



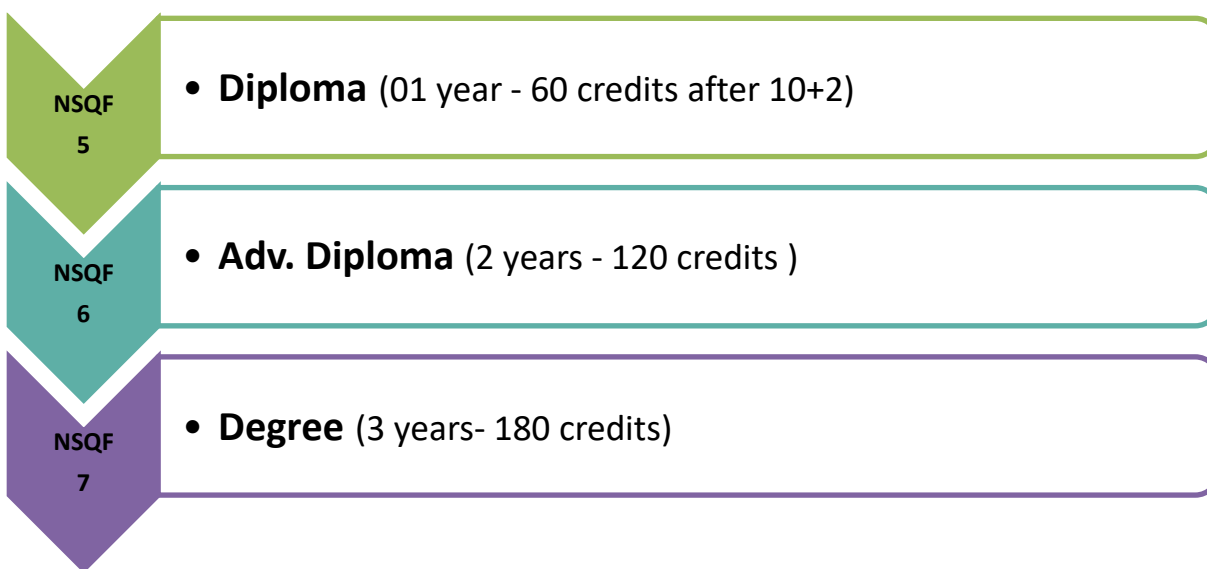
DEPARTMENT OF B.VOC

Food Processing and Preservation

B.Voc in Food Processing and Preservation

Programme Structure:

The three year B. Voc. Course (full time) has a specific feature of multi point entry and multi point exit provision. After completing one year of course, if any student desire to leave he/she will be awarded Diploma, subject to the condition of earning the required credit points. Similarly after completing the second year he/she will be awarded Advance Diploma and once the candidate completes the third year candidate will be awarded the degree of Bachelor of Vocational (Food Processing and Preservation). If any student desires to take admission to some other university, at any other stage i.e., on completing first year, he/she may take admission to second year in same branch. Similarly, on completing the second year, one can take admission to third year.



Programme Outcomes

The program outcomes are the skills and knowledge which the students have at each exit level/at the time of graduation. These outcomes are generic and are common to all exit levels mentioned in the program structure

- Students with vocational training can find work in several state and central government organizations, non-profit groups, and academic institutions and in private sectors as well.
- This program prepares students for specific types of occupations and frequently for direct entry into the market.
- After completion of this program students will have enough competences, to get benefit from market opportunities.
- This program would enable students to update their knowledge and professional skills for entering the work force executing income generating activities or occupying better positions

At each exit level of this program, students will be able to

- ✓ Apply knowledge of general education subjects and skill development subjects to the conceptualization of food processing technologies.
- ✓ Designing and formulation of new food products, on the basis of consumers demands, development of methodology/technologies of food processing, design that meet solutions needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
- ✓ Conduct and undertake investigations of problems of including design of processing technology for various type food, food analysis, food quality and safety aspects and interpretation of data in order to provide valid conclusions.
- ✓ Create, select and apply appropriate processing technology/techniques, resources, modern processing tools in order to improve the quality, safety and the shelf life fresh and process food.

- ✓ Communicate effectively on minimal processing activity and value addition to the farmers/producers/grower at large, such as being able to comprehend and write effective reports, design documentation and make effective presentations.
- ✓ Demonstrate understanding of the social, health, safety, legal and cultural issues and the consequent responsibilities relevant to Food processing.
- ✓ Understand and commit to professional ethics and responsibilities and norms/regulation for manufacturing of process food and its effects on health.
- ✓ Understand the impact of food processing technologies solutions in a societal context and demonstrate technical know-how and understanding of food safety, quality for sustainable development.

Programme Specific Outcomes.

- ❖ To impart knowledge in various aspects of Food Technology through Theory and Practical knowledge.
- ❖ To impart the knowledge about various compounds such as protein, carbohydrates, lipids amino acids, minerals, vitamins etc associated with the chemical compositions of food, their structures and functions.
- ❖ The students can gain knowledge about some very essential topic of nutrition and its metabolism balance inside the body.
- ❖ To make the students familiar with the technologies of food processing and preservation of plant and animal foods, cereals, pulses, oilseeds, fruits vegetables, spices, meat, fish, poultry, sea food, milk and dairy products.
- ❖ To gain concepts of food safety and quality managements, national and international, food laws and regulations as well as importance of food engineering and packaging in food industry.
- ❖ To gain knowledge about advanced technologies adapted in various food industries by physically visiting different food industries.



- ❖ To develop broader understandings on various aspects of management of waste coming from food Industries as well as from homes starting from its generation to processing with options for reuse and recycle, transport, and disposal practices so as to contribute towards sustainable development.
- ❖ To development students' understanding and communication skills through various assignments which will enable them to develop skills in writing and effective's interpersonal skills. Presentations in different topics enhances their confidence, ability to express themselves & presentation skills .

Course Outcome

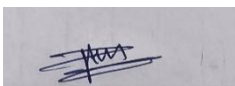
Year	Course Name	Course Outcome
FY. (Sem-I)	FPP-102: Fundamental of Food and Nutrition	✓ To develop proficiency skill in producing different nutritious food products.
		✓ Operating & management of balanced diets for different age groups
		✓ Make different processed food products with quality assurance
		✓ Assessment of nutritional status of the women and children
FY. (Sem-I)	FPP-103: Principles of Food Preservation	✓ Student will enable to understand different food preservation techniques, process.
		✓ Student will enable to extend shelf life of different food product by using the various methods of food preservation.
FY. (Sem-II)	FPP-111: Food Biochemistry	✓ To learn and understand the chemistry of various Food micronutrient used in foods along with their role and properties.
		✓ Students will learn about basic reaction in food and their kinetics; nucleic acid, digestion and electrophoresis - protein electrophoresis, protein purification
FY. (Sem-II)	FPP 112: Food Microbiology	✓ Students will understand causes of food spoilage of different foods and its type
		✓ To enable the students to gain an insight into basic aspects of food microbiology.
		✓ To understand the advanced techniques in microbial analysis of food.

FY. (Sem-II)	FPP-113: Processing Technology of Fruits and Vegetables	✓ To develop proficiency skill in producing different types of processed fruits & vegetables products.
		✓ Operating & maintenance the modern processing equipments& machineries
		✓ To make different processed fruit & vegetable based products with quality assurance and safety
		✓ Process of packaging, storing & marketing
Year	Course Name	Course Outcome
SY. (Sem-III)	FPP-201: Food Chemistry	✓ Student will enable to learn and understand the chemistry with respect to role and functionality of constituents of the food .
		✓ Student will enable to extend shelf life of different food product by using the various methods of food preservation, by adding preservatives and enhance the quality of food by adding food additives.
SY. (Sem-III)	FPP-202: Dairy Technology	✓ To get acquainted with the processing technology of milk and milk products
		✓ Students will learn about milk and milk products physicochemical properties, chemical properties.
		✓ Student will be able to learn the processing of paneer, cheese, butter, ghee and other milk products.
SY. (Sem-III)	FPP-203: Processing Technology of Cereals, Legumes & Oil seeds.	✓ Students will understand causes of food spoilage of different foods and its type

SY. (Sem-IV)	FPP-211: Food Biotechnology	<p>✓ Students will be enable to gain knowledge about, the biotechnological aspects involved in food and its application for development of food in relation to food security.</p> <p>✓ Students will be enable to learn genetics, molecular biology and basis for developments of genetically modified foods and their safety issues involved in food biotechnology</p>
SY. (Sem-IV)	FPP-212: Animals Products Technology	<p>✓ The students will get exposure in slaughtering techniques, processing and preservation of various meat, fish and poultry products</p>
SY. (Sem-IV)	FPP-213: Bakery & Confectionary Technology	<p>✓ The students will be familiar to various types of wheat flour, its application in bakery products and skill development in preparation of various bakery and confectionary products.</p>
Year	Course Name	Course Outcome
TY. (Sem-V)	FPP-301: Food regulation and quality control	<p>✓ Be able to critically evaluate the recent developments in the control of food safety and Have an integrated view of the issues involved</p> <p>✓ Be able to conduct risk assessments of food safety problems including genetic modification and demonstrate detailed knowledge of the requirements for compliance with national and international food safety legislation</p>

		<ul style="list-style-type: none"> ✓ Be able to explore the history and basic ideas underlying quality management and have a detailed knowledge of the role of Quality Management (QM) in modern management
TY. (Sem-V)	FPP-302: Food Packaging	<ul style="list-style-type: none"> ✓ Students will understand the principles, the fundamentals and the importance of packaging systems in the supply chain of food. ✓ Acquire knowledge on major packaging systems for foods and beverages in what concerns the materials, properties and their relation with the foods shelf-life and performance in the supply chain ✓ Acquire knowledge of physical, mechanical and chemical properties of the materials, and understand the impact of packaging on the safety of the food product and the role regarding food security.
TY. (Sem-V)	FPP-303: Spices & Flavors Technology	<ul style="list-style-type: none"> ✓ Acquire knowledge and skills in solving problems related to the preservation and use of spices and ability to understand foreign cultures and customs. ✓ Students will understand various major and minor spices and will acquire knowledge related to functional role.
TY.	FPP-311:	<ul style="list-style-type: none"> ✓ To learn and understand the chemistry

(Sem-VI)	Food Safety, Hygiene & Sanitation	of various Food micronutrient used in foods along with their role and properties.
		✓ Students will learn about basic reaction in food and their kinetics; nucleic acid, digestion and electrophoresis - protein electrophoresis, protein purification
TY. (Sem-VI)	FPP-312: Waste & By-products Utilization	✓ Students will be able to identify various wastes from food industries and understand their characteristics.
		✓ Understand various by products from food industry waste and understand various methods of waste treatment and disposal
		✓ To understand the advanced techniques in microbial analysis of food.
		✓ Understand legal aspects related to food waste disposal
TY. (Sem-VI)	FPP – 313: Novel Food Processing Technologies	✓ In depth understanding of novel and innovative food sciences and emerging technologies
		✓ Understanding and ability to apply these novel technologies and the underpinning science to preserve and control the nutritional, microbiological and functional properties of foods.



Head of the Dept. B.Voc

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Principal



DEPARTMENT OF B.VOC

Livestock production and Management

Programme Outcomes :

Vocational Education is education that prepares the students for specific job role in various sectors in livestock production and management organization. It trains the students from a trade, technician or professional position in R & D organizations for specific job roles.

The program outcomes are the skills and knowledge which the students have at each exit level/at the time of graduation. These outcomes are generic and are common to all exit levels mentioned in the program structure.

- i. Students with vocational training can find work in several state and central government organizations, non-profit groups, and academic institutions and in private sectors as well.
- ii. This program prepares students for specific types of occupations and frequently for direct entry into the market.
- iii. After completion of this program students will have enough competences, to get benefit from market opportunities.
- iv. This program would enable students to update their knowledge and professional skills for entering the work force executing income generating activities or occupying better positions
- v. At each exit level of this program, students will be able to
 - a) Apply knowledge of general education subjects and skill development subjects to the conceptualization of livestock production and management.
 - b) Livestock production and management appropriate consideration for public health and safety, cultural, societal, and environmental considerations.



- c) Conduct and undertake investigations of problems of including design of processing technology in livestock production and management interpretation of data in order to provide valid conclusions.
- d) Create, select and apply appropriate processing technology/techniques, resources, modern processing tools in order to improve the quality, safety in livestock production and management.
- e) Communicate effectively on minimal processing activity and value addition to the farmers/producers/grower at large, such as being able to comprehend and write effective reports, design documentation and make effective presentations.
- f) Demonstrate understanding of the social, health, safety, legal and cultural issues and the consequent responsibilities relevant to livestock production and management.
- g) Understand and commit to professional ethics and responsibilities and norms/regulation for manufacturing of livestock production & management.
- h) Understand the impact of livestock production and management in a societal context and demonstrate technical know-how and understanding of livestock production and management, quality for sustainable development.

Exit Options: Bachelor of Vocation (B. Voc.) is launched under the scheme of University Grants Commission for skill development based on higher education leading to Bachelor of Vocation (B. Voc.) Degree with multiple exits as Diploma/Advanced Diploma under the National Skill Qualification Framework (NSQF). The B. Voc. programme incorporates specific job roles and their National Occupational Standards along with broad based general education.

1. B. Voc. Programme has been designed as per National Skill Qualification Framework emphasizing on skill based education.
2. LEVELS OF AWARD:
 - i) The certification levels shall lead to certificate/Diploma/Advanced Diploma/ B. Voc. Degree in livestock production and management.

Award	Duration	Corresponding NSQF level
Certificate in Livestock Production and Management	6 Months	4
Diploma in Livestock Production and Management	1 Year	5
Advanced Diploma in Livestock Production and Management	2 Years	6
B. VOC. Degree in Livestock Production and Management	3 Years	7

Programme Specific Outcomes

After successful completion of the 1st year, the student shall be able to perform the following skills.

1. Student will be able to know Fundamentals of Livestock production and management, Animal nutrition and feed technology & Fodder production and management.
 2. Student will obtain knowledge Livestock production and management, Avian production management & Applied nutrition
- **Self-Employment and Employment Opportunities:** On successful completion of the course the candidates can either get employed, or become a self-employed / performer in any one of the following fields.
 1. To develop different Livestock production and management Farms.
 2. To works in different Livestock production and management Farms

➤ Skills to be acquired after completion of 2nd Year :

After successful completion of the 2nd year, the student shall be able to perform the following skills.

1. Livestock production and management-II
2. Avian production management
3. Applied nutrition
4. Livestock and poultry breeding

5. Commercial poultry production and hatchery management-I

6. Milk and meat hygiene

- **Self-Employment and Employment Opportunities:** On successful completion of the course the candidates can either get employed, or become a self-employed / performer in any one of the following fields.

1. Students will get job in poultry production and hatchery

2. Can start its own poultry production and hatchery.

➤ **Skills to be acquired after completion of 3rd Year :**

After successful completion of the 3rd year, the student shall be able to perform the following skills.

1. Epidemiology and zoonoses

2. Meat science

3. Pet animal breeding and management

4. Veterinary Clinical Medicine

5. Animal Welfare, Ethics

6. Environment and environmental hygiene

7. Livestock entrepreneurship

- **Self-Employment and Employment Opportunities:** On successful completion of the course the candidates can either get employed, or become a self-employed / Entrepreneur in any one of the following fields.

1. Student can start own livestock production Student can start own business

➤ **Course Outcomes**

Course: 101 Livestock Production Management I

After successfully completing this course, students will be able to:

1. Students study Identification of various breeds of

a. cattle,

b. buffalo,

c. sheep

d. goat

student study . Familiarization with body points of animals. Approaching, handling and restraining

- a. cattle,
 - b. buffalo,
 - c. sheep
3. To develop different Livestock production and management Farms.
 4. To work in different Livestock production and management Farms

Course : 102 Animal nutrition and feed technology

After successfully completing this course, students will be able to:

On successful completion of the course the candidates can either get employed, or become a self-employed Preparation and processing of samples for chemical analysis - herbage, faeces, urine and silages.

3. Weende's System of analysis - Estimation of dry matter, total ash, acid insoluble ash, crude protein, ether extract crude fibre, nitrogen free extract, Calcium and phosphorus in feed samples.
4. Demonstration of detergent methods of forage analysis.
5. Qualitative detection of undesirable constituents and common adulterants of feed.
6. Demonstration of laboratory ensiling of green fodders. Silage pit preparation.
7. Demonstration of conducting digestion trial in ruminants. Calculation of nutritive value of different feed stuffs in terms of digestible crude protein (DCP), total digestible nutrient (TDN), Nitrogen retention (NR) and starch equivalent (SE). Calculation of requirements of nutrients in terms of DCP, TDN and metabolisable energy (ME) for maintenance, growth, and other types of production like meat, milk, wool, reproduction and work.
8. Formulation of rations for different categories of livestock under different conditions.
9. Demonstration of the methods for improving the nutritive quality of straws and other crop residues.
10. Formulation of rations for feeding of livestock during scarcity periods. Visit to feed factories

Course : 103 Fodder production and management

After successfully completing this course, students will be able to:

Students study of grasslands and fodders in-livestock production.



Students identify Agronomical practices for production of leguminous and non-leguminous fodders in different seasons.

Student study Soil and water conservation and irrigation drainage for fodder production. Farm, power and agro-energy. Farm machinery and equipment Harvesting and post-harvest techniques for fodder preservation.

Course :-111: Livestock Production Management-II

After successfully completing this course, students will be able to:

- Student study** Identification of Indian and exotic breeds of swine; handling of swine; Routine inspection. Identification of diseases, examination and control of parasites, vaccination, Identification of pregnant animals. Care during pregnancy, isolation and care of farrowing sows, care of pig lings, Castration, culling, tooth cutting.
2. Calculation of profits and preparation of feasibility reports and projects for piggery. Layout plans of swine houses; routine operations of swine farms. Marketing of swine. Feeding of swines. Preparation of swines for show and judging.
 3. student Identification of body parts and handling of laboratory animals. Housing system and space requirements for laboratory animals. Weighing, sexing and weaning of laboratory animals. Marking for identification of laboratory animals for purpose of their individual recording. Computation and compounding of balanced diet for laboratory animal mainly Mice, Rats, Guinea -pigs and Rabbits.
 4. Feeding schedule of laboratory animals for high breeding efficiency. Maintenance of breeding records of laboratory animals. Prophylactic measures against common disease of lab animate. Hygienic care and control of parasites (routines).

Course –112 Avian Production Management

After successfully completing this course, students will be able to:

1. . Students will get job in poultry production and hatchery
2. Can start its own poultry production and hatchery.

Course -113: Applied Nutrition

After successfully completing this course, students will be able to:

1. student study the Calculation of requirements of nutrients in terms of DCP, TDN and ME for maintenance, growth, reproduction and other types of production like egg and meat.
2. Formulation of rations for poultry and swine with conventional and unconventional feed ingredients.
3. Principles of compounding and mixing of feeds.

Course -201: Livestock and Poultry Breeding

After successfully completing this course, students will be able to

1. Student study the Breeding methods for the improvement of dairy cattle and buffaloes crossbreeding, sire evaluation, field progeny testing, open nucleus breeding system (ONBS), sheep, goat, swine and poultry; Breed development; Conservation of germplasm, Current livestock and poultry breeding programmes in the state and country.
2. Description and measurement of economic traits of Livestock & poultry.
3. Standardization of performance records, Computation of selection differential, generation interval and expected genetic gain; Construction of selection index; Sire indices.
4. Measurement of inbreeding and relationship coefficients; Estimation of heterosis.

Course- 202: Commercial Poultry Production and Hatchery Management-I

After successfully completing this course, students will be able to

- 1 Male and female reproductive system. Artificial insemination. Selection of breeder flock.
2. Working of hatchery Incubation requirement; incubators working, care. Hatchery layout and equipment's. Handling of eggs prior and during incubation. Candling. Fumigation.
3. Project reports of setting up a hatchery. Hatchery records and maintenance. Exposure to commercial broiler and layer farms-different system of housing.
4. Demonstration of litter and cage rearing systems. Feed equipment's and maintenance; hammer mill, mixture, pellet mill-types, principle of working, comparison of different types, premix preparations, quality control of raw materials. Feed mill operation.
5. Demonstration of different types of feeder, waterer, fogger, sprinklers etc. Maintenance of farm records. Medication-demonstration of routinely employed methods of administration.
6. Vaccination practice in general and demonstration of different routes of administration in particular.

Course -203: Milk and Meat Hygiene.

After successfully completing this course, students will be able to

1. Sanitary collection of samples for chemical and bacteriological examination. Grading of milk by MBR test for pasteurization and plant sanitation.
2. Microbiological examination of raw and pasteurized milk, milk products and water. Standard plate, coliform, faecal streptococcal, psychrophilic, mesophilic and thermophilic counts.
3. Detection of adulterants and preservatives in milk and milk products. Isolation and identification of organisms of public health significance from milk.
4. Visit to abattoirs, meat processing plants, marketing centers and food service establishments. Ante-mortem and post mortem inspection of food animals. Methods of slaughter (demonstration at the slaughter houses).
5. Demonstration of speciation of meat. Physical and bacteriological quality of meat and aquatic foods (fish). Demonstration of toxic chemical and microbiological residues in milk and meat

Course 211: Milk and milk Products Technology

After successfully completing this course, students will be able to

1. Sampling of milk, estimation of fat, solid not fat (S.N.F.) and total solids. Platform tests.
2. Cream separation.
3. Detection of adulteration of milk.
4. Determination of efficiency of pasteurization.
5. Microbiological quality evaluation of milk and milk products.
6. Preparation of milk products like curd, ghee, paneer/channa, khoa, ice-cream, milk beverages.

Course : 212: Abattoir Practices and Animal Products Technology

After successfully completing this course, students will be able to

Methods of ritual and humane slaughter, flaying and dressing of food animals including poultry. Carcass evaluation.

