;k tk ldrk gSA
D;ksafd fganhHkkkjr ns’k ds
vaf/kdk’k yksxksa dh Hkk”kk gsa
vksj ftl Hkk”kk esa ,d f’k’kq
cksyuk lh[krk gSa ml vklkuh ls
laLdkfjr fd;k tk ldrk gSA

2-   fganh Hkk”kk
ds }kjk dksbZ Hkh fo/kkFkhZ vius
fl)karksa dks vklkuh ls lekt o jk”kVªds Hkoh
d.kZ/kkj gksrh gSA

3-   foKku fo”k; ds
fo|kfFkZ;ksa esa uSfrdrk dk lekos’k djus ds
fy, ikB;deZ esa fganh Hkk”kk lqLaLd`r gksrs
gq, fdlh fdHkh O;fdr esa laosnuk mRiUu dj
ldrh gSA

4-   fganh Hkk”kk ij
cxj vPnh vf/kdkj ‘kfDr gS rks bl ds
ifj.kkeLo:I fdlh Hkh çdkj dh lsok Hkh nh tk
ldrh gSApkgs çk’k’kfud {ks= gks ;k dksbZ
O;ol;fnd {ks=A

5-   vkt fganh Hkk”kk
dk xzWkQ c<+rk gh tk jgk gSA blfy, blds
çpkj&çlkj dks c<+kus ds lkFk&2 gesa blds
‘kCn p;u çfØ;k ij Hkh fo|kfFkZ;ksa dk /;ku

vkdf"kZr djuk gS tks fdlh Hkh jk"Vª uhao gks
ldrs gSA

programme specific outcome importance-

B.S.C : (2016-2023)

1- fganh fo"k; ls oSKkfud n`f"Vdks.k
okys fo/kkfFkZ;ksa esa fganh lkfgR; ds }kjk
lqLaLd`r cukukA

2- fganh Hkk"kk ds }kjk fo/kkfFkZ;ksa dh
eqyHqr ço`fr;ksa esa vkewypqj ifjorZu djds
ekuorkokuh n`f"Vdks.k dks fodflr djukA

3- fganh Hkk"kk ds }kjk fo/kkfFkZ;ksa esa
lekftd tkx:drk dks mRiUu djukA

4-fganh Hkk"kk ds }kjk fo/kkfFkZ;ksa esa
fo'o dh Hkkouk dks fodflr djukA

Ckh-,- f}rh; lsesLVj /kzoLokfeuh
ukVd ,ao HkfDrdky dk egRo
2016&2023 ¼iapae lsesLVj½
2016&2023

        Lkedkyhu fganh dfork

1-/kzoLokfeuh ukVd ds ek?;e ls ukjh leL;k
dks fo|kfFkZ;ksa ds le> çLrqr dj muesa
laosnu'khyrk dk çknqZHkko mRiUu djuk A

2- bl ukVd ds ek?;e ls ukjh eqfDr dks ckr
dks lekt rd fo|kfFkZ;ksa }kjk igwapkuk rkfd
lekt esa ukjh dh eqfDr dks losfifj LFkku
fn;k tk lds tks fdlh Hkh :i esa gks ldrk
gSa ;Fkk iquZfookg fo/kok fookg vkfnA

3-HkfDrdky ds ek?;e fo|kfFkZ;ksa dks
lxq.k ,o fuxqZ.k dfo;ksa ,oa lekt lq/kkj
dksa dh jpukvksa ,oa dforkvksa ls voxr
djokukA

4- HkfDrdkyhu lekt lq/kkj ds vkank:syuksa ls
fo|kfFkZ;ksa dks :c: djokukA

Ckh-,- f}rh; lsesLVj 2016&2023

¼iapae lsesLVj½ 2016&2023

Lkedkyhu fganh dfork

1-fo|kfFkZ;ksa esa jlkuqHkwfr ,ao
lkSUn;kZuqHkwfr djuk Nk=k igys dfork dk vFkZ
le>s mlds ckn dkO; }kjk ijekuUn dh çkfIr
djsa A

2- ç;kstuewyd fgUnh 'kCn Nk=k esa
O;kogkfjd :Ik dks lEidZ Lo:Ik ls gS tks
tuekul ds vuqdwy vkSj tuO;ogkj ds fy, loZFkk
l{keg SA

3- foKku dh Hkk"kk ,ao 'kCnkoyh esa o`f}
gksrh gSA 'kCnks esa li"Vrk vkrh gSa

Ckh-,- f}rh; lsesLVj 2016&2023

¼iapae lsesLVj½

2016&2023 gfj;kuk Hkk"kk vkSj lkfgR;

1-çFke bdkbZ esa vusd dfo;ks dh çfl} jpukvks ds ek/;e ls cPpks ds euksfodkl mudh Hkkoukvksa dks çse dks çksRlkfgr fd;k tkrk gSa

2-gfj;k.koh Hkk"kk ds bfrgkl ls voxr dj;k tkrk gSa gfj;k.koh Hkk"kk ls gfj;k.kk ds bfrgkl ls lkax vkfn ls voxr djk;k tkrk gSa rkfd mles Hkh Hkk"kk ds çfr jkspdrk c<+s

3- gekjh laLdfr jhfr fjokt [kku& iku ls voxr djk;k tkrk gSa

4-ekuoh; detksfj;ksa] jktuhfrd Ny vkfn dks le>us dh {kerk vkrh gSA