2. Determination of meat yield, dressing percentage, meat bone ratio and cut up parts.
3. Preparation of different abattoir byproducts.
4. Visit to leather processing unit and slaughterhouses/meat plants.
5. Wool sampling techniques, determination of fleece density, fiber diameter, staple length, crimp and modulation percentage, scouring/clean fleece yield



Course 213: Avian Pathology

After successfully completing this course, students will be able to

1. Post mortem examination and diagnosis of poultry diseases based upon clinical signs and gross lesions
2. Collection, preservation and dispatch of morbid materials in poultry diseases.
3. Clinical examination of blood, faeces and other tissues/fluids for poultry disease diagnosis
4. Submission of feed samples for analysis.
5. Study of gross specimens and histopathological slides of different diseases of poultry

Course 301: Epidemiology and Zoonoses

After successfully completing this course, students will be able to

1. Collection of epidemiological samples. Measurement of disease: determination of morbidity and mortality rates/ratios.
2. Generation of epidemiological protocols and reports. Demonstration of selected software programmes/models e.g. EPIZOO, HandiSTATUS and India-Admas-EPITRAK. Evaluation of vaccines and diagnostic tests.
3. Determination of Associations and risks: relative risk, Odd's ratio and attributable risk. Survey of an animal disease on a farm.
4. Field survey of zoonotic diseases. Concurrent isolation and identification of important pathogens of zoonotic importance from animal and human sources including foods of animal origin and their interpretation.
5. Study of rural environment and health status of rural community.

Course 302. Pet Animal Breeding and Management

After successfully completing this course, students will be able to

Breeds of dogs- international pedigree breeds and those commonly seen in India. Pedigree sheet and major breed traits. Detection of oestrus and Breeding of dogs. Selecting a breed to keep, selection of a pup

Feeding of dogs- nutritional requirements of important breeds and different age groups. Management of dogs-kennels, care of pups and pregnant bitch. Dog shows- preparation for the shows, kennel clubs, important characters for judgment.

Common diseases affecting dogs (bacterial, viral, parasitic, fungal, nutritional etc.) their clinical manifestations, diagnosis, treatment and control. Vaccination/ deworming schedules. Common surgical interventions in dogs- docking, ear cropping, nail cutting, sterilization. Common anaesthetics and anaesthesia in dogs.

Common breeds of cats, their habits, feeding, breeding and management. Common diseases of cats- their diagnosis, treatment and control. Common surgical interventions in cat. Common pet birds seen in India. Introduction to their caging, breeding, feeding, management, disease control and prevention.

Course 303 Veterinary Clinical Medicine -II

After successfully completing this course, students will be able to

1. Student study the Diagnosis and management of diseases caused by deficiency of iron, copper, cobalt zinc, manganese, selenium, calcium, phosphorus, magnesium, vitamin A, D, E, B. complex, K and C in domestic animals and poultry. Nutritional haemoglobinuria. Diseases of neonates. Diseases of skin, musculo-skeletal system, nervous system and sense organs of domestic animals. Management of common clinical poisonings. Role of alternative/integrated/ethno veterinary medicine in animal disease management.
2. Clinical manifestation, diagnosis, prevention and control of infectious diseases, namely foot and mouth disease, rinderpest, bovine viral diarrhoea, malignant catarrhal fever, Infectious bovine rhinotracheitis, enzootic bovine leucosis, ephemeral fever, blue tongue, sheep and goat pox, PPR, classical swine fever.

Course 311: Livestock Economics and Marketing

After successfully completing this course, students will be able to

1. Book keeping; general entry, writing of journal and ledger, cash book (two and three column), purchase-book and purchase-sale return registers, trading account, profit and loss accounts, income and expenditure accounts, balance sheet bills of exchange (bill of receivable and bill of payable), bank reconciliation statement.
2. Economics of a dairy unit poultry, piggery, sheep and goat units.



Course 312: Veterinary Clinical Medicine –II

After successfully completing this course, students will be able to

Student study the Aetiology, clinical manifestations, diagnosis, differential diagnosis, treatment prevention and control of metabolic disorders/ production diseases. Milk fever, acute parturient hypocalcaemia in goats, sows and bitches, osteodystrophy fibrosa, lactation tetany in mares, downer cow syndrome, ketosis, hypomagnesaemia in cattle and buffalo, azoturia in equines, hypothyroidism and diabetes in dogs

Course 313: Commercial poultry production and hatchery management –II

After successfully completing this course, students will be able to

- 1. Health care-** Common poultry diseases: bacterial, viral, fungal, parasitic and nutritional deficiencies. Vaccination schedule for commercial layers and broilers: factors that govern vaccination schedule; vaccination principles type, methods, pre and post vaccination care. Medication: Types of administration-general principles and precautions with emphasis on administering medication through water and feed; commonly used drugs in poultry diseases. Disinfection: Types of disinfectants; mode of action; recommended procedure; precaution and handling.
 - 2. Economics-** Economics of layer and broiler production; Projects reports layer in different systems of rearing. Projects reports for broilers.-Feasibility studies on poultry rearing- in context of small units and their profitability. Designer meat and egg production. Export/import of poultry and poultry products.
 - 3. Breeder flock management-** Layer and broiler breeder flock management housing & space requirements. Different stage of management during life cycle; Light management during growing and laying period, Artificial insemination.
- Feeding:** Feed restriction, separate male feeding. Nutrient requirement of layer and broiler breeders of different age groups. Healthcare: vaccination of breeder flock; difference between vaccination schedule of broilers and commercial birds. Common diseases of breeders (Infectious and metabolic disorders)-prevention. Fertility disorder- etiology, diagnosis and corrective measures. Selection and culling of breeder flocks. Economic parameters on returns from breeders- for example saleable chick/hen/production cycle

Head
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Livestock Production & Management
G.M.D. Arts B.W. Commerce
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CO-ORDINATOR
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G.M.D. Arts, B.W. Commerce and Science College,
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Program Outcomes, Program Specific Outcomes, Course specific Outcomes

Department of Botany

Program Outcome: B.Sc. (Botany)	
Department of Botany	After successful completion of three-year degree program in Chemistry a student will be able to;
➤	Compete in different types of science-related branches and examinations
➤	Seeks admission to M.Sc. Botany, Biotechnology and other branches of Life sciences
➤	Enter in any research field of life science after completion of PG to find out new solutions to biology related issues.
➤	Solve the problem and also think methodically, independently and draw a logical conclusion.
➤	Employ critical thinking and the scientific knowledge to design, carry Out, record and analyze the results of biological (botanical) concepts.
➤	to think practically on various environmental issues like pollution, global warming, soil erosion etc. and act accordingly.
➤	To inculcate the scientific temperament in the students and outside The scientific community.
➤	Use modern techniques, decent equipment's and biological software's
➤	Find out biological solutions to revolutionize agriculture and crop improvement
➤	To implement Integrated pest management effectively
➤	Take care of the environment, agriculture and society with his knowledge
➤	Appear for competitive examinations and defend interviews

Program Specific Outcome: B.Sc. (Botany)	
➤	Student can get knowledge of plant world and can apply it in his daily life
➤	He is able to identify and classify any plant with his medicinal properties and basic chemical constituents.
➤	He is able to get job in agriculture, forest and any other sectors.
➤	He will become expert in operating various basic and advanced equipment's and chemical solutions for the basic experiments.
➤	He can compete any subject related competitive examinations like forest department.
➤	Understand good laboratory practices and safety.
➤	Develop research-oriented skills.
➤	Gets appropriate knowledge of environment and regarding solutions of various environmental issues by biological way.
➤	Act and aware people for environmental pollutions and other issues.
➤	With his knowledge he can effectively run the afforestation programme in the society.

Course Outcomes of B.Sc. (Botany)

Class	Course title & Code	Course Outcome
Semester- I		
F.Y.B. Sc.	BO-111: Plant Life and Utilization	<ul style="list-style-type: none"> Students may get knowledge of world of lower plants. An understanding of morphology, anatomy, reproduction methods, systematic position can be acquired by students. Economic and medicinal importance of different cryptogams like. Algae, fungi, lichens and bryophyte's may be known by the students. The utilization of different types of lower plants for the welfare of man can be understood by the students. Students can make small projects on collection, identification and enumeration of different types of algae, fungi, lichens and bryophytes occurring in the local area.
F.Y.B.Sc.	BO-112: Plant morphology and Anatomy	<ul style="list-style-type: none"> Students will be well acquainted with morphology and different terms used for the study of morphology of plants They can also study plant identification, nomenclature systems and classification of plants. Students will get knowledge of different anatomical terms and different tissue system They will be well acquainted with the morphological and anatomical differences of monocot and dicot plants.

F.Y.B.Sc.	BO-113: Botany Practical Course I	<ul style="list-style-type: none"> • Actual practical of lower plants like algae, fungi, bryophytes and lichens gives student the better understanding of lower plants. • They may also get familiar with different morphological terms with direct practical experience by handling different plants. • They may know diversity of flowers and fruits in Angiospermic plants and get knowledge to identify the plant. • By practicing taking sections of various plant parts, students may become familiar with anatomical studies and get skills of sectioning and staining of different plant parts.
Semester- II		
F.Y.B.Sc.	BO-121: Plant Life and Utilization-II	<ul style="list-style-type: none"> • Students will get an idea of vascular plants • They may know the morphology, reproduction and systematic position of different pteridophytes like <i>Nephrolepis</i>. • Economic and medicinal importance and utilization of different Pteridophytes can be learnt by the students. • Students will definitely learn difference between phanerogams and cryptogams, i.e. higher plants and lower plants. • The morphology, anatomy and reproductive organs of gymnosperms like <i>Cycas</i> can be better understood by students with their economic importance. • Students will be well acquainted with the different systems of classification of higher plants. • The economic importance and utilization of different food, fodder, fiber and medicinal plant can be better understood by students. •
F.Y.B.Sc.	BO: Principles of Plant Science	<ul style="list-style-type: none"> • Important physiological phenomenon like diffusion, osmosis, plasmolysis, plant growth etc. can be learnt by the students. • The role of all these physiological process in plant life can be better understood by the students. • The students will be better familiar with basics of plant cells and also get knowledge of various cell organelles. • They may become familiar with the cell cycle and different stages of mitosis and meiosis. • Advanced knowledge of molecular biology can be acquired by students. • They may also know the structure of DNA and nucleotides and also learn popular theory of DNA proposed by Watson and Crick. • They will know different types of DNA. Chromosomes etc. • Students will get thorough knowledge of DNA replication

		and enzymes involved in it which will be applicable for the better understanding of important concepts of molecular biology and molecular basis of inheritance.
F.Y.B.Sc.	BO-123: Botany Practical –II	<ul style="list-style-type: none"> • In this practical student can handle the plants like <i>Nephrolepis</i> for the better understanding of these plants. • Also, they will be well acquainted with the gymnosperms by handling specimens of Cycas. • Students can easily make comparison between Dicot and monocot plants. • They will practically study importance of angiospermic plants which includes, food, fodder, fiber, medicine etc. • Students with a study tour can better know about plant diversity in the local area. • Students will be well acquainted with mitosis and meiosis processes by using various plant parts. • They can understand the concepts of plasmolysis, osmosis and DPD by direct practicals.
Semester- III		
S.Y.B.Sc.	BO-231: Taxonomy of Angiosperms and Plant Ecology	<ul style="list-style-type: none"> • In this course students will get basic knowledge of plant taxonomy. • They can be acquainted with the different systems of classification, Rules of plant nomenclature and Identification. • Student may learn basic knowledge of plant identification. • Students are well acquainted with some basic terms like typification, binomial nomenclature etc. • Students will study some representative families in detail. • In other half of course students are get knowledge of some basic phenomenon of ecology • Different plants and ecological grouping will also be studied by the students.
S.Y.B.Sc.	BO-232: Plant Physiology	<ul style="list-style-type: none"> • Students will be familiar with many physiological phenomenon like Water absorption, ascent of sap, transpiration, nitrogen metabolism, seed dormancy and germination and physiology of flowering. • Students may get answers of the questions in their mind about the metabolic activities of the plants. • Students will get an idea of various phenomenon of flowering, how plants absorb water from soil and provide it to upper plant parts. • They may get knowledge of seed dormancy and germination. • Students may be well acquainted with basic phenomenon of nitrogen fixation and microorganisms

		associated with it.
S.Y.B.Sc.	BO-233: Practical Botany-III	<ul style="list-style-type: none"> • In this practical course, students will have hands on training on • Identification of plant families • Description of flowering plants • Study of different types of taxonomic and ecological instruments. • Different physiological processes like, DPD, Leaf protein isolation, transpiration etc. • Some ecological field work practical's also carried out by students including seed germination percentage, study of vegetation by list count quadrat method etc. • Students will also experience the field trips, excursion visits arranged by department.
Semester- IV		
S.Y.B.Sc.	BO-241: Plant Anatomy and Embryology	<ul style="list-style-type: none"> • In this basic theory course, students will be familiar to • Basics of plant anatomy • Plant embryology • Different types of tissue systems which includes, epidermal, mechanical and other. • Students may learn how secondary normal and abnormal growth takes place in dicot and monocot plants. • In the second half of this course, students will get an idea of plant embryology. • They may learn in details about the concepts of microsporangium and mega sporangium with their stepwise development. • . Students will get knowledge of pollination and its various types. • They may also get familiar with the fertilization and formation of endosperm and embryo. •
S.Y.B.Sc.	BO-242: Plant Biotechnology	<ul style="list-style-type: none"> • In this advanced subject, students will get an idea of plant biotechnology and its importance. • Students will learn in detail about emerging branch which is known as Plant tissue culture. • They also get knowledge of single cell proteins and their application. • Plant genetic engineering and its different techniques may be learned by the students with different types of

		<p>enzymes associated with.</p> <ul style="list-style-type: none"> • Students also will learn the concepts of genomics, proteomics and bioinformatics. • A new and emerging field, bioremediation is included in the syllabus which can be utilized by the students for pollution control. • Biofuel is an emerging technology and it is need of time. Students by studying the concept of biofuel may be well acquainted with the techniques and significance of biofuel over fossil fuels.
S.Y.B.Sc.	BO-243: Practical Botany-IV	<ul style="list-style-type: none"> • In this, practical paper, students will practice hands on training on sectioning for the better understanding of concepts like different types of tissue system, including epidermal, meristamatic, vascular etc. • Students may get practical knowledge of staining. • In the biotechnology section, they may learn practicals of tissue culture, media preparation, stant preparation, sterilization etc. • Students may practice laboratory cultivation of Spirullina. • They will have demonstration of some practical's like gel electrophoresis, transgenic crops, tissue culture etc. • Students will visit any tissue culture laboratory for the better understanding of different steps. • By better understandings of the cultivation techniques of spirullina, students may start their own business.
Semester-V		
T.Y.B.Sc.	BO-351: Cryptogamic Botany (Algae and Fungi)	<ul style="list-style-type: none"> • This course is important for the better understanding of the basic botany especially Algae and fungi. • Algae, fungi, bryophytes and pteridophytes will be better understood by the students in here. • General characteristic features of different cryptogamic plants including algae, fungi can be better understood by the students. • Nutrition, taxonomic positions, and reproduction of different cryptogams will be better understood by the students. • Students would learn Morphological and anatomical characteristics, life cycles and classification of different algae and fungi Classification of different cryptogamic plants can be studied by students. • Students will also become acquainted with the symbiotic associations of various algae an fungal groups.
T.Y.B.Sc.	BO-352: Archegoniate	<ul style="list-style-type: none"> • The present course deals with detailed study of higher cryptogams including bryophytes and pteridophytes. • In the first credit, students will learn about general account, classification, thallus organization origin of different bryophytes. Students will also learn life

		<p>cycles, morphology, anatomy and reproduction of different species of bryophytes.</p> <ul style="list-style-type: none"> • Second credit of the course deals with the study of general characteristics, classification and distribution of pteridophytes. Students will also learn about classification morphology, anatomy, reproduction of selected groups of pteridophytes. Lastly students will get know about ecological and economical applications of pteridophytes.
T.Y.B.Sc.	BO-353: Spermatophyta and Paleobotany	<ul style="list-style-type: none"> • Spermatophytes are the higher plants which includes gymnosperms and angiosperms. • Through this course, students will learn the different types of classifications systems associated with gymnosperms and angiosperms. • The first credit deals with angiosperms in which students will learn about concepts like, origin of angiosperms, speciation, endemism, classification systems, herbaria and botanical garden. • Second credit is devoted to gymnosperms in which students are able to learn distribution, morphology, anatomy, reproduction, gametophyte and sporophyte of the plants <i>Pinus</i> and <i>Gnetum</i>. • In the last chapter of course, students will learn about palaeobotany and fossils with different type of fossil groups. • This course is very important for students to differentiate angiosperms and gymnosperms and also to describe and identify different plants. •
T.Y.B.Sc.	BO-354: Plant Ecology	<ul style="list-style-type: none"> • This is basic course associated with environment. • In the first credit, students are able to learn about concepts of ecosystem, biogeography, population ecology, community ecology and various biogeochemical cycles. • Second credit is associated with some advanced concepts like ecological Impact assessment, environmental audit, remote sensing and ecological management. • This course will be very helpful from students to know the ecology and help them to take efforts for environmental conservation.
T.Y.B.Sc.	BO-355: Cell and Molecular Biology	<ul style="list-style-type: none"> • Cell is basic fundamental unit of life. How it is can be learnt by students in this paper. • Introduction to cell and cell biology with its brief history will be learned by the students. • Students will be familiar with cell and different types of cell organelles. • Cell organelles like, cell wall, plasma membrane, Endoplasmic reticulum, mitochondria, chloroplast etc can be learn by the students with their morphology, chemical constituents and functions.

		<ul style="list-style-type: none"> • It is very important for the better understanding of prokaryotic and eukaryotic cells. • Cell signaling is an important aspect of cell science which also will be learnt by the students. • In the second half of this course students are able to learn various phenomenon of molecular biology which includes central dogma, transcription, translation, DNA replication, damage and repair, genetic code etc. • Students may also get familiar with different gene actions and regulations
T.Y.B.Sc.	BO-356: Genetics	<ul style="list-style-type: none"> • In this course students can learn concepts of Genetics. • In the first credit, students will learn basics of genetics, Mendelism and his laws and different crosses. • They will also learn concepts like gene interaction, multiple alleles, linkage and crossing over and mutations. • In the second credit, students will learn about quantitative and cytoplasmic inheritance, sex linked inheritance, chromosomal aberrations (structural and functional alterations in chromosomes), euploidy and aneuploidy with suitable examples. • Students also will get an idea of • In the second half, students may get an idea of different
T.Y.B.Sc.	BO-3510 Medicinal Botany	<ul style="list-style-type: none"> • Actually this course is added newly in the syllabus as a skill enhancement course. • This course is very important for students to enhance their skills in the field of medicinal plants and Ayurveda which will make them an expertise in the field. • In the first credit, students will learn about history and scope of medicinal plants and concepts of indigenous medicinal sciences. They will also learn in detail about different medical systems like Ayurveda, Siddha and Unani. • Students will also learn how to conserve endangered and endemic medicinal plants. • Second credit of the course deals with propagation of medicinal plants in nursery and associated practices. They will also learn about ethnobotany and folk medicines used for the treatment of common and severe ailments. • As it is a skill enhancement course, it will develop students with skills of business and inculcate skills among them.
	BO-3511 Plant Diversity and Human health	<ul style="list-style-type: none"> • This course is also included in the syllabus as a skill enhancement course which is related to human health. • In the first half of the course, students will learn about concepts of plant diversity, agrobiodiversity, losses of biodiversity and management of plant diversity. • Second credit deals with conservation of biodiversity,

		<p>biodiversity awareness, sustainable development etc.</p> <ul style="list-style-type: none"> Students will also learn about role plants in human life. Importance of forestry with their utilization and commercial aspects. This course is helpful for students to make themselves expert in social forestry, in-situ and ex-situ conservation of plants, sustainable development etc.
T.Y.B.Sc.	BO-357: Botany Practical-I	<ul style="list-style-type: none"> This practical course is dependent on the theory courses Cryptogamic botany (Algae and fungi) and Archegoniate. In this course students will learn thallus structure and structure of different algal and fungal species practically (<i>Nostoc</i>, <i>Oedogonium</i>, <i>Chara</i>, <i>Sargassum</i>, <i>Palmaria</i>, <i>Mucor</i>, <i>Saccharomyces</i>, <i>Penicillium</i>, <i>Puccinia</i> and <i>Cercospora</i>). Also they will study morphology of thallus of different bryophytes and pteridophytes with their systematic position and reproductive structures (<i>Marchantia</i>, <i>Anthoceros</i>, <i>Funaria</i>, <i>Psilotum</i>, <i>Selaginella</i> and <i>Equisetum</i>). Stelar evolution is an important concept in the life of pteridophytes. Students will practically get acquainted with it through sections and permanent slides.
T.Y.B.Sc.	BO-358: Botany Practical-II	<ul style="list-style-type: none"> This practical course is depending on two theory courses, Spermatophyta & Palaeobotany and Ecology. Students will practically dissect flowers of plant species belonging to families, <i>Nymphaeaceae</i>, <i>Oleaceae</i>, <i>Amaranthaceae</i> and <i>Cannaceae</i> and learn floral diagram, morphological features, floral diagram and systematic position of those plants. Students will practically learn how to make different types of artificial keys. In the gymnosperms, students will learn about internal and external morphology of <i>Gnetum</i> and <i>Pinus</i> by taking sections of leaf, stem roots, reproductive parts, Fossils are important sources of plant identification and for the study of ancient plants. Through permanent slides students will practically know about the concepts of impression, compression and petrification. In the practical's of ecology, students will learn practical's based on Study of BOD, Turbidity, pH etc of polluted water body. Also, students are able to learn practical applications of GPS and study of vegetation by various methods.
T.Y.B.Sc.	BO-359: Botany Practical-III	<ul style="list-style-type: none"> This practical course is dependent on theory courses cell and molecular biology and Genetics. Some advanced practicals are included in this practical course. Students will learn how to prepare different stains and fixatives, technique of isolation of nuclei, stages of mitosis and meiosis, c-metaphase, study of

		<p>chromosomal morphology, Isolation of plant genomic DNA, Estimation of plant DNA by DPA method.</p> <ul style="list-style-type: none"> Students will also learn to solve problems based on monohybrid and dihybrid crosses, human genetic traits, quantitative inheritance, multiple alleles etc.
Semester-IV		
T.Y.B.Sc.	BO- 361: Plant Physiology and Metabolism	<ul style="list-style-type: none"> In the first half of this course, the concepts like photosynthesis, respiration, translocation of solutes, stress physiology will be studied in detail. Different physiological phenomenon like mineral nutrition, light reaction, dark reaction, photophosphorylation, HSK pathways, C4 pathways, Glycolysis, ETS, etc can be studied by students in detail. In the the second half, student will learn about stomatal biology, translocation in phloem, different plant growth regulators and concept of photomorphogenesis.
T.Y.B.Sc.	BO-362: Biochemistry	<ul style="list-style-type: none"> This course is very important for students as far as competitive examinations are concern. In this course, the first credit is associated with the study of foundation of biochemistry, biochemistry of water. Study of different types of amino acids and proteins with their properties and functions. Enzymology is also an important part of the courses in which students will learn about nature, properties activities and functions of various enzymes. In the second half of the course students will become well acquainted with classification, properties, classification configuration and functions of carbohydrates. Also students will learn about properties, classification and functions of lipids and different vitamins.
T.Y.B.Sc.	BO-363: Plant Pathology	<ul style="list-style-type: none"> In this course students will get knowledge of some important terms of plant pathology, incitants, host etc. Also, students will also get knowledge of the mechanism of disease development, defense mechanism etc. Students also learn the methods of studying plant diseases. The students can get knowledge of different fungal, bacterial, mycoplasma, nematodal, viral diseases with causal organisms, symptoms and control measures. Some non-parasitic plants diseases are also included under the syllabus which are also beneficial for students to get better knowledge of plant diseases. Students will also learn about principles of plant

		<p>disease control and molecular diagnostic features & transgenic in crop protection.</p> <ul style="list-style-type: none"> • By the knowledge of this course students will get basic knowledge of local crop diseases.
T.Y.B.Sc.	BO-364: Evolution and Population Genetics	<ul style="list-style-type: none"> • This course is newly introduced in the syllabus but it is very important. • Credit first of the course includes study of organic evolution, origin of life, origin of earth, fossils early life and origin of genetic code. • It also depends on theories of evolution, Darwinism, natural selection theory, and evidences of evolution. • In the second credit students will learn concepts of evolution through ages, population genetics, speciation and isolating mechanism in detail. • By the study of this students can get a detailed insight about how life and earth originated and hown plants are evolved with time.
T.Y.B.Sc.	BO-365: Advanced Plant Biotechnology	<ul style="list-style-type: none"> • This is advanced course of botany in which some biotechnological principles will be learnt by students. • In the plant tissue culture section, students are able to study techniques, and applications of callus, cell suspension, protoplast, and embryo culture. Apart from this, students may get knowledge of some concepts like somatic hybridization, micropropagation, embryo rescue etc. • Students will also become familiar with the concept of germplasm and cryopreservation, microbial biotechnology. • Through this course students will learn essential steps of genetic engineering and its tools and vectors. • . Students will also get a knowledge of genomics and proteomics with their concept and applications. • Students can get know how transgenic plants serves as bioreactors. • With the proper study of this course students will become well acquainted with advanced concepts related to biotechnology.
T.Y.B.Sc.	BO-366: Plant Breeding and Seed Technology	<ul style="list-style-type: none"> • This course deals with two branches 1. Plant breeding and 2. Seed technology. • In the first half of this course, students will learn basics of plant breeding, plant introduction and acclimatization. • Also students will learn about different selection methods like mass, pure line and clonal selection. • Also students will learn about different concepts of hybridization, breeding methodology, heterosis and hybrid vigour, mutation breeding. • Students may know the different types of mutagens like

		<p>chemical and physical to carryout mutation breeding.</p> <ul style="list-style-type: none"> • Students also get an idea of polyploidy and aneuploidy in crop improvement. • Also, students become acquainted with breeding for stress tolerance. • Seed technology is another section of this course in which students would learn about different types of seeds. • Students also get knowledge about different concepts of seed technology including, seed certification, seed processing, seed sampling, storage and packaging, testing and marketing.
T.Y.B.Sc.	BO-3610: Nursery and Gardening Management	<ul style="list-style-type: none"> • This is skill enhancement course newly introduced in the syllabus. • First credit of this course is based on nursery management. Students of botany through this course will get knowledge of erection of nursery. They get know about concept and scope of nursery. Also students will get knowledge of seed and associated terms like seed dormancy, seed structure, storage, propagation, seed bank etc. • Some plants in a Nursery can be grown by using vegetative propagation methods like cutting, layering, budding and hardening of plants. Student will earn skill of plant propagation in nursery through sexual and vegetative propagation methods. • In the second credit, students will learn about Gardening management. In this they will learn about skills of gardening, landscaping etc. • Student will also learn seed sowing, testing and transplanting of seedlings of various vegetable plants. • In this way students thorough this course will become skilled in nursery management and landscaping.
T.Y.B.Sc.	BO-3611: Biofertilizers	<ul style="list-style-type: none"> • This course is also skill enhancement course under which students will get knowledge of different biofertilizers. • By successful completion of this course students will become able to erect a biofertilizer company. • They will get knowledge about mass cultivation of various bacterial biofertilizers. • Students may also practice cultivation of algal as well as fungal biofertilizers. • Students will also get knowledge of composting and green manure synthesis. • Students can achieve expertise in vermicomposting. • With the knowledge of this course, students will reach up to the farmers and help them to increase their

		<p>productivity without causing any type of pollution. It will also earn money by selling biofertilizers.</p> <ul style="list-style-type: none"> • Thus this course is definitely helpful to students to become an entrepreneur.
T.Y.B.Sc.	BO-367: Botany Practical-I	<ul style="list-style-type: none"> • This practical paper is based on two theory courses, 1. Plant physiology & metabolism and 2. Biochemistry • Students can learn some advanced practical experiments in this course. • Students will get practical knowledge of the courses like, plasmolysis, stomatal index and stomatal frequency, effect of certain enzymes, photosynthesis, respiration etc. • Students will also learn about biochemical experiments like paper chromatography, protein estimation, enzyme activity, spectrophotometry, estimation of vitamins, qualitative tests for starch, lipids and proteins etc.
T.Y.B.Sc.	BO-368: Botany Practical-II	<ul style="list-style-type: none"> • This practical course is based on two theory courses, plant pathology and Evolution & population genetics. • This practical course is really helpful for students to know various crop diseases caused due to bacteria, fungi and viruses with their symptoms, life cycle and control measures. • Students can also learn about preparation of different mixtures like <i>Bordeaux</i>, <i>Jivamruta</i> for the control of different crop diseases. • This course is also helpful for students to know about different fungicides and pesticides. • Students can also learn about various fossil groups. • In the second half of the paper, students will also learn about organic evolution, problems based on allele and genotype frequency, Hardy-Weinberg equilibrium, Sympatric and Allopatric speciation etc.
T.Y.B.Sc.	BO- 369: Botany practical- III	<ul style="list-style-type: none"> • All the practical's included in this course are based on two papers, Advanced Plant Biotechnology and Plant breeding & Seed Technology. • This practical paper is also having advanced practical's of plant biotechnology like Tissue culture, secondary metabolites, artificial seed production, nanoparticle preparation etc. • Students will learn about demonstration of transgenic plants, hybridization, preparing of nano-particles etc.

		<ul style="list-style-type: none"> • Students will learn some problems on genetic engineering. • In the second half, students will learn about effects of chemical mutagens on seed germination and growth, seed testing methods, seed germination methods seed diseases.
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Dr. B. W. Chavre

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CO-ORDINATOR
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 G.M.D. Arts, B.W. Commerce
 And Science College, Sinnar

Principal
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 Science College, Sinnar, Dist. Nashik



M.V.P. SAMAJ'S
G. M. D. Arts, B. W. Commerce and Science College
Sinnar, Nashik
(Internal Quality Assurance Cell)

Program Outcomes (PO) B.Sc.●

Science graduates are expected

PO-01	To do masters in the basic areas of the discipline.
PO-02	To apply their broad knowledge of science across a range of fields, with in-depth knowledge in at least one area of study.
PO-03	To articulate the methods of science and explain why current scientific knowledge is both contestable and testable by further inquiry.
PO-04	To apply appropriate methods of research, investigation and design, to solve problems in science, including the planning and/or conduct of a significant project, problem or investigation.
PO-05	To recognize the need for information; effectively search for, evaluate, manage and apply that information in support of scientific investigation.
PO-06	Employ highly developed conceptual, analytical, quantitative and technical skills and are adept with a range of technologies.
PO-07	To evaluate the role of science, in addressing current issues facing local and global communities, for example climate change, health and disease, food security, sustainable energy use etc.
PO-08	To work effectively in groups to meet a shared goal with people who's disciplinary and cultural backgrounds differ from their own.
PO-09	To communicate clearly and convincingly about science ideas, practice and future contributions to expert and non-expert audiences, matching the mode of communication to their audience.

Department of Chemistry

Programme Specific Outcome (Chemistry):

On the completion of B.Sc. Chemistry the students:

PSO1	Understand the scope, methodology and application of modern chemistry
PSO2	Study theoretical and practical concepts of instruments that are commonly used in most chemistry field.
PSO3	Plan and conduct scientific experiments and record the results of such experiments.
PSO4	Get acquainted with safety of chemicals, transfer, and measurement of chemicals, preparation of solutions, and using physical properties to identify compounds and chemical reactions.
PSO5	Describe how chemistry is useful to solve social, economic and environmental problems and issues facing our society in energy, medicine and health.

Course Outcome (Chemistry):

F.Y.B.Sc. (Chemistry)	
1. Chemical Energetics	<ol style="list-style-type: none"> 1. Students will be able to apply thermodynamic principles to physical and chemical process 2. Calculations of enthalpy, Bond energy, Bond dissociation energy, resonance energy 3. Variation of enthalpy with temperature –Kirchoff's equation 4. Third law of thermodynamic and its applications
2. Chemical Equilibrium	<p>Knowledge of Chemical equilibrium will make students to understand</p> <ol style="list-style-type: none"> 1. Relation between Free energy and equilibrium and factors affecting on equilibrium constant. 2. Exergonic and endergonic reaction 3. Gas equilibrium , equilibrium constant and molecular interpretation of equilibrium constant 4. Van't Haff equation and its application
3. Ionic equilibria	<p>Ionic equilibria chapter will led students to understand</p> <ol style="list-style-type: none"> 1) Concept to ionization process occurred in acids, bases and pH scale 2) Related concepts such as Common ion effect hydrolysis constant, ionic product, solubility product 3) Degree of hydrolysis and pH for different salts , buffer solutions
1. Atomic Structure	<ol style="list-style-type: none"> 1) Various theories and principles applied to revel atomic structure 2) Origin of quantum mechanics and its need to understand structure of hydrogen atom 3) Schrodinger equation for hydrogen atom 4) Radial and angular part of hydrogenic wave functions 5) Significance of quantum numbers 6) Shapes of orbitals
2. Periodicity of Elements	<ol style="list-style-type: none"> 1) Rules for filling electrons in various orbitals. 2) Electronic configuration of an atom and anomalous electronic configurations. 3) Stability of half-filled and completely filled orbitals. 4) Concept of exchange energy and relative energies of atomic orbitals 5) Skeleton of long form of periodic table. 6) Block, group, modern periodic law and periodicity. 7) Classification of elements as main group, transition and inner transition elements

	<ul style="list-style-type: none"> 8) Name, symbol, electronic configuration, trends and properties. 9) Periodicity in the following properties in details: 10) Effective nuclear charge, shielding or screening effect; some numerical problems. 11) Atomic and ionic size. 12) Crystal and covalent radii 13) Ionization energies 14) Electronegativity- definition, trend, Pauling electronegativity scale. 15) Oxidation state of elements
3. Chemical Bonding	<ul style="list-style-type: none"> 1) Attainment of stable electronic configurations 2) Types of chemical bonds- Ionic, covalent, coordinate and metallic bond 3) Ionic Bond- characteristics of ionic bond, types of ions, energy consideration in ionic bonding, lattice and solvation energy and their importance in the context of stability and solubility of ionic compounds, Born-Lande equation, Born-Haber cycle, Fajan's rule, bond moment, dipole moment and % ionic character. 4) Covalent bond- VB approach, Hybridization with example of linear, trigonal, square planar, tetrahedral, TBP, and octahedral. 5) VSEPR theory – assumption, need of theory, applications of 6) Concept of different types valence shell electron pairs and their contribution in bonding 7) Application of non-bonded lone pairs in shape of molecule 8) Basic understanding of geometry and effect of lone pairs with examples such as ClF_3, Cl_2O, BrF_5, XeO_3 and XeOF_4.
4. Calculations used in Analytical Chemistry	<ul style="list-style-type: none"> 1. Calculations of mole, molar concentrations and various units of concentrations which will be helpful for preparation of solution 2. Relation between molecular formula and empirical formula 3. Stoichiometric calculation
Course Outcomes Practicals	After completing the course work learner will be acquired with knowledge of chemical energetics, Chemical equilibrium and ionic equilibria.
CH- 101: Physical Chemistry	
CH- 102: Organic Chemistry	Will learn Fundamentals of organic chemistry, stereochemistry (Conformations, configurations and nomenclatures) and

	functional group approach for aliphatic hydrocarbons
CH- 201: Organic Chemistry	Will learn Fundamentals of organic chemistry, stereochemistry (Conformations, configurations and nomenclatures) and functional group approach for aliphatic hydrocarbons
CH- 201: Inorganic Chemistry	Students will learn quantum mechanical approach to atomic structure, Periodicity of elements, various theories for chemical bonding and calculations used in analytical chemistry
CH-202: Organic Chemistry	Students will learn Functional group approach for the various reactions (preparations & reactions) in context to their structure
Lab Course CH 103 and CH-203	<ol style="list-style-type: none"> 1. The practical course is in relevance to the theory courses to improve the Understanding of the concepts. 2. It would help in development of practical skills of the students. 3. Use of microscale techniques wherever required

S.Y.B.Sc. (Chemistry)

Course	Outcomes
CH-301 : Physical and Analytical Chemistry (Physical Chemistry)	<ul style="list-style-type: none"> • Concept of kinetics , terms used , rate laws , types of order Discuss examples of first order and second order reaction. Pseudo molecular reactions • Factors affecting on rate of reaction Techniques of measurement of rate of reaction • Know about photochemistry • Understand difference between thermal and photochemical reactions • Understand laws of photochemistry • Learn what is quantum yield and it's measurement • Know Types of photochemical reactions and photophysical process Know about quenching and chemiluminescent • Concept of distribution of solute amongst pair of immiscible solvents ii. Distribution law and it's thermodynamic proof • Distribution law and nature of solute in solution state iv. Application – Solvent extraction • Students should learn • What is Analytical Chemistry • Chemical analysis and its applications

	<ul style="list-style-type: none"> • Sampling • Common techniques • Instrumental methods and other techniques • Choice of method • Meaning of error and terms related to expression & estimation of errors • Methods of expressing accuracy and precision • Classification of errors • Significant figures and computations • Distribution of errors • Mean and standard deviations • Reliability of results Basic principles in qualitative analysis • Meaning of common ion effect • Role of common ion effect and solubility product • Different groups for basic radicals • Group reagent and precipitating agents
CH-302 : Inorganic and Organic Chemistry (Organic Chemistry)	<ul style="list-style-type: none"> • Students should be able to – • Identify chiral center in the given organic compounds. • Define Erythro, threo, meso, diastereoisomers with suitable examples. • Able to find R/S configuration in compounds containing two chiral centers. • Explain Bayer's strain theory, Heat of combustion and relates stability of cycloalkanes. • Explain the stability of cyclohexanes. • Draw the structure of boat and chair configuration of cyclohexane. • Draw axial and equatorial bonds in cyclohexane. • Draw structure of conformations of mono- & disubstituted cyclohexanes • Explain the stability of axial and equatorial conformation of monosubstituted • Cyclohexanes. Define and classify heterocyclic compounds. • Use Huckel rule to predict aromaticity. • Suggest synthetic route for preparation of various heterocyclic compounds. • Write and complete various reactions of heterocyclic compounds. • Predict products.
CH-203: Practical Chemistry	<ul style="list-style-type: none"> • Inorganic volumetric analysis and synthesis of Inorganic compounds. • Chemical analysis of commercial products. • Preparations and purification of organic compounds.

CH-301 : Physical and Analytical Chemistry

(Analytical Chemistry)

- Meaning of equivalent weight, molecular weight, normality, molality, primary and secondary standards.
- Different way to express concentrations of the solution. Preparation of standard solution.
- To solve numerical problems.
- Calibrate various apparatus such as burette, pipette, volumetric flask, barrel pipette etc.
- Types instrumental and non instrumental analysis. Explain role of indicators.
- Know mixed and universal indicators.
- Know neutralization curves for various acid base titration
- Know principle of complexometric precipitation and redox titrations.
- Know the definitions and difference between iodometry and iodimetry.
- To know standardization of sodium thiosulphate and EDTA.
- Reactions between CuSO_4 and Iodine and liberated I_2 and $\text{Na}_2\text{S}_2\text{O}_3$
- Choice of suitable indicator.
- Estimate copper from CuSO_4 and available chlorine in bleaching powder.
- Prepare standard silver nitrate solution.
- Mohr's and Fajan's method.
- Determine the amount of halides separately and in presence of each other.

CH-302 : Inorganic and Organic Chemistry

(Inorganic Chemistry)

- A student should be able –
- To differentiate between ore and minerals.
- To differentiate between calcination and roasting and smelting.
- To know the different methods for separation of gangue or matrix from metallic compounds.
- To know the terms smelting, flux.
- A student should be able -
- To know physico-chemical principles involved in electrometallurgy.
- To understand electrolysis of alumina and its refining.
- To explain the uses of Aluminum and its alloys.
- To know purification of bauxite ore.
To explain the term pyrometallurgy and to explain the physico chemical principles involved in the reduction process by carbon monoxide.
- To know different reactions in the blast furnace.
- To differentiate between properties of pig iron and wrought iron.
- To explain the basic principles of different methods for preparation of steel.

	To explain the merits and demerits of different methods.
CH-303: Practical Chemistry Paper-III	<ul style="list-style-type: none"> • Verification of theoretical principles by experiment observations and interpret practical output with the help of theoretical principles. • Methods of identification of substance by chemical methods. • To write and verify balanced equation for the chemical reactions performed in the laboratory. • Different reactions of organic and inorganic synthesis and follow the progress of the chemical reaction by suitable method (colour change, ppt. formation, TLC). • To arrange and set the apparatus for the desired experiments. • Quantitative chemical analysis of substances & explain principles behind it. • Systematic working skill in the laboratory.

T.Y.B.Sc. Chemistry (First Term)

Course	Outcomes
CH-501:Physical Chemistry	<p>After studying this course, the student will be able to</p> <ul style="list-style-type: none"> • Understand the term additive and constitutive properties. The term specific volume, molar volume and molar refraction. The meaning of electrical polarization of molecule, induced and orientation polarization. • Dipole moment and its experimental determination by temperature variation method. Electromagnetic spectrum, Nature of wave and its characteristics such as wavelength, wave number, frequency and velocity, Energy level diagram, • Classification of molecules on the basis of moment of Inertia, • Rotational spectra of rigid diatomic molecules, selection rules, nature of spectral lines. Simple Harmonic oscillator model, Born-Oppenheimer approximation. Vibrational spectra of diatomic molecules selection rules, nature of spectral lines. The difference between Rayleigh, Stokes and anti-Stokes lines in a Raman

	<p>spectrum.</p> <ul style="list-style-type: none"> Justify the difference in intensity between Stokes and anti-Stokes lines. Draw the Stokes and anti-Stokes lines in a Raman spectrum \ Raman spectra: Concept of polarizability, Pure rotational Raman spectra of diatomic molecules, Energy Expression, Selection rule, Rotational energy level diagram, Rotational Raman spectrum and Problems
CH-502: Analytical Chemistry	<p>After completion of the course student should be able to</p> <ul style="list-style-type: none"> Define basic terms in gravimetry, spectrophotometry, qualitative analysis and parameters in instrumental analysis. Such as: Gravimetry, precipitation, solubility product, ionic product, common ion effect, precipitating agent, washing of ppt., drying and ignition of ppt., linearity range, detection limit, precision, accuracy, Sensitivity, Selectivity, Robustness and Ruggedness, electromagnetic radiations, spectrophotometry, Beers law, absorbance, transmittance, molar absorptivity, monochromator, wavelength of maximum absorbance. Identify important parameters in analytical processes or estimations. Example: minimum analyte concentration in particular method, reagent concentration in particular analysis (gravimetry, spectrophotometry, thermogravimetry), reagent for particular analysis, reaction condition to convert analyte into measurable form, drying and ignition temperature for ppt in gravimetry, heating rate thermogravimetry, wavelength in spectrophotometry, group reagent, removal borate and phosphate in qualitative analysis. Perform quantitative calculations depending upon equations student has studied in the theory. Furthermore, student should be able to solve problems on the basis of theory. . Discuss / Describe procedure for different types analyses included in the syllabus. Select particular method of analysis if analyte sample is given to him. Differentiate / distinguish / Compare among the different analytical terms, process and analytical methods.8. Demonstrate theoretical principles with help of practical. Design analytical procedure for given sample.
CH-504:Inorganic Chemistry	<p>A student should know:</p> <ul style="list-style-type: none"> The assumptions and limitations of VBT .Understand the need of concept of MOT. Know LCAO principal and its approximation Understand and show the formation of bonding and antibonding

	<p>MO's .Draw the shapes of s, p, d orbital. Draw combinations of s-s, s-p, p-p and d-d orbital to form σ and π molecular orbitals.</p> <ul style="list-style-type: none"> The meaning of term f-block elements, Inner transition elements, lanthanides, actinides. Electronic configuration of lanthanides and actinides. Oxidation states of lanthanides and actinides and common oxidation states. Separation lanthanides by modern methods.. Lanthanide contraction and effects of lanthanide contraction on post-lanthanides. Use of lanthanide elements in different industries. Transuranic elements. Preparation methods of transuranic elements. Nuclear fuels and their application. The difference between metal, semiconductor and insulator. Metallic bond on the basis of band theory. The energy band and energy curve. n and p type of semiconductors. Discovery and applications of superconductors.
CH-505: Industrial Chemistry	<p>The students are expected to learn</p> <ul style="list-style-type: none"> Importance of chemical industry. Meaning of the terms involved, Comparison between batch and continuous process, Knowledge of various industrial aspects. Concept of basic chemicals, their uses and manufacturing process. They should also know the physico-chemical principals involved in manufacturing process. Importance of sugar industry, Manufacture of direct iii. Consumption (plantation white) sugar with flow diagram. Cane juice extraction by various methods, Clarification by processes like carbonation, Sulphitation, Phosphatation, etc. Concentration of juice by using multiple effect evaporator system, Crystallization of sucrose by using vacuum pan. Importance, Basic requirement of fermentation process, Manufacturing of ethyl alcohol by using molasses and fruit juice. Different types of soap products, Chemistry of soap. Raw materials required for soap manufacture Meaning of the term's Surfactants, Types of surfactants. Raw materials for detergents. Detergent builders, additives ,Washing action of soap and detergents

CH-507:Organic Chemistry	<ul style="list-style-type: none"> • After studying the polynuclear and heteronuclear aromatic compounds, students will be able to Define and classify polynuclear and heteronuclear aromatic hydrocarbons. Write the structure, synthesis of polynuclear and heteronuclear aromatic hydrocarbons. Understand the reactions and mechanisms. Explain the reactivity of polynuclear and heteronuclear aromatic hydrocarbons. • Meaning of active methylene group. Reactivity of methylene group. Synthetic applications ethyl acetoacetate and malonic ester. To predict product with panning or supply the reagent/s for these reactions • Students will also learn about Elimination, different rearrangement reaction. • To predict product/s or supply the reagent/s for these reactions • Different types of carbon-carbon unsaturated compounds • Orientation / rules in addition reactions • The structure of carbonyl group • Reactivity concept • Correct mechanism of addition reactions using different reagents • Types of some known addition reactions • To predict product/s or supply the reagent/s for such reactions
CH-508: Chemistry of Biomolecules	<p>The student will understand</p> <ul style="list-style-type: none"> • Cell types, Biological composition and • Organization of cell membrane, structure and function of various cell organelles of plant and animal cell. Concepts of biomolecules • Types of carbohydrates, Lipids, Proteins, Amino acids and Enzymes • Basic concepts of Endocrinology. Types of Endocrine glands and their hormones. Biochemical nature of hormones. Mechanism of action of lipophilic and hydrophilic hormone.
CH:510 (A): Introduction of Medicinal Chemistry	<p>Upon completion of the course the student shall be able to understand,</p> <ul style="list-style-type: none"> • The basics of medicinal chemistry, biophysical properties, overview of basic concepts of traditional systems of medicine. • Over view of the overall process of drug discovery, and the role played by medicinal chemistry in this process. • Biological activity parameters and importance of stereochemistry

	of drugs and receptors. Knowledge of mechanism of action of drugs belonging to the classes of infectious and non-infectious diseases.
CH-511 (A) : Environmental Chemistry	<p>The students are expected to learn</p> <ul style="list-style-type: none"> • Concept and scope of chemistry • Acquire Knowledge about water Pollution, Pollutants and various techniques of Analysis • Various Treatment Methods

(Second Term)

Course	Outcomes
CH-601 : Physical Chemistry	<p>After studying this topic students are expected to know and understand:</p> <ul style="list-style-type: none"> • Distinguish between crystalline and amorphous solids / anisotropic and isotropic solids. • Explain the term crystallography and laws of crystallography. • Weiss and Millers Indices, determination of Miller Indices • Bravais lattices, space groups, seven crystal systems and fourteen Bravais lattices; • Cubic lattice and types of cubic lattice • Distance between the planes for 100, 110 and 111 for cubic lattice • Methods of Crystal structure analysis: The Laue method and Braggs method: Derivation • Bragg's equation, • Determination of crystal structure of NaCl by Bragg's method, • X ray analysis of NaCl crystal system and Calculation of d and λ for a crystal system, • Problems
CH-602 : Physical Chemistry	<p>After studying this course students are expected to know</p> <ul style="list-style-type: none"> • Meaning of the terms-Solution, electrolytes, nonelectrolytes and colligative properties, Lowering of vapour pressure of solvent in solution, Elevation of B.P. of solvent in solution, Landsberger's method, <p>freezing point depression, Beckmann's method Osmosis and Osmotic pressure, Berkeley and Hartley method, Application of colligative properties to determine molecular weight of</p>

	<p>nonelectrolyte, abnormal molecular weight, Relation between Vant Hoff's factor and degree of dissociation of electrolyte bycolligative property,</p> <ul style="list-style-type: none"> • Factors affecting on solid state reactions, Rate laws for reactions in solid state .Applying rate laws for solid state reactions. Results of kinetics studies • History of polymers. Classification of polymers .Chemical bonding & Molecular forces in Polymer. Molecular weight of polymers. Practical significance of polymer molecular weights. Molecular weight determination
CH-604 Inorganic Chemistry	<p>Students should be able</p> <ul style="list-style-type: none"> • To understand M-C bond and to define organometallic compounds , to define organometallic chemistry • To understand the multiple bonding due to CO ligand.To know methods of synthesis of binary metal carbonyls. • To understand the structure and bonding using valence electron count (18 ele. rule) To understand the catalytic properties of binary metal carbonyls. To understand the uses of organometallic compounds in the homogenous catalysis. Chemistry of ferrocene • Understand the phenomenon of catalysis, its basic principles and terminologies, differentiate homogeneous and heterogeneous catalysis, brief account of homogeneous catalysts. Understand the essential properties of homogeneous catalysts, examples of heterogeneous catalysts. Understand the classification and essential properties of heterogeneous catalysts. • Identify the biological role of inorganic ions & compounds. Know the abundance of elements in living system and earth crust. Classification of metals as enzymatic and non-enzymatic. Understand the role of metals in non-enzymatic processes. Know the metalloproteins of iron. Explain the functions of hemoglobin and myoglobin in O₂ transport and storage. Understand the toxicity of CN⁻ and CO binding to Hb. the structure of Vit.B12 and give its metabolism.
CH-605: Inorganic Chemistry	<p>Student will learn</p> <ul style="list-style-type: none"> • The concept of acid base and their theories. They will also come to know different properties of acids and bases. Strength of various types acids. Know the nature of solids. Know the crystal structures of solids.

	<ul style="list-style-type: none"> • Be able to define Pauling's univalent radius and crystal radius. Able to solve simple problems based on Pauling's univalent radii and crystal radii. Know how to draw Born-Haber cycle. Able to solve simple problems based on Born- Haber cycle. Know the defects in Ionic solids. • Different Zeolite Framework Types and their classification. Zeolite synthesis and their structure. Application of zeolites • Various methods of nanoparticle synthesis. Stabilization of Nanoparticles in solution. Properties and Application of Nanoparticles. Know about carbon nanotube and its application. • Toxic chemical in the environment. Know the impact of toxic chemicals on enzyme. Know the biochemical effect of Arsenic, Cd, Pb, Hg. Explain biological methylation.
CH-607: Organic Chemistry	<ul style="list-style-type: none"> • Students will learn the interaction of radiations with matter. They will understand different regions of electromagnetic radiations. They will know different wave parameters. • Students will learn the principle of mass spectroscopy, its instrumentation and nature of mass spectrum. Students will understand the principle of UV spectroscopy and the nature of UV spectrum. They will learn types of electronic excitations. Students will be able to calculate maximum wavelength for any conjugated system. And from the value of λ-max they will be able to find out the extent of conjugation in the compound. • Students will understand the principle of IR spectroscopy, types of vibrations and the nature of IR spectrum. Students will understand the principle of NMR spectroscopy and will understand various terms used in NMR spectroscopy. They will learn measurement of chemical shift and coupling constants. Students will be able to interpret the NMR data and they will be able to use it for determination of structure of organic compounds. Students will be able to determine the structure of simple organic compounds on the basis of spectral data such as λ max values, IR frequencies, chemical shift (δ values).
CH-608: Organic Chemistry	<p>Students should be able to learn about</p> <ul style="list-style-type: none"> • . Retrosynthetic Analysis and Applications, Organic Reaction Mechanism and Synthetic Applications

	<ul style="list-style-type: none"> • Reagents in Organic Synthesis, Natural Products • Terpenoids: Introduction, Isolation, Classification. Citral- structure determination using chemical and spectral methods, Synthesis of Citral by Barbier and Bouveault Synthesis. • Alkaloids: Introduction, extraction, Purification, Some examples of alkaloids and their natural resources. Ephedrine- structure determination using chemical methods
CH-610 (A) : Chemistry of Soil and Agrochemicals	<p>Students will Know about</p> <ul style="list-style-type: none"> • The different components and properties of soil. Classification of soil on the basis of pH. Can Identify the problematic soil and recommend method for their reclamation. The different plant nutrients required for plants and their functions. Know the role of various fertilizers and manures required for plant growth. The various methods and their techniques in analysis of soil. Importance of manures as compared to chemical fertilizers • Know various techniques to protect the plants. Have the knowledge of various pesticides, insecticides, fungicides and herbicides.
CH-611(A): Analytical Chemistry-	<p>After completion of the course student should able to</p> <ul style="list-style-type: none"> • Basic terms in solvent extraction, basics of chromatography, HPLC, GC, and AAS and AES. Some important terms are: solvent extraction, aqueous and organic phase, distribution ratio and coefficient, solute remain unextracted, percent extraction, ion association complex, theoretical plate, HETP, retention time, selectivity, resolution, stationary phase, normal and reverse phase, ion exchange, column efficiency, carrier gas, split and spitless injection, packed column, tubular column, atomic absorption and emission spectroscopy, electronic excitation in atoms, nebulization, atomization, reduction of metal ions in flame, absorbance by atoms in flame, flame atomizers, furnace atomizers, interference in AES and FES, HCL, hydride generator, etc

Course Outcomes Practical

➤ Physical chemistry-I (Sem-V)

- The molecular weight of polymer by using Ostwald viscometer.
- Different instrument like pH meter, Spectrophotometry, colorimeter, photofluorometer etc. and are able to determine different parameters.
- Students can develop the technique to analysis of the given vibration-rotation spectrum of HCl(g)

➤ Inorganic Chemistry-I (Sem-V)

- Gravimetric analysis of ores and alloy. Preparation of various inorganic complex and their % purity.
- Removal of borate and phosphate from inorganic binary mixtures. Chromatographic techniques

➤ Organic Chemistry-I (Sem-V)

- Separation of organic binary mixture and its qualitative analysis
- Preparation of dibenzalpropanone, nitration of phenol and bromination of acetamide by green synthesis route.
- Preparation of 1,4-dihydropyrimidone, p-Iodonitrobenzene and p-Chloro benzoic acid.
- Preparation of organic derivative of carboxylic acid, glucose and p-Aminophenol

➤ Physical chemistry-I (Sem-VI)

- Determination of plateau voltage, resolving time of GM counter and Emax of beta particle.
- Handling of different instrument like pH meter, conductivity meter, turbidometer etc. and determine different parameters.
- Determination of various colligative properties and analysis of crystal structure from X-ray diffraction spectra.

➤ Inorganic Chemistry-I (Sem-VI)

- Gravimetric and volumetric analysis of ores and alloy..
- Importance of flame photometry, column chromatography techniques for estimation and purification respectively. Synthesis of Nanomaterial.

- Verification of periodic trends using solubility of alkaline earth metal hydroxides.

Organic Chemistry-I (Sem-VI)

- Functional group from given IR spectra and structure from NMR spectra of organic compound.
- Estimation of glucose, glycine, Alkali content in antacid and saponification value of oil volumetrically.
- Extraction of caffeine from tea leaves, Eugenol from cloves, lycopene from tomato peels, cinnamic acid from cinnamon and Trimyristin from nutmeg.
- Separation of mixture of aldehyde and carboxylic acid, o-nitrophenol and p-nitrophenol by column chromatography.

M.Sc. Organic Chemistry
NEP Syllabus

Program Outcomes (PO) M.Sc. • Post graduates are expected

PROGRAM OUTCOMES (POs) PO No.	PO Statement After completing the Programme Master of Science in Organic Chemistry, students will be able to	Knowledge and Skill
PO-1	Learn the terms, theories, assumptions, methods, principles, theory statements, and classification.	Disciplinary knowledge
PO-2	Fixed out the problem and resolved it using theories and practical knowledge.	Critical thinking & Problem-solving
PO-3	Inculcate his knowledge for carrying projects and advanced research-related skills.	Research related skill
PO-4	Actively participate in the team on case studies and field-based situations.	Cooperation/Teamwork
PO-5	Analyse and interpret ideas, evidence, and experiences with learned scientific reasoning	Scientific reasoning
PO-6	Aware and implement the subject facts that can be applied to personal and social development	Reflective thinking
PO-7	Use digital literacy to retrieve and evaluate subject-related information	Information/Digitally literacy:
PO-8	Get moral and ethical values for society as well as in research	Moral and ethical awareness

PO-9	Give analytical reasoning to interpret research data.	Analytical Reasoning
PO-10	Improve their managerial skills and abilities in subject-related activities.	Leadership readiness/qualities
PO-11	Inculcate continuous learning habits through all available resources.	Lifelong readiness/qualities

CHEOD-502, Inorganic Chemistry-I (2 credits, 30 L)
(Molecular Symmetry and its applications to Inorganic chemistry)

Course Outcomes: At the end of course student should able to -

CO-1: Define symmetry elements and symmetry operations, classes, properties of a group, group multiplication table, etc.

CO-2: Classify symmetry elements, point group, Group, sub-group and classes.

CO-3: Use wave function as basis for determination of irreducible representations and the Great Orthogonality theorem and its consequence.

CO-4: Solve problem based on point group, matrix representation and character table

CO-5: Construct character table of various point group

CO-6: Justify which can take part in bonding on the basis of SALCs and point group of molecules.

CHE-503, Organic Chemistry-I (4 credits, 60 L)
(Organic Reaction Mechanism, Stereochemistry and Reagents)

Course Outcome: Student will able to –

CO1: Understand the concepts of chemical bonding, various structural effects, acids and bases, intermediates and aromaticity.

CO2: Learn the concepts of stereochemistry.

CO3: Understand and identify the types of organic reactions.

CO4: Advanced knowledge of various stereochemical aspects.

CO5: Establish mechanistic knowledge of aliphatic and aromatic substitutions, and oxidation-reduction reactions

CO6: Develop problem solving ability of the students.

CHE- 504, Physical Chemistry Practical I [2 Credits, 60 L]

Course outcomes:

CO1: Students will grasp the concept of reaction rate and its significance in Chemical Kinetics.

CO2: Students will learn how to use experimental data to deduce rate laws and rate constants.

CO3: Students will be familiar with the fundamental principles of colorimetry and spectrophotometry including Beer's law, Lambert- Beer's law and the relationship between absorbance and concentration.

CO4: Students will be able to operate the instruments like spectrophotometer and colorimeter.

CO5: Students will be able to determine the densities of the solutions and can calculate molar volumes.

CHE-505, Inorganic Chemistry Practical-I (2-Credits; 60 L)

Course Outcomes: Student will able to -

CO-1: Prepare solution of required conc. and the handle laboratory equipment properly.

CO-2: Perform experiment accurately and able to perform calculation.

CO-3: Explain experiment and principal of experiment in detail.

CO-4: Perform calculations and discuss results and write conclusions of the experiment.

CO-5: Apply knowledge to a) design experiment for given aim or modify experiment to enhance results.
 b) to find out lacuna in experimental procedure.

CO-6: Solve problem/ numerical depending on given experimental data / information.

CHE-506, Organic Chemistry Practical I (2-Credits; 60 L)

Course Outcome: Student will able to -

- CO1: Understand the theoretical aspects behind separation, purification and synthesis of organic compounds.
- CO2: Acquire the experimental skills for separation, purification, identification and synthesis of organic compounds.
- CO3: Design experimental set up for performing the organic reactions.
- CO4: Monitor the organic reactions.
- CO5: Describe the mechanistic aspects of organic reactions.
- CO6: Develop problem solving ability.

CHEOD-507(D) Organic Reactions and Reagents [2 Credits, 30 L]

Course outcomes: At the end of the course, students will be able to-

- CO1: Understand the concepts of named organic reactions and reagents.
- CO2: Identify the type of named organic reaction and uses of reagents.
- CO3: Predict the reaction conditions of organic reaction.
- CO4: Write the reaction mechanism.
- CO5: Design appropriate synthetic route.
- CO6: Develop problem solving ability of the students.

CHE-508, Research methodology (4 credits, 60 L)

Course outcomes:

- CO1: Develop a comprehensive understanding of different research methodologies and their applications in mathematics.
- CO2: Cultivate critical thinking and analytical skills necessary for identifying research problems and formulating research questions.
- CO3: Provide practical experience in designing experiments, collecting and analyzing data, and interpreting research results.
- CO4: Foster effective communication skills for presenting research findings orally and in written form.
- CO5: Promote ethical research practices and awareness of responsible conduct in mathematical research
- CO5; Develop problem solving ability.

Semester II

CHEOD- 551, Molecular Spectroscopy (2 Credits, 30 L)

Course Outcomes

- CO1: Remember basic concepts of molecular spectroscopy, selection rules, intensity of spectral lines and width of spectral transition.
- CO2: Understand principles and applications of rotational, vibrational, raman, electronic and mossbauer spectroscopy.
- CO3: Apply various spectroscopic techniques for gaining insights into molecular structure
- CO4: Analyse vibrating diatomic molecule, simple harmonic and anharmonic oscillator, Scattering of light and Raman Spectrum.
- CO5: Evaluate bond length, vibrational frequency, force constant and dissociation energy using spectral data.
- CO6: Create awareness about rotational fine structure, vibrational coarse structure, Quadrupole effects.

CHE-552: Inorganic Chemistry-II (4 Credits, 60 L)

Course Outcomes: At the end of course student should able to –

- CO-1: Define R. S. term, configuration, microstate, paramagnetic, diamagnetic ferromagnetic, antiferromagnetic, Curie and Neel temperature.
- CO-2: Identify complex ions showing same R.S. terms, degeneracy of ground state terms of metal ions, and spin multiplicities of different configurations.
- CO-3: Interpret electronic spectra for spin allowed Oh and Td complexes using Orgel diagram, Magnetic properties of A, E and T ground terms in complexes and selection rules.
- CO-4: Calculate frequencies of absorption spectrum, 10Dq, Racah and nephelauxetic parameter for a complex, and magnetic moments of complexes
- CO-5: Construct microstate table for various configuration and prepare correlations diagram and

Tanabe-Sugano diagram for various configurations in Td and Oh ligand field.

CO-6: Assess appropriate full spectroscopic terms for various configuration/ion/term.

Section-II

Course Outcomes: At the end of course student should be able to –

CO-1: Define metalloproteins, metallo-enzymes, photosynthesis, HSAB concept, nucleic acids, metalloregulation, Biopolymer effects and acetylcholine receptor.

CO-2 : Explain chelate effect and Irving-William series, pK_a values of coordinated ligands, Tuning of redox potential, and Reactions of coordinated ligands.

CO-3: Describe Fe-S clusters, model compounds and spontaneous self-assembly, metals in medicine, blue copper proteins, and cytochromes, and Na/K pumps.

CO-4: Express nitrogen fixation, detoxification of mercury, structure of RNA, cis-platin, amino acids, siderophore, and calmodulin zinc finger proteins.

CO-5: Distinguish between hemoglobin and myoglobin, transferrin and ferritin, photosystem-I and photosystem-II.

CO-6: Decide role of metals in biological system, medicine, blood coagulation, oxygen storage and transport, photosynthesis and uptake and transport of iron.

CHE-553, Organic Chemistry-II (4 credits, 60 L)

(Pericyclic Reactions, Molecular Rearrangements, Photochemistry and Organic Spectroscopy)

Course Outcome: Student will be able to –

CO1: Understand the concepts of pericyclic and photochemical reactions, and molecular rearrangements

CO2: Learn concepts of Organic Spectroscopy.

CO3: Identify the type of pericyclic and photochemical reactions

CO4: Solve the problems based on pericyclic and photochemical reactions and molecular rearrangements

CO5: Deduce the structure from the spectral data and justify the findings.

CO6: Develop problem solving ability of the students.

CHE- 554, Physical Chemistry Practical II [2 Credits, 60 L]

Course outcomes:

CO1: Students will grasp the fundamental principles of Conductometry, Polarography, Potentiometry and pH metry.

CO2: Students will familiar with the operation of Conductometer, Polarimeter, Potentiometer and pH meter.

CO3: Students will understand the concepts of conductance, resistance and learn how to calculate and interpret these values.

CO4: Students will learn to interpret polarographic waves and understand their significance in identifying electroactive species and determining their concentration.

CO5: Students will explore the applications of Potentiometry in various fields such as acid- base titrations, determination of pH and analysis of ionic concentration.

CHE-555: Inorganic Chemistry Practical-II (2 Credits, 60 L)

Course Outcome: Student will be able to

CO-1: Define coordination complex, cell constant, resistance, specific conductance, equilibrium constant, absorbance, Beer's law, solubility product, chromatography, etc.

CO-2: Discuss photochemistry of potassium trioxalatoferrate complex, kinetics of formation of Cr(III)-EDTA, Determination of Cu(II) and Fe (II) by solvent extraction technique.

CO-3: Outline the flow-chart for synthesis of [Mn(acac)₃], Chloropentaamminecobalt(III) chloride, Nitro pentaamminecobalt(III) chloride, Bis[TrisCu(I)thiourea complexes.

CO-4: Estimate purity of the [Mn(acac)₃], Chloropentaamminecobalt(III) chloride, Nitro pentaamminecobalt(III) chloride, Bis[TrisCu(I)thiourea complexes.

CO-5: Determine equilibrium constant of M – L systems Fe(III)–Sulphosalicylic acid, magnetic susceptibility (χ_g and χ_m) of mercury tetracyanato cobalt or Fe(acac) and magnetic susceptibility (χ_g and χ_m) of mercury tetracyanato cobalt or Fe(acac).



CO-6: Calculate the quantity from observation of the experiments and Interpret the result obtained respective experiments.

CHE-556, Organic Chemistry Practical II (2-Credits; 60 L)

Course Outcome: Student will able to -

CO1: Understand the theoretical concepts behind organic synthesis.

CO2: Acquire the experimental skills for separation, purification, identification and synthesis of organic compounds.

CO3: Design experimental set up for performing the organic reactions.

CO4: Monitor the organic reactions and analyse the products using spectral results.

CO5: Describe the mechanistic aspects of organic reactions.

CO6: Develop problem solving ability.

Chemistry Electives

(Any one option from the following four courses)

CHE-557(A), Organometallic Compounds and Inorganic Reaction Mechanism (2 Credits, 30L)

Course Outcomes: At the end of course student should able to -

CO1: Define various terms in organometallic chemistry and inorganic reaction mechanism etc.

CO2: Explain/Discuss various reaction mechanisms such as ligand insertion, inner and outer sphere mechanism, ligand substitution reaction.

CO3: Discuss 1. Structure and bonding in carbonyl and organometallic complexes, 2: Trans effect, 3. Ligand field effects, catalytic cycles, 4. Inert and labile complexes, 5. Synthesis methods of organometallic compounds, etc.

CO4: Apply 18 electron rule. Applications of organometallic compounds and mechanism of these reactions.

CO5: Demonstrate IR spectra of carbonyl complexes, deduce structure of carbonyl complexes

CO6: Justify structures of organometallic compounds from spectral data.

Semester-III

CHO-601 MJ: Organic Reaction Mechanism and Stereochemistry

PO-01	To do Ph.D. in allied subject.
PO-02	To apply their advance knowledge of science in society and among the community
PO-03	To become a researcher and upgrade the skills in industries
PO-04	To apply appropriate methods of research, investigation and design, to solve problems in science, including the planning and/or conduct of a significant project, problem or investigation.
PO-05	To recognize the need for information; effectively search for, evaluate, manage and apply that information in support of scientific investigation.
PO-06	Employ highly developed conceptual, analytical, quantitative and technical skills and are adept with a range of technologies.
PO-07	To evaluate the role of science, in addressing current issues facing local and global communities, for example climate change, health and disease, food security, sustainable energy use etc.
PO-08	To work effectively in groups to meet a shared goal with people who's disciplinary and cultural backgrounds differ from their own.
PO-09	To communicate clearly and convincingly about science ideas, practice and future contributions to expert and non-expert audiences, matching the mode of communication to their audience.

M.Sc. II Organic Chemistry

1. Semester- III

1. CCTP-7: CHO-350: Organic Reaction Mechanism and Biogenesis

The goal of this course is to introduce students to

- Study the design of organic synthesis.
- Understand the reaction pathway via various intermediate.
- Get an idea about the synthesis of natural products.

2. CCTP-8: CHO-351: Structure Determination of Organic Compounds by Spectroscopic Methods

- Students are are about advances in spectroscopic techniques
- Students are familiar with application of different spectroscopic techniques such as $^1\text{H-NMR}$, $^{13}\text{C-NMR}$. Mass spectrometry
- Students are able to solve numericals based on spectroscopic techniques.

3. CCTP-9: CHO-352 :Stereochemistry and Asymmetric Synthesis of Organic Compounds.

- Study the stereochemistry concept of different molecules
- Students are able to draw stereo structures of different structure .
- Understand asymmetric synthesis and its terms.
- Students gain knowledge for application of asymmetric synthesis in designing chiral molecules.

4. CBOP-3: CHO-353: Theory: CHO-353-A) Protection - De-protection, Chiron approach and Carbohydrate Chemistry

- The goal of this course is to introduce students to
- Study the design of organic synthesis, protection deprotection of hydroxyl, amino carboxyl, ketones and aldehyde, amines, solid state peptide synthesis
- Study of carbohydrates: Introduction of sugar, structure of triose tetrose, pentose , hexose, stereochemistry of glucose.
- Understand the chiral approach, concept of chiral templates, and utilization of the basic concept for retrosynthetic strategy.

5. CCPP-3: CHO-354 Practical I: Solvent Free Organic Synthesis

- To know and study the
- Study of green chemistry approach.
- No involvement of organic solvents, less time, improved yields, mild conditions & ready operations.

- Reduce pollution and bring down handling costs due to simplification of experimental procedure, work up technique and saving in labour.

2. Semester- IV

6. CCTP-10: CHO-450 Chemistry of Natural Products

- Understands the planning of total synthesis without altering the stereochemistry
- Able for total synthesis of natural products.

7. CCTP-11: CHO-451 Organometallic Reagents in Organic Synthesis

To know and study the

- Study of transition metal complexes in organic synthesis.
- Learn C=C formation reaction, multi compound reaction, ring formation reaction.
- Study of sharpless azides Cycloaddition, use of boron and silicon in organic synthesis.

8. CBOP-4: CHO-452: Theory: A) Medicinal Chemistry

At the end of course students will able to explain

- Helps in correlating between pharmacology of a disease and its mitigation or cure.
- To understand the drug metabolic pathways adverse effect and therapeutic value of drugs.
- Well acquainted with the synthesis of some important class of drugs.
- To know the structural activity relationship of different class of drugs.

9. CBOP-5: CHO-453 Practical: Practical III: Select any two Sections

Section-I: Ternary Mixture Separation

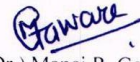
Section-I: Project / Industrial Training/ Internships/Summer Project

- This course is designed to make students aware of how to perform organic Compounds in laboratory.
- Different components of a mixture are separated in order to either separate the unrequired components from a mixture.
- To obtain pure substances.
- To separate more than one useful components from a mixture.
- Students undergo industrial training or summer project to different industry or institution to upgrade practical skill knowledge and get hands on training.

10. CCPP-4: CHO-454 Practical II: Convergent and Divergent Organic Syntheses.

After completion of this course, students aware of

- Synthesis of Organic compounds.
- It gives shorter and more efficient than a linear synthesis leading to a higher overall yield.
- It is flexible and easier to execute due to the independent synthesis of the fragments of the target molecule.
- Several compounds can make from a common intermediate.


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Department of Computer Science

POs, COs,PSOs 2023-2024

PROGRAMME OUTCOME (PO)

By the end of the program, the student will be able to:

1. To develop problem-solving abilities by analyzing the problems, and identifying and defining the computing resource requirements to achieve appropriate solutions to it.
2. To build the necessary skill set and analytical abilities for developing computer-based solutions for real-life problems.
3. To develop the necessary knowledge base to pursue advanced studies in computer science such that they can pursue a career in the software industry.



COURSE OUTCOME (CO)

F.Y.B.Sc. (Computer Science) Semester-I

Course Title:-CS-101 Problem solving using computer and C programming

Course Outcomes:-

- Explore algorithmic approaches to problem solving.
- Ability to analyze a problem and devise an algorithm to solve it.
- Able to formulate algorithms, pseudo codes and flowcharts for arithmetic and logical problems.
- Ability to implement algorithms in the 'C' language.
- Develop modular programs using control structures and arrays in 'C'.

Course Title :CS-102 Database Management Systems

Course Outcomes

- Understand fundamental concepts of database.
- Understand user requirements and frame it in data model.
- Ability in creations, manipulation and querying of data in databases.
- Ability to solve real world problems using appropriate set, function, and relational models.
- Ability to design E-R Model for given requirements and convert the same into database tables.

Course Title:- CS-103 Practical Course based on CS-101 and CS-102 (C and DBMS)

Course Outcome:-

- Able to devise pseudo code and flowchart for computational problems.
- Understand how to write, debug and execute simple programs in C.
- Able to create database tables in Postgres SQL.
- Able to write and execute simple and nested queries.



Course Title: - ELC-111: Semiconductor Devices and Basic Electronic Systems

Course Outcome:

- To study various types of semiconductor devices, elementary electronic circuits and systems.
- To bridge the gap between Theoretical and practical knowledge.

Course Title: - ELC-112: Principles of Digital Electronics

Course Outcome:

- To get familiar with concepts of digital electronics.
- To study arithmetic circuits, combinational circuits and sequential circuits.

Course Title: - ELC-113 Electronics Practical Paper – I

Course Outcome:

- To use basic concepts for building various applications in electronics.
- To understand design procedures of different electronic circuits as per requirement.
- To build experimental setup and test the circuits.
- To develop skills of analyzing test results of given experiments.

Course Title: MTC 111 Matrix Algebra

Course Outcome:

- Perform basic Matrix operation.
- Define special matrices: diagonal, triangular, and symmetric.
- Basics of solving systems of linear equations.
- Understand determinants and their properties.
- Logic behind writing programs using computer language.
- Factorization of any square matrix in simpler LU-form.

Course Title: MTC 112 Discrete Mathematics

Course Outcome:

- Understanding the concepts of discrete mathematics.
- Learning applications of discrete structures in Computer Science.
- Express a logic sentence in terms of predicates, quantifiers, and logical connectives.
- Apply the operations of sets and use Venn diagrams to solve applied problems; solve problems using the principle of inclusion-exclusion.
- Demonstrate different traversal methods for trees and graphs.
- Model problems in Computer Science using graphs and trees.



Course Title: MTC 113 Mathematics Practical

Course Outcome:

- Students will be able to compute matrix calculation using Maxima software.
- Use appropriate modern technology to explore calculus concepts.
- Solve applied problems using matrices.
- Solve systems of linear equations by use of the matrix.
- Students will be able to formulate problems in the language of sets and perform set operations, and will be able apply the Fundamental Principle of Counting, Multiplication Principle.

Course Title: CSST 111 Descriptive statistics

Course Outcome:

- The main purpose of descriptive statistics is to provide a brief summary of the samples and the measures done on a particular study.
- To provide basic information about variables in a dataset.

Course Title: CSST 112 Mathematical Statistics

Course Outcome:

- It will help students develop skills in thinking and analyzing problems from a probabilistic and statistical point of view.
- It will provide difference between Discrete and continuous distributions.

Course Title:- CSST 113 Statistics Practical Paper I

Course Outcome:

- To Study free statistical software's and use them for data analysis in project
- To use of Statistical tools in Ms-Excel



F.Y.B.Sc(Computer Science) Semester -II

Course Title:-CS 201 Advanced C programming

Course Outcomes:-

- Develop advanced concepts of programming using C.
- Develop modular programs using control structures, pointers, arrays, strings and structures.
- Design and develop solutions to real world problems using C.
- Able to develop structured programming approach.

Course Title : CS-202 Relational database Management Systems

Course Outcome

- Able to acquire knowledge of data security and its importance.
- Design E-R Model for given requirements and convert the same into database tables.
- Able to use database techniques such as SQL & PL/SQL.
- Understand and able to implement concept of transactions.
- Use advanced database Programming concepts.

Course Title:- CS-203 Practical Course based on CS-201 and CS-202(Advanced C and RDBMS)

Course Outcome:-

- Write debug and execute programs using advanced features in C.
- To perform advanced database operations.

Course Title: - ELC-121 Instrumentation System

Course Outcome:

- To study various kind of Instrument of different Instrumentation System
- To control the parameter in process or a particular system.
- To study smart sensors for smart Electronics Applications.

Course Title: - ELC-122 Basics of Computer Organization

Course Outcome:

- To study and design different counters.
- To study basics of computer system.
- To study Memory Organization.

Course Title: - ELC- 123 Electronics Practical Paper – II

Course Outcome:



- To use basic concepts for building various applications in electronics.
- To understand design procedures of different electronic circuits as per requirement.
- To build experimental setup and test the circuits.
- To develop skills of analyzing test results of given experiments.

Course Title:- MTC 121 Linear Algebra

Course Outcome:

- Solve systems of linear equations using various methods including Gaussian and GaussJordan elimination and inverse matrices.
- Perform matrix algebra, invertibility, and the transpose and understand vector algebra in \mathbb{R}^n .
- Compute linear transformations, kernel and range, and inverse linear transformations, and find matrices of general linear transformations.
- Compute inner products on a real vector space and compute angle and orthogonality in inner product spaces.
- Prove basic results in linear algebra using appropriate proof-writing techniques such as linear independence of vectors; properties of subspaces; linearity, injectivity and surjectivity of functions; and properties of eigenvectors and eigenvalues.

Course Title:- MTC 122 Graph Theory

Course Outcome:

- Explain basic concepts in graph theory.
- Define how graphs serve as models for many standard problems.
- Account for the theory of paths and degree of connectedness of graph.
- Learn the use of spanning tree.
- Discuss the concept of graph, tree, and Euler graph.
- See the applications of graphs in science, business and industry.
- To present a survey of essential topics for computer science students who will encounter some of them again in more advanced courses.

Course Title:- MTC 123 Mathematics Practical

Course Outcome:

- Students will be able to find eigen values and eigen vectors using Maxima software.
- Students will be able to perform operations on orthogonality and quadratic forms.
- Use appropriate modern technology to explore calculus concepts.



Course Title:- CSST 121 Method of Applied Statistics

Course Outcome:

- To create a mathematical model that can be used to predict the values
- To Handle large data and analyze it by statistical tools

Course Title:- CSST 122 Continuous Probability Distribution and Testing of Hypothesis

Course Outcome:

- To study distribution of various data
- Student should use these techniques for their project.

Course Title:- CSST 123 Statistics Practical Paper II

Course Outcome:

- How to use statistical tools in real life situation.
- Handling data for research purpose



S. Y. B.Sc.(Computer Science) Semester- I

Course Title:-CS-211 Data Structure

Course Outcome

- Understand different methods of organizing large amount of data using data structure.
- Able to choose appropriate data structure as applied to specified problem definition.
- Understand various techniques for representation of the data in the real world.
- Able to compute the complexity of various algorithms.
- Able to understand internal structure of compiler and interpreters.

Course Title:- CS-212 RDBMS

Course Outcome

- Able to understand database concepts and database management system software.
- Analyze and design a real database application.
- Develop and evaluate a real database application using a database management system.
- Able to develop applications using PL/SQL & front end tools.

Course Title: - ELC-211: Digital System Hardware

Course Outcome:

- To study and understand basics of microprocessors.
- To understand fundamentals of multicore technology.

Course Title: - ELC-212: Analog Systems

Course Outcome:

- To understand basics of analog electronics.
- To study different types of sensors.
- To understand different types of signal conditioning circuits.
- To learn data conversion techniques.
- To apply knowledge of analog systems in different applications.

Course Title:-MTC-211 Linear Algebra

Course Outcome:

- Analyze finite and infinite dimensional vector spaces and subspaces over a field and their properties, including the basis structure of vector spaces,
- Use the definition and properties of linear transformations and matrices of linear transformations and change of basis, including kernel, range and isomorphism,
- Compute with the characteristic polynomial, eigenvectors, eigen values and Eigen spaces, as well as the geometric and the algebraic multiplicities of an eigen value and apply the basic Diagonalization result.

Course Title:-MTC-212 Numerical Techniques

Course Outcome:



- Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.
- Apply numerical methods to obtain approximate solutions to mathematical problems.
- 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.
- Analyze and evaluate the accuracy of common numerical methods.

Course Title:- EN-211: Technical English Sem - I

Course Outcome:

- To expose students to the best examples of prose and poetry in English so that they realize the beauty and communicative power of English.
- To enhance employability of the students by developing their linguistic competence and communicative skills



S. Y. B.Sc.(Computer Science) Semester-II

Course Title:- CS-221 Object Oriented Programming using C++

Course Outcome

- Able to understand the concept of object oriented programming.
- Use the benefits of object oriented design and understand when it is an appropriate methodology to use.
- Design object oriented solutions for small systems involving multiple objects.

Course Title:-CS-222 Software Engineering

Course Outcome

- Able to design and conduct experiments, as well as to analyze and interpret data.
- Able to identify, formulate, and solve engineering problems.
- Able to analyze, design, verify, validate, implement, apply, and maintain software systems.
- Able to understand different phases of SDLC.

Course Title:-CS-223 Practical Based on CS-211 and CS221-Sem-I and II

Course Outcome

- Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
- Students will be able to use linear and non-linear data structures like stacks, queues, linked list etc.
- Students will be able to apply concepts learned in various domains like DBMS, compiler construction etc.
- Students will be able to perform programming in object oriented language.
- Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.

Course Title:-CS-224 Practical Based on CS-212 and CS222-Sem-I and II

Course Outcome

- To use SQL- the standard language of relational databases.



- Able to write SQL commands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS.
- Able to identify and analyze user needs and take them into account in the selection, creation, evaluation and administration of computer-based.
- Students will be able to create report/documentation for real life projects.
- Can apply their knowledge and understanding with a professional approach.

Course Title: - ELC-221: The 8051 Architecture, Interfacing & Programming

Course Outcome:

- To study the basics of 8051 microcontroller, Programming and its Interfacing techniques.
- To apply knowledge of 8051 to design different application circuits.
- To introduce the basic concepts of advanced Microcontrollers.

Course Title: - ELC-222: Communication Principles

Course Outcome:

- To understand basics of communication systems.
- To understand digital communication techniques.
- To introduce concepts in advanced wireless communication.

Course Title: - ELC-203: Practical Course

Course Outcome:

- To use basic concepts for building various applications in electronics.
- To understand design procedures of different electronic circuits as per requirement.
- To build experimental setup and test the circuits.
- To develop skills of analyzing test results of given experiments.

Course Title:-MTC-221 Computational Geometry

Course Outcome:

- Student will get acquainted with the typical problems of computational geometry.
- Student will understand the existing solutions and their applications in computer graphics and machine vision.
- Student will get deeper knowledge of mathematics.
- Student will learn the principles of geometric algebra including its application in graphics and vision related tasks.
- Student will practice programming, problem solving and defense of a small project.

**Course Title:-MTC-222 Operation Research:****Course Outcome**

- Construct linear integer programming models and discuss the solution techniques.
- Set up decision models and use some solution methods for nonlinear optimization problems.
- Propose the best strategy using decision making methods under uncertainty and game theory.
- Solve multi-level decision problems using dynamic programming method.
- Formulate pure, mixed, and binary integer programming models.
- Formulate the nonlinear programming models.

Course Title:-MTC-223 Mathematics Practical**Course Outcome**

- Do basic 2- and 3-D plotting,
- Write code in the prescribed language for a number of algorithms for the topics covered given pseudo-code, or modify a given code to perform an indicated task,
- Debug code in the prescribed language at an appropriate level, and decide if they can make their code more efficient,
- Verify the correctness of a solution or decide whether the result is an acceptable approximation to the solution,
- Identify algorithms with which to solve mathematical problems, and
- Write programs from the underlying algorithms, and demonstrate the ability to employ good commenting and coding techniques.

Course Title:- EN-221: Technical English – Sem-II**Course Outcome:**

- To expose students to the best examples of prose and poetry in English so that they realize the beauty and communicative power of English.
- To enhance employability of the students by developing their linguistic competence and communicative skills



T.Y. B.Sc. (Computer Science) Semester I

Course Title:- CS-331 Systems Programming

Course Outcome :

- Able to design structure of a simple editor.
- Able to design structure of Assembler and macro processor for an hypothetical simulated computer.
- Understand working of linkers and loaders and other development utilities.
- Understands Complexity of Operating system as a software.

Course Title : CS-332 Theoretical Computer Science

Course Outcome :

- Understand the fundamental mathematical , regular languages and finite automata
- Able to describe and transform regular expressions and grammars.
- Able to design different types of Finite Automata and Machine as Acceptor , verifier and translators.
- Able to understand the concept and design of push-down automata.
- Able to understand the design and different types of Turing machine .
- Understand the relation between context free languages, PDA and TM .
- Able to understand recursive enumerable languages, recursive function theory and Problems on recursive function.

Course Title : CS-333 Computer Networks –I

Course Outcome :

- Understand basic computer network technology.
- Understand and explain Data Communications System and its components.
- Able to identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- Identify the different types of network devices and their functions within a network .
- Understand the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

Course Title : CS-334 Internet Programming I

Course Outcome :

- To understand client server architecture.
- Implement PHP, Server Side Scripting Language .
- To know how to implement socket programming.

Course Title : CS-335 Programming in Java-I

Course Outcome :



- Understand to implement object oriented programming concepts.
- Understand how to design graphical user interface in Java programs.
- Understand how to design and develop applets.
- Able to design User Interface using Swing and AWT.
- Understand concept of packages and study how to implement them.

Course Title : CS-336 Object Oriented Software Engineering

Course Outcome :

- Understand the importance of Object Orientation in Software engineering.
- Acquire knowledge of components of Unified Modeling Language .
- Able to understand techniques and diagrams related to structural modeling .
- Will learn techniques and diagrams related to behavioral modeling .
- Will learn different techniques of Object Oriented analysis, design and testing .

T.Y. B.Sc. (Computer Science) Semester II

Course Title:- CS--341 Operating Systems

Course Outcomes:

- Understand the role of operating system as System software.
- Able to compare the various algorithms and comment about performance of various algorithms used for management of memory, CPU scheduling, File handling and I/O operations.
- Understand various concept related with Deadlock to solve problems related with Resources allocation, after checking system in Safe state or not.
- To understand role of Process synchronization towards increasing throughput of system.

Course Title:- CS-342 Compiler Construction

Course Outcomes:

- Learn how to use lexical analyzer and parser generator tools.
- Understand how to build symbol tables and generate intermediate code.
- Will study compiler architecture.
- Study and understand the technique of compiler optimization.

Course Title:- CS-343 Computer Networks II

Course Outcomes:

- Will study how to configure PCs running Linux so that they receive IP addresses, have default routes, can resolve host names, and so on. (And similarly for Windows, if time permits.).
- Able to apply knowledge of the TCP/IP layering model to intelligently debug networking problems.
- Will be able to use Linux commands to understand how a PC is configured.



- Will able to understand and build the skills of subnetting and routing mechanisms.

Course Title : CS-344 Internet Programming II

Course Outcomes :

- Understand working of XML, CSS and XML parsers.
- Will learn to implement PHP framework for effective design of web application.
- Will use JavaScript to program the behavior of web pages.
- Will use AJAX to make our application more dynamic.

Course Title : CS-345 Programming in Java-II

Course Outcome :

- Understand how to use database programming using Java.
- Will able to implement web development concept using Servlet and JSP.
- Will Able to develop a game application using multithreading.
- Learn and implement socket programming concept.

Course Title:- CS-346 Computer Graphics

Course Outcomes:

- Understand how to use graphics objects represented in computer.
- Will able to correlate between user and computer through graphics.
- Able to increase the productivity through graphics.
- Understand programmer's perspective of working of computer graphics.

Course Title:- CS-347 Practical Based on CS-331 and CS341-Sem-I and II

Course Outcomes:

- Understand how to implement structure of a simple editor.
- Able to develop structure of Assembler and macro processor for an hypothetical simulated computer.
- Able to develop various algorithms used for management of memory, CPU scheduling, File handling and I/O operations.
- Understand how to develop Banker algorithms related with Resources allocation, after checking system in Safe state or not.

Course Title:- CS-348 Practical Based on CS-335 and CS345-Sem-I and II and Computer Graphics using Java

Course Outcomes:



- Understand how to implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity.
- Able to identify classes, objects, members of a class and the relationships among them needed for finding the solution to specific problem.
- Able to demonstrate how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.
- Able to demonstrate understanding and use of different exception handling mechanisms and concept of multithreading for robust faster and efficient application development.
- Able to identify and describe common abstract user interface components to design GUI in Java using Applet & AWT along with response to events.
- Able to identify, Design & develop complex Graphical user interfaces using principal Java Swing classes based on MVC architecture.

Course Title:- CS-349 Practical Based on CS-334 and CS344-Sem-I and II and Project Course Outcomes:

- Able to design a basic web site using HTML5 and CSS3 to demonstrate responsive web design.
- Learn how to implement dynamic web pages with validation using JavaScript objects by applying different event handling mechanism.
- Learn how to use AJAX Programming Technique to develop RIA.
- Able to develop simple web application using server side PHP programming and Database Connectivity using My SQL.
- Will understand how to build well-formed XML Document and implement Web Service using Java.

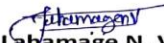



PROGRAMME SPECIFIC OUTCOME (PSO)

By the end of the program, students will be able to:

1. Analyze problems and identify computing resource requirements to develop effective solutions, demonstrating the ability to tackle complex real-world challenges using computational techniques.
2. Acquire and apply technical skills and analytical abilities to design and implement computer-based solutions for diverse problems, utilizing knowledge from core areas such as programming, databases, and software engineering.
3. Develop a solid foundation in computer science principles, enabling them to pursue advanced studies or enter the software industry, contributing to professional development and career growth in the technology sector.




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<p style="text-align: center;">MVP's G.M.D .Arts , B.W. Commerce & Science College Sinnar COLLEGE, Department of Commerce Course Outcomes- CBCS 2019 Pattern</p>
Programme Outcomes:
After successfully Completing B.Com. programme, students will able to
PO1: In depth knowledge, understanding and skills in commerce
PO2: students can get skills regarding various aspects like Marketing Manager, Selling Manager
PO3: Increase Capability of the students to make decisions at personal & professional level
PO4: Grow the skill of applying concepts and methods used in Commerce for real life difficulties
PO5: Habit well recent Trends in Business, Administrations and Industries
PO6: Use recent technologies effectively to communicate ideas in the area of commerce & management
PO7: Students can self-sufficiently start up their own Business
PO8: Students can independently start up their own Business
PO9: The awareness of different specializations in Marketing , costing, banking and finance with the practical exposure helps the students to stand in organization
PO10: Develops communication skills and build confidence to face the challenges of the corporate world.

Programme Specific Outcomes
PSO 1:- Students will prove progressive affective domain development of values, the role of accounting in society an business
PSO 2:- - Empowers learners to prove themselves in different Professional examinations like CA, CS, CAT, GRE, CMA, MPSC, UPSC etc.
PSO 3 : Students will learn relevant managerial accounting career skills, applying both quantitative and qualitative knowledge to their future careers in business.
PSO 4 : -Learners further move towards research in the field of Commerce.
PSO 5 : Students will able to demonstrate quantitative and qualitative knowledge in key areas of organization behaviour.
PSO 6: Students will able to evaluate national and international issue and discussion on economic, commercial and business related topics

Course Outcome	
F.Y.B.Com.	
Financial Accounting- I	
CO1	To impart knowledge of basic accounting concepts
CO2	To create awareness about application of these concepts in business world
CO3	To impart skills regarding Computerized Accounting
CO4	To impart knowledge regarding finalization of accounts of various establishments.
Business Mathematics & Statistics- I	
CO1	To introduce the basic concepts in Finance and Business Mathematics and Statistics
CO2	To familiar the students with applications of Statistics and Mathematics in Business
CO3	To acquaint students with some basic concepts in Statistics.
CO4	To learn some elementary statistical methods for analysis of data.
CO5	The main outcome of this course is that the students are able to analyze the data by using some elementary statistical methods
Organizational Skills Development- I	
CO1	To introduce the students to the emerging changes in the modern office environment
CO2	To develop the conceptual, analytical, technical and managerial skills of students efficient office organization and records management
CO3	To develop the organizational skills of students
CO4	To develop Technical skills among the students for designing and developing effective means to manage records , consistency and efficiency of work flow in the administrative section of an organization
CO5	To develop employability skills among the students
Marketing and Salesmanship- I	
CO1	To introduce the basic concepts in Marketing.
CO2	To give the insight of the basic knowledge of Market Segmentation and Marketing Mix
CO3	To impart knowledge on Product and Price Mix.
CO4	To establish link between commerce, business and marketing.
CO5	To understand the segmentation of markets and Marketing Mix.
CO6	To enable students to apply this knowledge in practicality by enhancing their skills in the field of Marketing.
Business Environment & Entrepreneurship – I	
CO1	To understand the concept of Business Environment and its aspects
CO2	To make students aware about the Business Environment issues and problems of Growth
CO3	To examine personality competencies most common to majority of successful entrepreneurs and to show how these competencies can be developed or acquired
CO4	To understand the difference between Entrepreneurial and non-Entrepreneurial behavior
CO5	To provide knowledge of the significance of Entrepreneurship in economy
CO6	To familiarize the students with the contribution of selected institutes working to promote Entrepreneurship
CO7	To generate entrepreneurial inspiration through the study of successful Entrepreneurs
Financial Accounting- II	

CO1	To impart knowledge of various software used in accounting
CO2	To impart knowledge about final accounts of charitable trusts
CO3	To impart knowledge about valuation of intangible assets
CO4	To impart knowledge about accounting for leases
	Compulsory English-II
CO1	To develop oral and written communication skills of the students so that their employability enhances
CO2	To develop overall linguistic competence and communicative skills of students
	Business Economics (Micro) – II
CO1	To understand the basic concepts of micro economics.
CO2	To understand the tools and theories of economics for solving the problem of decision making by consumers and producers.
CO3	To understand the problem of scarcity and choices.
	Business Mathematics and Statistics – II
CO1	To introduce the basic concepts in Finance and Business Mathematics and Statistics
CO2	To familiar the students with applications of Statistics and Mathematics in Business
CO3	To acquaint students with some basic concepts in Statistics.
CO4	To learn some elementary statistical methods for analysis of data.
CO5	The main outcome of this course is that the students are able to analyze the data by using some elementary statistical methods
	Organizational Skill Development- II
CO1	To imbibe among the students the qualities of a good manager and develop the necessary skill sets
CO2	To develop the technical skills of the students to keep up with the technological advancements and digitalization
CO3	To develop the communication skills of students and introducing them to the latest tools in communication
CO4	To develop writing, presentation, interpersonal skills of the students for effective formal corporate reporting.
CO5	To educate the students on the recent trends in communication technology and tools of office automation
	Banking and Finance
CO1	To develop the working capability of students in banking sector
CO2	To Make the Students aware of Banking Business and practices.
CO3	To enlighten the students regarding the new concepts introduced in the banking system.
	Marketing and Salesmanship- Fundamental of Marketing- II
CO1	To introduce the concept of Salesmanship.
CO2	To give insight about various techniques required for the salesman.
CO3	To inculcate the importance of Rural Marketing.
CO4	To acquaint the students with recent trends in marketing and social media marketing.
	Business Environment & Entrepreneurship – I
CO1	Familiarize with the nature of business environment and its components.
CO2	The students will be able to demonstrate and develop conceptual framework of business environment and generate interest in international business.

CO3	Understand the definition of entrepreneurship and the importance and role of entrepreneur in the business world today
	Employability Skill Enhancement Programme(Add-on)
CO1	This programme is designed to aid candidates in their preparation for recruitment through campus or outside campus. The course will enable students to be a better professional through effective communication.. Students will learn skills to present themselves in an effective manner while facing interviews or similar test for placements.
	Value Education(Add-on)
CO1	The course is designed to inculcate the values which are an utmost need of the hour to overcome various challenges. The students will learn to adopt and implement the suitable values at appropriate time, understand various challenges in value adoption in this contemporary world, use the 'Reflection method' to explore values from inside out.
CO2	The course is expected to acquaint students with the core values such as physical, mental and spiritual aspects of personality, developing respect for the dignity of individual and the society, inculcation of spirit of patriotism and national integrity and developing tolerance towards understanding of different religious faiths as well. The course will help students to be a better human being and a strong pillar of society.

	S.Y.B.Com.
	Business communication III
CO1	Described about principles of effective communication.
CO2	Classifying the different kinds of business letters and its purpose.
CO3	Acquired knowledge about requirement of different types of correspondence and How to write the same.
CO4	Analyses and preparation of reports & minutes of meeting.
CO5	Described different forms of communication, its importance & need Fax, E-mail Etc.
	Business Management III
CO1	Described about different management theories Taylor & Fayol.
CO2	Acquired knowledge on scientific management F.W.Taylor.
CO3	Understands about PODSCORB.
CO4	Described about different concept like staffing, departmentation & delegation.
CO5	Understands about co-ordination & controlling
	Corporate Accounting III
CO1	Acquired knowledge on issue of shares.
CO2	Understand the knowledge on issue of debentures.
CO3	Describe the calculation of profits prior to incorporation and company final Accounts.
CO4	Understand the accounting treatment for valuation of goodwill & shares.
CO5	Analyse the alterations of share capital.
	Elements of Company Law III
CO1	To develop general awareness of Elements of Company Law among the students.
CO2	. To understand the Companies Act 2013 and its provisions.
CO3	. To have a comprehensive understanding about the existing law on formation of new company in India
CO4	To create awareness among the students about legal environment relating to the company law.

CO5	To acquaint the students on e-commerce, E governance and e-filing mechanism relating to
	Business Economics III
CO1	To familiarize the students with the basic concept of Macro Economics and its application
CO2	To aware students about Gross National Product (GNP), Net National Product (NNP) ,Income at Factor cost or National Income at Factor Prices ,Per Capita Income , Personal Income (PI) ,Disposable Income etc
	Marketing Management-III
CO1	To introduce the concept of Marketing Management.
CO2	To give the students the basic knowledge of Marketing Management to be a successful modern
CO3	marketer.
CO4	To inculcate knowledge of various aspects of marketing management through practical approach.
CO5	To interpret the issues in marketing and their solutions by using relevant theories of marketing
	Business communication IV
CO1	Described about principles of effective communication.
CO2	Classifying the different kinds of business letters and its purpose.
CO3	Acquired knowledge about requirement of different types of correspondence and How to write the same.
CO4	Analyses and preparation of reports & minutes of meeting.
CO5	Described different forms of communication, its importance & need Fax, E-mail Etc.
	Business Management IV
CO1	Described about different management theories Taylor & Fayol.
CO2	Acquired knowledge on scientific management F.W.Taylor.
CO3	Understands about PODSCORB.
CO4	Described about different concept like staffing, depart mentation & delegation.
CO5	Understands about co-ordination & controlling
	Corporate Accounting IV
CO1	Acquired knowledge on issue of shares.
CO2	Understand the knowledge on issue of debentures.
CO3	Describe the calculation of profits prior to incorporation and company final Accounts.
CO4	Understand the accounting treatment for valuation of goodwill & shares. Analyse the alterations of share capital.
	Elemenmts of Company Law IV
CO1	To develop general awareness among the students about management of company
CO2	To acquaint the students about E Governance and E Filling under the Companies Act, 2013.
CO3	To equip the students about the various meetings of Companies and their importance.
CO4	To make students capable of becoming good human resource of the corporate sector.
	Business Entrepreneurship
CO1	To understand the concepts in Business Entrepreneurship and its aspects.
CO2	To make students aware about the entrepreneur and entrepreneurship.
CO3	To study the new age of entrepreneur and to know in details of entrepreneurship.
	Marketing Management-IV
CO1	To create awareness and impart knowledge about the basics of Marketing Management which is the basic foundation of marketing subject.

CO2	To orient the students in recent trends in marketing management.
CO3	To understand the concept of Green Marketing.
CO4	To enable students to apply this knowledge in practical by enhancing their skills in the field of

Sr. No.	T.Y.B.Com.
	Business Regulatory Framework
CO1	To provide conceptual knowledge about the framework of business Law in India.
CO2	To orient the students about the legal aspect of business.
CO3	To create awareness among the students about legal environment relating to the Contract Law, Partnership Act, Sale of Goods Act in India
CO4	To understand the emerging issues relating to e-commerce, e-transaction issues and E Contracts
	Auditing & Taxation
CO1	Described about the concept of auditing, types and methods of auditing.
CO2	Acquired knowledge about vouching of cash & credit transaction, verification of assets & liabilities.
CO3	Described about preparation of different methods & auditors responsibility Regarding depreciation & reserves.
CO4	Comprehend the knowledge about appointment of different types of auditor, Their rights and duties.
CO5	Acquired knowledge about audit in EDP environment.
CO6	Impart knowledge on the provisions of Income tax law and practice and make students compute the assessment practices under the various heads of income.
CO7	Acquire knowledge about taxation, Rates of tax & Residential status.
	Advanced Accounting
CO1	Described about preparation of branch accounts, inter branch and head office Accounts
CO2	Acquired knowledge on preparation of departmental accounts with respect to Apportionment of overheads.
CO3	Calculation of interest on hire purchase and instalment system.
CO4	Described about new profit sharing ratio and calculation of profit during admission of a new partner and retirement of partner.
CO5	Computing the accounting treatment during death of a partner and dissolution of a partner
	Indian Global Economics
CO1	To impart knowledge of business economics
CO2	Students understand the problem of scarcity and choices.
	Marketing Management- (SPI II)
CO1	Understand the concept of marketing and various types of market.
CO2	Knowledge on segmentation of market and Consumer behaviour.
CO3	Analyses of marketing mix and pricing strategies.
	Marketing Management- (SPL III)
CO1	Classification of channels of distribution and promotional activities.
CO2	Awareness on recent trends used by the marketers and Consumer Protection act.
	Business Entrepreneurship (SPI II)
CO1	To Develop understanding of MSME and its formation



CO2	To Develop Knowledge and understanding in creating and managing new venture.
CO3	To Equip students with necessary tools and techniques to set up their own business venture
CO4	To help students to bring out their own business plan.
	Business Entrepreneurship(SPL III)
CO1	To acquaint students how to establish connections, encourage communication and teamwork, foster innovation and creativity and building team bonds.
CO2	To develop the ability in students to tap personal strengths for preventing stress and achieving meaningful goals.
CO3	To develop the ability in students how to accept the responsibility of taking charge of your own levels of stress.
CO4	To identify theories of motivation and evaluate their applicability

Class: M. Com. Part-I, Sem. I &	
Programme Outcomes PG	
Sr. No.	Course (SUBJECT)
	Management Accounting
CO1	To enhance the abilities of learners to develop the concept of management accounting and its significance in the business.
CO2	To enhance the abilities of learners to analyze the financial statements.
CO3	To enable the learners to understand, develop and apply the techniques of management accounting in the financial decision making in the business corporates.
CO4	To make the students develop competence with their usage in managerial decision making and control.
	Strategic Management
CO1	Understand the basic concepts and principles of strategic management analyse the internal and external environment of business
CO2	Develop and prepare organizational strategies that will be effective for the current business environment
CO3	Devise strategic approaches to managing a business successfully in a global context
	Advanced Accounting & Taxation Special Paper I
CO1	To lay a theoretical foundation of Accounting & Accounting Standards.
CO2	To gain ability to solve problems relating to Corporate Accounting.
	Income Tax

CO1	To gain knowledge of the provisions of Income - tax including Rules pertaining there to, relating to the following topics
CO2	To develop ability to calculate taxable Income of 'Individual', 'Hindu Undivided Family' and 'Company' assesses
	Financial Analysis & Control
CO1	To enable the students to acquire knowledge of financial analysis and control tools
CO2	To Make appropriate application and uses of financial analysis and control
	Specialized Areas in Accounting
CO1	To understand the application of advanced specialized accounting practices in the field of modern business and profession
CO2	To gain the knowledge on corporate restructuring which are essentially mean to attain greater market share, acquire additional brand and create new synergies
CO3	To develop proficiency in new skills expected for future accountants in this changing business environment
CO4	To acquaint with the amalgamation and reconstruction procedures of companies
	Business Tax assessment and planning
CO1	To provide understanding of Direct Taxes including rules pertaining there to and their application to different business situations
CO2	To understand principles underlying the Goods and Service tax
CO3	To understand basic concepts of Goods Service Tax and Customs Duty
	Business Tax assessment and planning
CO1	To provide understanding of Direct Taxes including rules pertaining there to and their application to different business situations.
CO2	To understand principles underlying the Goods and Service tax
CO3	To understand basic concepts of Goods Service Tax and Customs Duty
	BUSINESS FINANCE
CO1	To acquaint the students with corporate finance required for Indian Industries.
CO2	To make the students aware about the latest developments in the field of corporate finance.
CO3	To enable the students to understand the traditional theories of capitalization and dividend distribution practices.

CO4	To give detail exposure of working capital management practice of finance to students Skills to be developed:
	RESEARCH METHODOLOGY FOR BUSINESS
CO1	To acquaint the students with the areas of Business Research Activities
CO2	To enhance capabilities of students to conduct the research in the field of business and social sciences
CO3	c. To enable students in developing the most appropriate methodology for their research studies
CO4	d. To make them familiar with the art of using different research methods and techniques
	ADVANCED AUDITING
CO1	To enable the students to acquire knowledge of Auditing.
CO2	To Make appropriate application and uses of Auditing.
	Capital Market and Financial Services
CO1	To acquaint the students with working of capital market.
CO2	To make the students aware about the latest developments in the field of capital market in India.
CO3	To enable the students to understand various transactions in stock exchanges and agencies involved in it.
CO4	To give exposure of financial services offered by various agencies and financial adviser to students.
	Recent Advances in Accounting, Taxation & Auditing
CO1	To enable the students to be abreast with the latest advances in the field of Accounting.
CO2	To acquaint students with the latest trends of accounting adopted by large and small entities worldwide.
CO3	To enable students to realize the need for up gradation of technology based accounting skills.



MVP Samajs Nashik
G.M.D.Arts, B.W. Commerce and Science College, Sinnar Department of Defence & Strategic
StudiesThe Mision and The Vision

➤ **THE MISION**

“Educating encouraging and transforming young minds into future leaders in the respective areas.”

- 1) To impart knowledge and develop defence oriented intellectual aptitude.
- 2) The promotion and dissemination of knowledge on defence, strategic and security related issues among students for bringing security consciousness in the society and nation.

➤ **THE VISION**

“To impart qualitative and valuable service in higher education for the students in Maharashtra”

- 1) DSS is devoted to the production and refinement of knowledge related to the broader themes of defence, strategy, security and peace
- 2) Emerging as a premiere academic institution with exceptional educational and research opportunities that will shape the discourse in the field.
- 3) To impart knowledge and disseminate ideas of war and peace.
- 4) To create security and strategic cultural consciousness at national level.



MVP Samajs Nashik
G.M.D.Arts, B.W. Commerce and Science College, Sinnar
Department of Defence & Strategic Studies
Programme Outcome / Programme Specific Outcome / Course Outcome

➤ **PROGRAMME OUTCOME**

- Students will have a better understanding on National Security
- Students will learn how to comprehend, critically analyse and evaluate trends in International Politics
- The study will foster creative thinking about pressing Global problems
- The students will develop defence oriented awareness and disseminate ideas of war and peace.

➤ **PROGRAMME SPECIFIC OUTCOME**

After the Completion of programme the students should

- Attain the sound knowledge about the basic competency in strategic affairs covering a wide spectrum of interstate security to global security issues.
- Develop capability in understanding the implications of use and threat of use of force in International relations.
- Have a clear understanding of the key concepts related to the subject along with their applications in real life situations.
- Acquire the ability to move from LOTS (Lower Order of Thinking Skills) to HOTS (Higher Order of Thinking Skills) in the discipline.
- Inculcate a spirit of nationalism and develop good values contributing to building strong national character

➤ **COURSE OUTCOME**

- Investigate the qualitative behavior of solutions of systems of differential equations and interpret in the context of an underlying model.
- Use various canonical types of groups (including cyclic groups and groups of permutations) and canonical types of rings (including polynomial rings and modular rings).
- Solve discrete mathematics problems that involve: computing permutations and combinations of a set, fundamental enumeration principles, and graph theory.
- Produce rigorous proofs of results that arise in the context of real analysis.
- Apply the concept and consequences of analyticity and the Cauchy-Riemann equations and of results on harmonic and entire functions including the fundamental theorem of algebra.

F.Y.B.A (Department of Defence & Strategic Studies)

DS101: DEFENCE ORGANISATION OF INDIA

The basic aim of the paper is to introduce students to Defence Organisation of India.

- This paper will cover military organisation in India
- reconstruction of armed forces after 1947
- Higher Defence Organisation as well as Intelligence Organisation In India.



DS201: INDIA'S NATIONAL SECURITY

- To make aware the students about India's National Security.
- This paper covers overall picture of India's National Security which encompasses the internal, external challenges to India's National Security alongwith its dimensions.

S.Y.B.A (Department of Defence & Strategic Studies)

Course: 23273 - G2 - Chhatrapati Shivaji Maharaj As A Nation Builder

The Course Focuses On The War History Of The Marathas. The Emphasis Is On The Strategies And Tactics Used And On The Approaches To War. Specific Battles Would Be Used As Illustrations For The Study.

- To Learn About Chhatrapati Shivaji Maharaj As A Nation Builder
- To Understand About The Maratha Military Organization
- To Gain Knowledge Of Military History

Course: 23271 - S1 - INDIA'S INTERNAL SECURITY – I

- Values of India's National Security
- Understanding the nature of internal security
- Social Problems in India and its effects
- Regionalism in India
- Jammu and Kashmir Problem
- Naxalite Problems
- Terrorism
- Cyber Crime in India

Course: 23272 - S2 -GEOPOLITICS

- Understanding the India's Geopolitics
- Evolution of Geopolitical Thoughts Since
- Maritime Boundaries and Territorial Sea
- Geographical factors affecting War



Course: 24272 - S2 Military Geography

Students get following information from the subject of Military Geography.

- Military Geography
- Geo-strategy
- Geography and Warfare
- Warfare in different Terrains

T.Y.B.A (Department of Defence & Strategic Studies)

Course: 35273- G3 - India's National Security Policy and Strategy – I

A National Security Strategy or Policy (NSS or NSP) is a key framework for a country to meet the basic needs and security concerns of citizens, and address external and internal threats to the country.

- A National Security Strategy or Policy (NSS or NSP) is a key framework for a country to meet the basic needs and security concerns of citizens, and address external and internal threats to the country.
- The Indian state does not possess an overarching national security strategy (NSS) that comprehensively assesses the challenges to the country's security and spells out policies to deal effectively with them.
- A well-defined national strategy is a clear vision of the path that India must take in pursuit of its national vision. It also provides a guide for all organs of the state on the policy directions that they must follow.
- Such a strategy must be executed within the parameters laid down by the Constitution of India and the country's democratic political dispensation.

Course: 35271 -S3 International Organization

Students Informed about International Organisation of United Nation.

- Information of the United Nations Organization.
- Structure of UN.
- Importance's Role of UN.
- Role of World Trade Organization (WTO) and World Health.



Course: 35272– S 4 - CONTEMPORARY WARFARE

Morden times due to the development of science and technology wars take place in different ways

- Understanding of Advantages and Disadvantages of War, Conventional Warfare , Chemical and Biological Warfare
- Revolutionary War and Low Intensity Conflicts

Course: 36273- G 3 India's National Security Policy and Strategy – II

Knowledge of Different policies are informed. In this,

- India's Maritime Policy
- Non Aligned Movement (NAM)
- India's Look East and Act East policy
- India's South Asian Policy

Course: 36271 - S3 - Regional Organizations

- Understanding of the Various Organisation in South Asian
- India's Role in South Asian Organisation
- Detail Information of Organisation of South Asian

Course: 36272 S4 - MODERN WARFARE

- Nuclear Warfare system and Defence Technology
- Economic and Psychological Warfare, Space Warfare or Star War, Electronic or Information warfare , Environmental warfare

MA/ MSc

This course in Defence and Strategic Studies The Post-Graduate course in Defence and Strategic Studies is formulated over four semesters to provide wide-ranging perspectives, encourage analytical skills and understanding for solving crucial problems confronted by the state and the society. The structure of the Post-Graduate course has been organized so as to ensure that there is minimum core component which students of Defence and Strategic Studies shall have to study the basic requirement of the subject.

MA/ MSc –I (Department of Defence & Strategic Studies)

Course :DS: 1.1Key Concept Of National Security And Strategic Studies

- Students will learn about various aspects to understand security and strategic studies.



- With the basic understanding of security and strategic studies, students will be able to read and think and create new perspectives of the subject.

Course :DS: 1.2Geo-Politics and Military Geography:

- Understanding the behavior of nation-states within the geographical context in which they operate is critical to assess how and why they behave in a particular way and the choices they make.
- Students of Defense and Strategic Studies are provided with a perspective about geopolitical thinking and the applications of geography to elements and concerns of strategy.

Course :DS: 1.3International Relations:

- This is the broad field within which the various actors – nations, nations-states and non-states – interact in the international system.
- An attempt is made to provide for both, a theoretical understanding of how and why nations behave as they do and also a historical survey of the major trends in world affairs.

Course DS: 1:5 Cyber Security

- This course will enable the students to understand how cyber security started playing role an important role in national security.
- The course is also designed to study introductory concepts in the cyber security.
- This course will develop the students to understand the significant role of cyber security

Course :DS: 2.1Peace and Conflict Studies:

- Here the students are introduced to the nature and forms of conflict, approaches to conflict management and conflict resolution as well as to new concepts like comprehensive security and human security.

Course Code: Ds 2.2 Defence Economics

- Students will learn about the specific applications of economics and economic theories in the field of defence and national security.
- The analysis of defence expenditures will enable students to examine the contentious debate on defence spending.

Course Code: DS 2.3 India's National Security

- This course explores various aspects of national security, in order to understand the causes of challenges and threats to India's national security.
- The aim of this course is to identify India's internal and external security.

Course: DS: 2.4Un System And Global Security

- The course aims to study and understand the structure of the UN and UN organs.
- The course explores various functions of the UN and its contribution to Global Security.



MA/ MSc –II (Department of Defence & Strategic Studies)

Course :DS: 3.1: Contemporary And Critical Security Studies

- This course aims to go beyond the state-centric and military-centric traditional approaches to study security.
- Students will be introduced to the non-traditional approaches in contemporary security studies that developed in the post-Cold War period and particularly to the ‘critical turn’ in the discipline of International Relations.

Course :DS: 3.2: India’s Defence Management And National Security Apparatus

- This course will help to develop comprehensive understanding of major institutions in India’s Defence and National Security.
- The students will learn basic organisation and operating principles of these organisations.
- It will conclude with the major reforms proposed from time to time to overcome its limitations.

Course :DS: 3.3: Research Methodology

- The course will orient students for research in humanities and Social Sciences.
- It will introduce basic concepts and various tools for research.
- It will also introduce to the students the various forms of academic writings (formal /informal).

Course :DS: 3.4: Indian Military History

- Students will study the history of the armed forces and military traditions in India from the medieval to modern era.
- The course offers students an opportunity to study the evolution of military traditions in India

Course :DS: 4.1: Indo-Pacific Security Architecture: Challenges And Prospects

- The Indo-Pacific Security Architecture emerges as a salient theme of study given the converging geopolitical and geo-economic interests of Asia’s great powers of China, India, Japan and the United States that has been a Indo-Pacific and a global resident power for long.
- This course would assess the idea of Indo-Pacific, the convergent and competitive dynamics of the Indo-Pacific and the outcomes.

Course :DS: 4.2: India's National Security

- In order to maintain peace of a nation and avoid from unwanted threats
- there are different approaches and role to play while maintaining India's National Security.
- This is one of the core components of the course that provided students an understanding of various dimension of India's security challenges i.e. internal and external.

Course :DS: 4.3: Ocean And Maritime Security

- Students will learn why and how Ocean and Maritime safety and security is a multi-faceted issue, especially in the realm of traditional and non-traditional threats.
- There are various challenges of ocean and maritime like maritime terrorism, smuggling, transnational crime, drug trafficking, illegal immigration, compounded by natural disasters, oil spills and effects of climate change are threats and challenges that impose on the national interests of Indian Ocean Region.
- These threats conspicuously highlight the acute and imperative need for protection of the sea lanes of communications.

Course :DS: 4.8: Disaster Management

- Disasters are becoming the issues of national security due to their scale of devastation and effect society [nation-state].
- They always required appropriate response from individual, national government and world community.
- Purpose is of course is to give comprehensive knowledge about Disaster Management and its working apparatus


CO-ORDINATOR
IQAC
G.M.D. Arts, B.W. Commerce
And Science College, Sinnar


Principal
G. M. D. Arts, B. W. Commerce and
Science College, Sinnar, Dist. Nashik



Maratha Vidya Prasarak Samaj Nashik

**G. M. D. Arts, B. W. Commerce & Science College, Sinnar,
Tal- Sinnar, Dist- Nashik**

Department of Economics

B. A. Economics

Programme Outcomes:

After successfully completing B.A. Economics Programme students will be able to:

- PO1 Technical knowledge:** use various tools for economic analysis and apply knowledge of the Micro and Macro approach for the personal benefit and for the benefit of national and the global economy.
- PO2 Problem analysis:** recognize formulate and study the problems of various sectors of the Indian economy, regional economy and the global economy with the help of the economic ways of thinking, theories, concepts and laws
- PO3 Design/development of solutions:** Design policies and solutions for the economic problems of India and the global economy at large.
- PO4 Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern IT tools for economic analysis
- PO6 The student and society:** Apply the knowledge of economic concepts, laws and theories, for a better economic environment for the society at large.

- PO7 Environment and sustainability:** develop an economic way of thinking leading to the economic growth, protecting environment with sustainable development
- PO8 Ethics:** inculcate ethical values in the business and the government sector and define responsibilities and norms in the business environment and the policies of the government in the context of the welfare of the society.
- PO9 Individual and team work:** work efficiently as an individual, and as a part or leader of a team, having interdisciplinary approach
- PO10 Communication:** Communicate effectively on the economic activities with the community and the society through the acquiring knowledge of the national and the global economy.
- PO11 Project management and finance:** apply knowledge of the economic principles, functioning of various sectors of the economy as an individual on various private and government projects and devise sources of finance.
- PO12 Life-long learning:** understand the nature of any discipline as a continuous process of development and welfare of the human being

Program Specific Outcome:

- PSO 1 Knowledge of Economic System:** An ability to understand economic theories and functioning of basic microeconomic and macroeconomic systems.
- PSO 2 Statistical and Mathematical Skills:** Acquaint with collection, organization, tabulation and analysis of empirical data. Ability to use basic mathematical and statistical tools to solve real economic problems.
- PSO 3 Econometric Applications:** Acquaint with basic and applied econometric tools and methods used in economics. The aim of this course is to provide a foundation in applied econometric analysis and develop skills required for empirical research in economics. It

also covers statistical concepts of hypothesis testing, estimation and diagnostic testing of simple and multiple regression models.

- PSO 4 Development Perspectives:** Delineate the developmental policies designed for developed and developing economics. The course also acquaint with the measurement of development with the help of theories along with the conceptual issues of poverty and inequalities.
- PSO 5 Environmental Strategy and Management:** This course emphasizes on environmental problems emerging from economic development. Economic principles are applied to valuation of environmental quality, quantification of environmental damages, tools for evaluation of environmental projects such as cost-benefit analysis and environmental impact assessments.
- PSO 6 Perspectives on Indian Economy:** Acquaint with basic issues of Indian economy and learn the basic concept of monetary analysis and financial marketing in Indian financial markets. This course reviews major trends in economic indicators and policy debates in India in the post-Independence period.

Course Outcomes:

B.A. Economics

Class	Course	Course Outcomes
F.Y.B.A.	SEM- I & II G-1 Indian Economic Environment	<ul style="list-style-type: none"> To familiarize the students with the recent developments in the Indian Economy To provide the students with the background of the Indian Economy with focus on contemporary issues like economic environment. To help the students to prepare for varied competitive examinations To enable students to understand and comprehend the current business scenario, agricultural scenario and other sectorial growth in the Indian context. To make the student aware of the developments such as MSMEs, Digital Economy, E-Banking, BPO & KPO, etc. Programme Outcome: Ability to develop an understanding of the economic environment and the factors affecting economic environment. Ability to develop awareness on the various new

		<p>developments in the different sectors of an economy – agriculture, industry, services, banking, etc.</p> <ul style="list-style-type: none"> At the end of the course, the student should be able discuss and debate on the various issues and challenges facing the Indian Economic Environment.
S.Y.B.A.	Sem. III & IV G-2 Financial System	<ul style="list-style-type: none"> To understand fundamentals of modern financial system. To understand the recent trends and developments in banking system. To understand the role of the Reserve Bank of India in Indian financial system. To provide the knowledge of various financial and non-financial institutions. To provide the students the intricacies of Indian financial system for better financial decision making.
S.Y.B.A.	Sem. III & IV S-1 Micro Economics	<ul style="list-style-type: none"> To develop an understanding about subject matter of Economics. To impart knowledge of microeconomics. To clarify micro economic concepts To analyze and interpret charts, graphs and figures To develop an understanding of basic theories of micro economics and their application. To demonstrate that the theories discussed in class will usually be applied to real-life situations. To help the students to prepare for varied competitive examinations
S.Y.B.A.	Sem. III & IV S-1 Macro Economics	<ul style="list-style-type: none"> To introduce students to the historical background of the emergence of macroeconomics To familiarize students with the differences between microeconomics and macroeconomics To familiarize students with various concepts of national income To familiarize students with Keynesian macroeconomic theoretical framework of consumption and investment functions To introduce students to the role of money in an economy. To introduce students to the conceptual and theoretical frameworks of inflation, deflation and stagflation, Business Cycle To familiarize students with the conceptual and theoretical framework of business cycles To introduce students to the role of monetary and fiscal policies in fulfilling the macroeconomic objectives of stability, full employment and growth. To introduce students to the various instruments of monetary and fiscal policies
S.Y.B.A.	Sem. III & IV SEC-Research Methodology	<ul style="list-style-type: none"> Demonstrate his/her understanding of sampling methods and the ability to use collection of data Identify the appropriate sample techniques for different

		<p>kinds of research questions</p> <ul style="list-style-type: none"> • Identify the appropriate source of data in relation to the collection of research data. • Able to classify and present the collected data in the form of graph, bar diagram, chart etc.
T.Y.B.A.	Sem. V & VI G-3 Indian Economic Development	<ul style="list-style-type: none"> • To relate and recognize the concept and indicators of Economic Development. • To describe and analyze the concept and indicators of Human Development. • To explain the characteristics of Developing and Developed Countries. • To describe the constraints to the process of Economic Development. • To describe and explain the process of Economic Planning. • To describe and examine the changing structure of planning process in India. • To describe and explain the relation between Economic Development and Environment
T.Y.B.A.	Sem. V & VI S-3 International Economics	<ul style="list-style-type: none"> • To relate and recall the concepts of International Economics and • International Trade. • To describe and apply the theories of international trade. • To explain and comprehend the issues relating to Terms of trade and Balance of Payment. • Ability to relate and explain the concept of Exchange Rate and Foreign Exchange Market. • Ability to describe the trends in Growth, Composition and Direction of India's Foreign Trade. • Ability to comprehend the issues relating to Foreign Capital and Regional and International • Co-Operation.
T.Y.B.A.	Sem. V & VI S-4 Public Finance	<ul style="list-style-type: none"> • To relate and recognize the Nature and Scope of Public Finance. • To describe and analyze the concept of Public Revenue and its components. • To explain types of Public Expenditure and reasons for rising Public Expenditure. • To explain the types of Public Debt and its effects. • To explain and assess the components and instruments of Fiscal Policy. • To relate to the concepts of Budget and its components. • To describe and analyze the concept of Deficit Financing and its effects. • To describe and explain the Centre and State Financial Relationship.



T.Y.B.A.	Sem. V & VI SEC Business Management	<ul style="list-style-type: none">• At the end of the Course, the Learner will have the following skills:• Business planning and decision making• Analytical Skills – Ability to analyze data collected and interpret in the most logical manner• Project Report Writing Skills- Ability to comprehend and illustrate/demonstrate findings• Presentation Skills – PPT/Poster- Ability to illustrate findings in the most appealing manner• Leadership Skills: Ability to show leadership skills with business ideas or work on business ventures as a practical example
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B.Com Programme Department of Economics:

Class	Course	Course Outcomes
F.Y.B.Com.	Sem. I & II Business Economics (Micro)	<ul style="list-style-type: none">• To impart knowledge of business economics• To clarify micro economic concepts• To analyze and interpret charts and graphs• To understand basic theories, concepts of micro economics and their application• To understand the basic concepts of micro economics.• To understand the tools and theories of economics for solving the problem of decision making by consumers and producers.• To understand the problem of scarcity and choices.
F.Y.B.Com.	Sem. I & II Banking & Finance (Fundamentals of Banking)	<ul style="list-style-type: none">• To provide knowledge of fundamentals of Banking• To create awareness about various banking concepts• To conceptualize banking operations.• To develop the working capability of students in banking sector• To Make the Students aware of Banking Business and practices.• To enlighten the students regarding the new concepts introduced in the banking system.

S.Y.B.Com.	Sem. III & IV Business Economics (Macro)	<ul style="list-style-type: none"> • To familiarize the students to the basic theories and concepts of Macro Economics and their application. • To study the relationship amongst broad aggregates. • To impart knowledge of business economics. • To understand macroeconomic concepts. • To introduce the various concepts of National Income. • To familiarize the students to the basic theories and concepts of Macro Economics and their application. • To understand the theories of money. • To understand the phases of trade cycle and policy measures to elongate the trade cycle. • To understand various concepts related to public finance. • To understand credit creation of banks and money measures of RBI.
S.Y.B.Com.	Sem. III & IV Banking & Finance (Indian Banking System)	<ul style="list-style-type: none"> • To provide the knowledge about Indian Banking System. • To create the awareness about the role of banking in economic development. • To provide the knowledge about working of Central Banking in India. • To know the functioning of private and public sector banking in India. • To provide the knowledge of Cooperative Banking in India • To analyze the functioning of Development Banking • To create the awareness about Banking Sector Reforms • To understand the role of various committees on Banking Sector Reforms.
T.Y.B.Com.	Sem. V & VI Indian & Global Economic Development	<ul style="list-style-type: none"> • To develop ability to analyze economic development process of India. • To impart knowledge about the relevance of economic practices in modern competitive world. • To help the students develop a sound theoretical foundation for their future academic ventures. • To acquaint the students with the knowledge of recent trends in Human Development Index • To acquaint students with the emerging issues in policies of India's foreign trade • To update the students about International institutions and organizations.

T.Y.B.Com.	Sem. V & VI Banking and Finance-Special Paper II (Financial Markets and Institutions in India)	<ul style="list-style-type: none"> • To acquaint the students with Indian Financial System and its various segments. • To make the students aware about Indian Money Market. • To analyse and understand the functions of Indian Capital Market. • To enable the students the functioning of Foreign Exchange Market. • To familiarize students about various basic concepts of stock market. • To analyse the types and process of stock trading. • To enable the students to understand the functions and working of Non -Banking Financial Institutions in India. • To enable the students to acquire sound knowledge of Regulatory Bodies in India.
T.Y.B.Com.	Sem. V & VI Banking and Finance-Special Paper III (Banking Law and Practices in India)	<ul style="list-style-type: none"> • To familiarize the Banking Laws and Practice in correlation to the Banking System in India. • To understand the legal aspects of Banking transactions and its implication as a Banker and as a customer. • To familiarize the students with the Banking Laws and Practices in India. • To make students capable of understanding and applying the legal and practical aspects of banking to help them technically sound in banking parlance. • To familiarize students about concept and types cybercrimes in banking. • To understand the aspects of paying and collecting banker. • To analyse the banker and customers relationship. • To enable the students to apply the legal and practical aspects of bank advances.

Course Outcome: M.A. (Economics)

Course	Course Outcomes
M.A.I Micro Economics Analysis I & II	<ul style="list-style-type: none"> • To provide a thorough understanding of the principles of economics • To enable students to apply micro economic concepts in various contexts. • To enable understanding the basic theories in microeconomics such as demand theory, production theory, market structures. • To discuss the modern developments in micro economics such as Modern Demand theories. • To provide a thorough understanding of the principles of economics • To enable students to apply micro economic concepts in various contexts. • To enable understanding the basic theories in microeconomics such as demand theory, production theory, market structures. • To discuss the modern developments in micro economics such as Game Theory.

<p>M.A.I</p> <p>Public Economics I & II</p>	<ul style="list-style-type: none"> • To develop an understanding of the changing role of the government and the fiscal functions of the modern governments. • To discuss and deliberate on the concepts and theories in public economies like public policy, principles of taxation, theories of public expenditure, etc. • To develop an understanding of various policies in public economics like fiscal policy, taxation policy, public debt policy, public expenditure policy etc. • To develop an understanding of various policies in public economics like fiscal policy, public debt policy, fiscal finances, etc. • To help the students to understand the normative policies and compare it with the policies framed and followed by Indian economy. • To impart information to the students about the reforms like taxation reforms in India.
<p>M.A.I</p> <p>International Trade and finance</p>	<ul style="list-style-type: none"> • To develop an understanding of the theoretical concept in international trade. To analyze international economics with reference to terms of trade, trade policy, trade agreements etc. • To provide knowledge to students regarding recent developments and changes in international banking, international banking agreements etc. • To make the students understand role of international economic organization and global crisis development. • To develop an understanding of the theoretical concept in international finance Balance of Payments, exchange rate policies, capital flows, etc. • To compare and contrast the scenarios on international trade in India vis-à-vis the world economy. • To provide knowledge to students regarding recent developments and changes in international banking, international banking agreements etc. • To make the students understand role of international economic organization and global crisis development.
<p>M.A.I</p> <p>Agriculture Economics</p>	<ul style="list-style-type: none"> • To develop an understanding of agricultural economics in the theoretical as well as practical context. • To discuss and debate the various issues and challenges faced by agrarian economies w.r.t. production, productivity, efficiency, employment, etc.
<p>M.A.I</p> <p>Labour Economics</p>	<ul style="list-style-type: none"> • To develop an understanding of labour economics in the theoretical as well as practical context. • To discuss and debate the various issues and challenges faced by labour with reference to division of labour, employment, wage determination, etc. • To demonstrate on the various aspects of labour dynamics and labour relations w.r.t. India
<p>M.A.II</p> <p>Macro Economics Analysis I & II</p>	<ul style="list-style-type: none"> • To provide a thorough understanding of the principles of macroeconomics and the application of macroeconomic concepts in real-life situations. • To discuss the modern developments in macroeconomics. • To provide a thorough understanding of the principles of macroeconomics and the application of macroeconomic concepts in various contexts.

	<ul style="list-style-type: none"> To discuss the modern developments in macroeconomics.
M.A.II Growth & Development I & II	<ul style="list-style-type: none"> To enable learning and understanding of the basic concepts and process to measure the growth and economic development etc. To analyze and evaluate the obstacles in the process of economic growth and development. To enable learning and understanding of the basic concepts and process to measure the growth and economic development etc. To analyze and evaluate the obstacles in the process of economic growth and development
M.A.II Research Methodology	<ul style="list-style-type: none"> To enable an understanding of Research and its methods under various areas of economics. To demonstrate the practical and the applied aspects of research in relation to Economics.
M.A.II Industrial Economics	<ul style="list-style-type: none"> To provide an understanding of Industry, Industrial sector and growth and its relation to various economic issues and challenges. To demonstrate the practical and the applied aspects of Industrial economics and the study of Industry and its relation to Economics.
M.A.II Economics of Environment	<ul style="list-style-type: none"> To develop an understanding of the economics of environment in the theoretical as well as practical context. To discuss various analytical tools to comprehend various environmental issues.

Course Outcome: M.Com. (Economics Subjects)

Course	Course Outcomes
M.Com. I Industrial Economics	<ul style="list-style-type: none"> To make the students understand concepts of industrial economics To help the students know theories of industrial economics To impart students' knowledge about sources of industrial finance and Indian industrial growth
M.Com. II Industrial Economic Environment	<ul style="list-style-type: none"> To provide knowledge about basic issues in Industrial Economic Environment to students. To make students aware about Industrial pattern and growth in India and Industrial policies of India since independence. To study the progress and current problems of major industries in India.


CO-ORDINATOR
 IQAC

G.M.D. Arts, B.W. Commerce
And Science College, Sinnar


Principal
 G. M. D. Arts, B. W. Commerce and
 Science College, Sinnar, Dist.Nashik



DEPARTMENT OF ENGLISH

B. A. English

Programme Outcomes :

After successfully completing B.A. English Programme students will be able to:

- PO1: **Critical Thinking:** Analyse works of literature by employing various important critical approaches and their tenets. The students will be able to implement literary devices to discuss literary texts among their peers. They will be able to familiarize themselves with the terminology in critical appreciation of varied forms of literature.
- PO2: **Comprehension Skills:** The students will be able to comprehend the evolution of different categories of literature such as short story, drama, poetry, fiction and non-fiction.
- PO3: **Effective Communication:** The students will be able to develop oral and written communication skills in English. They will be able to enrich their vocabulary and its usage in communication. The students will be able to apply grammatical rules to day to day spoken and written language.
- PO4: **Effective Communication:** Capable of oral and written scientific communication, and will prove that they can think critically and work independently
- PO5: **Social Interaction:** The students will be able to use interpersonal and intrapersonal communication skills to interact effectively in social situations like interviews, group discussions, seminars etc.
- PO6: **Effective Citizenship:** The students will be able to execute their duties and responsibilities as citizens successfully by being a part of larger community.
- PO7: **Ethics:** The students will be able to perceive the complexities of human behaviour and identity through various forms of literature. They will be able to develop a deeper understanding of human values such as morality, empathy, good will etc.
- PO8: **Environment and Sustainability:** The students will become aware about the issues related to environment and the steps needed to be implemented for its sustainability through the study of texts with ecological elements and dimensions.
- PO9: **Self-directed and Life-long Learning:** The students will be able to grasp excellent pieces of prose and poetry in English whereby each and every lesson will be a lesson in life- long learning.

Programme Specific Outcomes

- PSO 1: Students will be able to understand the evolution of criticism and its application in language and literature
- PSO 2: Students will be able to comprehend excellent pieces of prose and poetry in English literature.
- PSO 3: Students will be able to apply knowledge of English language to improve skills in Listening, Speaking, Reading and Writing

Course Outcomes

F.Y.B.A. English

Course: 1017 Compulsory English

After successfully completing this course, students will be able to:

- CO1: Recall parts of speech.
- CO2: Identify various types of vocabulary.
- CO3: Recognize the themes of each lesson.
- CO4: Recite lines from poems.
- CO5: Summarize a poem.
- CO6: Describe various characters of a short story.
- CO7: Apply the knowledge of language in day-to-day conversation

Course: 1337 Additional English

After successfully completing this course, students will be able to:

- CO1: Identify different genres of literature.
- CO2: Interpret poems and discuss the literary devices used in the poems.
- CO3: Evaluate short story as a genre of literature.
- CO4: Analyse and criticise prose lessons.
- CO5: Determine the elements of a one act play.
- CO6: Define different functions of language as a means of communication
- CO7: Analyse the sound system of the English language.
- CO8: Develop literary competence in students to help them derive pleasure by reading the prescribed texts.

S.Y.B.A. English

Course: 2017 Compulsory English

After successfully completing this course, students will be able to:

- CO1: Define various parts of Speech
- CO2: Describe and give examples of different types of characters, situations, and values of life.
- CO3: Summarize prose and poetic pieces for better comprehension.
- CO4: Demonstrate competence in usage of language in day to day life.
- CO5: Classify and transform different types of sentences and apply vocabulary in communication
- CO6: Relate to real life situation.
- CO7: Compose and draft letters and essays and reports.

Course: 2337 General II Study of English Language and Literature

After successfully completing this course, students will be able to:

- CO1: Name and label different organs of speech and transcribe words in the phonetic script.
- CO2: Explain and give examples of varied intonation pattern and varieties of English.
- CO3: Apply brief history to the art and craft of short story writing.
- CO4: Categorize literary devices
- CO5: Illustrate various elements of short story like plot, characterization, setting etc.
- CO6: Compare and contrast various types of short stories.



Course:2338 Special I Appreciating Drama

After successfully completing this course, students will be able to:

- CO1: Define drama as a genre of literature and to identify different elements of drama.
- CO2: Interpret the prescribed plays by applying the theory of drama.
- CO3: Evaluate drama as a genre of literature.
- CO4: Analyse independently different scenes and acts of the play.
- CO5: Compare and contrast different characters in the play
- CO6: Develop literary competence in students to help them derive pleasure by reading the prescribed texts.
- CO7: Evaluate the prescribed plays by categorizing their types.

Course:2339 Special II Appreciating Poetry

After successfully completing this course, students will be able to:

- CO1: Recall the basics of poetry as one of the literary forms.
- CO2: Identify various elements of poetry.
- CO3: Describe the various types of poetry in English.
- CO4: Summarize a poem.
- CO5: Discuss various literary devices in a poem.
- CO6: Illustrate different figures of speech.
- CO7: Critically appreciate a poem.

T.Y.B.A. English

Course: 3017 Compulsory English

After successfully completing this course, students will be able to:

- CO1: Define communicative use of language in Indian Context.
- CO2: List declarative, imperative and interrogative sentences.
- CO3: Outline the idea of varied cultural experiences.
- CO4: Define verbal and non-verbal communication.
- CO5: Summarize in English Poetry.
- CO6: Give examples of selected diction of specific writer or poet.
- CO7: Use literary language with reference to Indian English
- CO8: Determine basic difference between Indian English Poetry and British English Poetry.
- CO9: Apply sentence transformation in given format.

Course: 3337 General III Advanced Study of English Language and Literature

After successfully completing this course, students will be able to

- CO1: Identify advanced areas of language study.
- CO2: Define comparative study of language and literature.
- CO3: Outline the basics of language study
- CO4: List varied dialects in Indian English Poetry.
- CO5: Summarize selected poems from the prescribed text.
- CO6: Describe types of sentences.
- CO7: Illustrate ethos and cultural study with reference to Indian English Poetry.
- CO8: Use creative use of language in Indian English Poetry.
- CO9: Analyse Indian English Poetry.

Course: 3338 Special III Appreciating Novel



After successfully completing this course, students will be able to:

- CO1: Define different types of novels.
- CO2: Discuss the evolution of novel as a genre.
- CO3: Comprehend various elements of a novel with varied examples in the literary canon.
- CO4: Apply critical theories to the study of novel with reference to the prescribed texts.
- CO5: Associate the study of novel with reference to historical, social, political context
- CO6: Compare and contrast the prescribed novels in the syllabus.

Course:3339 Special IV Introduction to Literary Criticism

After successfully completing this course, students will be able to:

- CO1: Define criticism and identify different types of criticism.
- CO2: Outline the history of English literary criticism
- CO3: Analyse independently prose passages and poems
- CO : Compare and contrast different critical theories
- CO5: Develop literary competence in students to help them derive aesthetic pleasure from different genres of literature.
- CO6: Evaluate different critics and their theories

S.Y.B.Sc.

Course: Optional English

After successfully completing this course, students will be able to:

- CO1: Define various parts of Speech
- CO2: Describe and give examples of different types of types of characters, situations, and values of life.
- CO3: Summarize prose and poetic pieces.
- CO4: Demonstrate competence in usage of language in day to day life.
- CO5: Students will be able to classify and transform different types of sentences
- CO6: Apply vocabulary in communication
- CO7: Achieve competence oral and written communication
- CO8: Draft letters and essays and reports.

M. A. English

Programme Outcomes :

After successfully completing M.A. English Programme students will be able to:

- PO1: **Critical Thinking:** Apply various important critical approaches and their canons to various texts. The students will be able to implement literary critical theories and discuss literary texts among their peers. They will be able to familiarize themselves with the glossary used in criticism.
- PO 2: **Analytical Skills:** The students will be able to analyse and evaluate different categories of literature such as short story, drama, poetry, fiction and non-fiction.
- PO 3: **Effective Communication:** The students will be able to develop oral and written communication skills in English. They will be able to enrich their vocabulary and its usage in communication. The students will be able to apply grammatical rules to day to day spoken and written language.
- PO 4: **Social Interaction:** The students will be able to use interpersonal and intrapersonal communication skills to interact effectively in social situations like interviews, group discussions, seminars etc.
- PO 5: **Effective Citizenship:** The students will be able to accomplish their duties and responsibilities as citizens successfully by being a part of larger community.
- PO 6: **Ethics:** The students will be able to identify the intricacies of human psyche through various themes and genres of literature. They will be able to develop a profound understanding of human values such as righteousness, morality, responsiveness, goodness etc.
- PO 7: **Environment and Sustainability:** The students will become aware about the issues related to environment and the steps needed to be implemented for its sustainability through the study of Eco-Critical texts.
- PO 8: **Self-directed and Life-long Learning:** The students will be able to grasp brilliant segments of prose and poetry in English whereby each and every unit will be a lesson in life- long learning.
- PO9: **Cognitive Skills:** The students will be able to comprehend, learn, process and apply knowledge in day to day life.
- PO10: **Research Oriented Learning:** Students will be able to demonstrate high-level aptitude in literary research.

Programme Specific Outcomes

- PSO 1: Students will be able to understand the evolution of criticism and its application in English literature.
- PSO 2: Students will be able to comprehend excellent pieces of Indian Writing in English.
- PSO 3: Students will be able to apply knowledge of English language to improve skills in Listening, Speaking, Reading and Writing.
- PSO4: Students will be able to explain different theoretical and practical aspects of language and literature teaching.

Course Outcomes :

Paper – 1: 10691/20691 English Literature from 1550-1798

After successfully completing these course students will be able to

- CO1: Illustrate literary sensibility and emotional response to the literary texts and implant sense of appreciation of selected literary texts.
- CO2: Demonstrate his/her artistic and innovative perspective through the study of renowned writers.
- CO3: Associate with human concern through exposure to literary texts
- CO4: Convince literary and linguistic competence.
- CO5: Discuss literary texts among peers.
- CO6: Identify the diction of language.
- CO7: Summarize the minor and major of forms literature.

Paper – 2: 10692/20692 English Literature from 1798-2000

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

- CO1: Analyse selected masterpieces of English literature from the literary canon.
- CO2: Acquaint themselves with diction and style of different genres in English Literature.
- CO3: Demonstrate deeper understanding of novel.
- CO4: Empower themselves to evaluate novel independently.
- CO5: Critically appreciate English poetry and its relevance to various ideologies.
- CO6: Appreciate the aesthetics of poetry.
- CO7: Demonstrate the ability to understand the creative process of poetry writing.

Paper -3: 10693/20693: Contemporary Studies in English Language

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

- CO1: Illustrate the role of language in communication skills.
- CO2: Discuss the factors that influence use of grammar and vocabulary in spoken and written English.
- CO3: Classify various sub-disciplines of linguistic.
- CO4: Apply linguistic theories to the study of language.
- CO5: Acquire knowledge of the structure of language through diverse critical and theoretical perspectives.

Paper—4: 10694/20694: Literary Criticism and Theory

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

- CO1: Discuss the nature, function and relevance of literary criticism and theory.
- CO2: Apply various important critical approaches and their tenets to literary texts.
- CO3: Familiarize themselves with the concept of literary criticism.
- CO4: Explain the evolution of criticism and its application in language and literature
- CO5: Develop literary competence in students to help them derive aesthetic pleasure from different genres of literature.
- CO6: Apply social, political, economic and historical theories to varied texts.

Paper -5 30691/40691: Indian Writing in English

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

- CO1: Identify the nuances of Indian English Literature.
- CO2: Interpret the texts with reference to literary critical theories.

- CO3: Evaluate Indian literary texts from social, cultural, political points of view.
- CO4: Acquaint themselves with the prominent writers in Indian English literature.
- CO5: Compare and contrast the artistic and innovative use of language employed by the writer.
- CO6: Classify major movements and figures of Indian Literature in English through the study of selected literary texts
- CO7: Discuss the prescribed texts in an analytical, critical and engaging style

Paper – 6 30692/40692: English Language Learning and Teaching

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

- CO1: Define different theoretical and practical aspects of language and literature teaching.
- CO2: Associate different approaches, methods and techniques to the teaching English language and literature.
- CO3: Identify the areas of ELLT.
- CO4: Conduct a comparative study of language and literature in ELLT.
- CO5: Comprehend the major issues in ELLT in the Indian context.
- CO6: Demonstrate skills of language teaching in the Indian education scenario.
- CO7: Propose innovative methods for ELLT.

Paper-7 30693/40693: Poetry in English

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

- CO1: State original examples of major movements related to poetry in English, works and poets through study of selected texts.
- CO2: Discuss major Indian English poets with reference to the prescribed poems
- CO3: Analyse Indian English Poetry by employing poetic devices.
- CO4: Appreciate poetry as a literary art form.
- CO5: Outline the ethos and cultural study with reference to Indian English Poetry
- CO6: Demonstrate skills to critique the prescribed poems.
- CO7: Differentiate between the varied dialects employed in Indian English Poetry.

Paper-8 30694/40694: Drama in English

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

- CO1: Identify major literary movements in Drama and theatre
- CO2: Interpret the prescribed plays by applying the theory of drama.
- CO 3: Analyse independently different scenes and acts of the play.
- CO4: Illustrate historical contexts, psycho-social aspects and discern the various cultural and moral values associated with prescribed dramas.
- CO5: Analyse the structure of a full length plays and one act play.
- CO6: Compare and contrast different characters in the play.
- CO7: Interpret the prescribed plays by applying the theory of drama.





Maratha Vidya Prasarak Samaj, Nashik
G.M.D. Arts, B.W Commerce and Science College, Sinnar,
Tal- Sinnar, Dist- Nashik-422103.

DEPARTMENT OF GEOGRAPHY

Academic Year: 2023-2024

Program Outcomes, Program Specific Outcomes, and Course specific Outcomes

Geography is the investigation of spots and the connections among individuals and their surroundings. Geographers investigate both the actual properties of Earth's surface and the human social orders spread across it. They likewise look at how human culture cooperates with the indigenous habitat and the way those areas and puts can affect individuals. Geography looks to comprehend where things are found, why they are there, and how they create and change after particular time. The investigation of the different conditions, places, and spaces of Earth's surface and their communications. It looks to address the inquiries of why things are as they are where they are. The cutting edge scholarly discipline of topography is established in old practice, worried about the qualities of spots, specifically their regular conditions and people groups, as well as the relations between the two.

Program Outcome: B.A. (Geography)	
1.	❖ To articulate the theories, philosophies, and concepts in the discipline of geography, including unifying themes of spatial patterns and structures, the interrelationship between people and places, and the interactions between nature and society.
2.	❖ To explain and distinguish differences among the various methodologies used in geographic research and analysis.
3.	❖ To acquire, analyze, evaluate, and interpret geographic data and/or research.
4	❖ To communicate geographic data, theories, philosophies, and concepts in oral, written, and visual forms, with ethical engagement and respect for diversity of individuals, groups, and cultures.
5	❖ To identify and assess how geographic concepts apply in the workplace and in everyday life to solve real-world problems.

Class	Course title & Code	Course Outcome
FYBA	Physical Geography (Gg.110 A)	<ul style="list-style-type: none"> ❖ To introduce the students to the basic concepts in Physical geography. ❖ To introduce latest concept in Physical geography ❖ To acquaint the students with the utility and application of Physical geography in different regions and environment. ❖ To make the students aware about Earth system (Lithosphere, Atmosphere, Biosphere and Hydrosphere)
	Human Geography (Gg.110 B)	<ul style="list-style-type: none"> ❖ To introduce the students to the basic concepts in Human geography. ❖ To introduce latest concept in Human geography ❖ To acquaint the students with the utility and application of Human geography in different regions and environment. ❖ To make the students aware about Elements And Study Area of Human Geography (Population, Settlement, and Agriculture)
SYBA	Economic Geography-I (G2) Gg.210 (A)	<ul style="list-style-type: none"> ❖ To introduce students to the basic principles and concepts of economic geography ❖ To acquaint students with the applications to economic geography for development in different areas ❖ The students should be able to integrate various factors of economic development and dynamic aspect of economic geography.
	Economic Geography –II G2 Gg.210 (B)	<ul style="list-style-type: none"> ❖ To acquaint students with the basic principles and concepts of economic geography ❖ To acquaint the students with the applications to economic geography for development in different areas. ❖ The main aims are to integrate the various factors of economic development and to acquaint the students with this dynamic aspect of economic geography.
	Geography of Maharashtra, Gg.220 (A) S1	<ul style="list-style-type: none"> ❖ To acquaint students with Geography of our State. ❖ To make students aware of the magnitude of problems and prospects in Maharashtra. ❖ To help students understand the inter relationship between the subject and the society. ❖ To help students understand the recent trends in regional studies
	Geography of Maharashtra, Gg.220 (B) S1	<ul style="list-style-type: none"> ❖ To make students aware about the Agriculture problems and prospects of Maharashtra. ❖ To understand the population distribution and settlement pattern in Maharashtra. ❖ To understand the concept of rural development. ❖ To understand the prospectus in Tourism activity in Maharashtra and the role of MTDC and Role of MIDC in



		industrial development in rural area of Maharashtra
SYBA	Scale and Map Projection, Gg. 201 (A) S2	<ul style="list-style-type: none"> ❖ To introduce the basic concepts in Practical Geography ❖ To enable students to use various Scales and Projection Techniques in Geography. ❖ To acquaint students with the utility of various Projections in Geographical knowledge. ❖ To explain the elementary and essential principles of practical work in Geography. ❖ To develop practical skill and use of map scale and projection. ❖ To make students aware of the new techniques, accuracy and skills of map making
	Cartographic Techniques, Surveying and Excursion / Village / Project Report Gg. 201 (B) S2	<ul style="list-style-type: none"> ❖ To introduce the students to the basic and contemporary concepts in Cartography. ❖ To acquaint the students with the utility and applications of various Cartographic Techniques. ❖ To introduce the latest concepts regarding the modern cartography in the field of Geography. ❖ To explain the elementary and essential principles of practical work in Geography. ❖ To develop practical knowledge and application of cartographical techniques. ❖ To make students aware of the new techniques, accuracy and skills of Map Making.
	Introduction to Geographic Information System SEC – A Semester - III	<ul style="list-style-type: none"> ❖ To introduce the students about the basic concepts of GIS. ❖ 2. To acquaint the students with the utility and applications of GIS Technique. ❖ To create the awareness about Geospatial technology among the students. ❖ To inculcate skill of map making among the students by using GIS Technique.
	Introduction to Remote Sensing SEC – B Semester -IV	<ul style="list-style-type: none"> ❖ To introduce the students about the basic concepts of Remote Sensing. ❖ To acquaint the students with the utility of RS and its applications. ❖ To inculcate the skill of satellite image interpretation among the students.
	Geography of Tourism- I CC1E Gg. 310 G3	<ul style="list-style-type: none"> ❖ To understand the history of Tourism ❖ To introduce the students to the basic concepts in Tourism Geography. ❖ To understand the types of Tourism ❖ To gain knowledge different aspects of Tourism Geography. To comprehend the contemporary issues facing the global community.

TYBA	Geography of Tourism- II CC1F	<ul style="list-style-type: none"> ❖ To understand the history of Tourism ❖ To introduce the students to the basic concepts in Tourism Geography. ❖ To understand the types of Tourism ❖ To gain knowledge different aspects of Tourism Geography.
	Geography of India -I DSE 1 C Gg-320 (S-3)	<ul style="list-style-type: none"> ❖ To acquaint the students with geography of our Nation. ❖ To make the student aware of the magnitude of problems and Prospects at National level. ❖ To help the students to understand the inter relationship between the subject and the society. ❖ To help the students to understand the recent trends in regional studied
	Geography of India -II DSE1 D	<ul style="list-style-type: none"> ❖ To acquaint the students with geography of our Nation. ❖ To make the student aware of the magnitude of problems and Prospects at National level. ❖ To help the students to understand the inter relationship between the subject and the society. ❖ To help the students to understand the recent trends in regional studied
	Practical Geography- I (Techniques of Spatial Analysis) DSE- 2 C Gg. 301 (S-4)	<ul style="list-style-type: none"> ❖ To introduce the basic concepts and techniques of Geographical Analysis. ❖ To introduce the students with SOI Toposheets and acquire the Knowledge of Toposheet interpretation. ❖ To introduce the students with Weather Maps and acquire the Knowledge of its interpretation. ❖ To introduce the students with Aerial Photographs and Satellite Images and acquire knowledge to interpret it . ❖ To acquaint students with the spatial and structural characteristics of Practical Geography. ❖ To explain the elementary and essential principles on field of practical work.
	Practical Geography- II (Techniques of Spatial Analysis, Surveying and Excursion /Village/ Project Report) DSE- 2 D	<ul style="list-style-type: none"> ❖ To introduce the basic concepts and techniques of Geographical Analysis. ❖ To introduce the students with SOI Toposheets and acquire the Knowledge of Toposheet interpretation. ❖ To introduce the students with Weather Maps and acquire the Knowledge of its interpretation. ❖ To introduce the students with Aerial Photographs and Satellite Images and acquire knowledge to interpret it . ❖ To acquaint students with the spatial and structural characteristics of Practical Geography. ❖ To explain the elementary and essential principles on field of practical work.
	Research Methodology – I SEC 2 C	<ul style="list-style-type: none"> ❖ To develop the understanding of the basic concept of research ❖ To develop the understanding of the basic framework of sampling and data collection ❖ To develop the understanding of various sampling methods and techniques

Research Methodology – II SEC 2 C	<ul style="list-style-type: none"> ❖ To identify various sources of information for data collection. ❖ To Understanding of the conducting survey on various issues and develop the Report writing skill of students
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Program Outcome: M.A./M.Sc. (Geography)	
1.	❖ Demonstrate an advanced understanding of and ability to differentiate among the various methodologies used in geographic research.
2.	❖ Acquire, analyse, evaluate, interpret and analyse geographic data and/or research.
3.	❖ Communicate mastery of geographic data, theories, philosophies, and concepts in oral, written, and visual forms, with ethical engagement and respect for diversity of individuals, groups, and cultures.
4	❖ Identify and assess how geographic concepts apply in the workplace and in everyday life to solve real-world problems.
5	❖ Compare and contrast the theories, philosophies, and concepts in the discipline of geography, including unifying themes of spatial patterns and structures, the interrelationship between people and places, and the interactions between nature and society.

Program Specific Outcome: M.A./M.Sc. (Geography)	
1.	❖ To provide a broad common framework, for exchange, mobility and free dialogue across the Indian Geography and associated community.
2.	❖ To create and aptitude for Geography in those students who show a promise for higher studies and creative work in Geography.
3.	❖ To enhance the quality and standards of Geography Education.
4	❖ To take care of fast development in the knowledge of Geography.
5	❖ To create confidence in others, for equipping themselves with that part of Geography which is needed for various branches of Sciences or Humanities in which they have aptitude for higher studies and original work

Program Course : M.A./M.Sc. (Geography)



MA/MSc. I Sem. Ist	GGUT-111:Principles of Geomorphology	<ul style="list-style-type: none"> ❖ Understand the effect of rotation of revolution the Earth. ❖ Understand interior structure of the earth. ❖ Understand Theory regarding of Origin of Continents and oceans. ❖ Understand the work of internal and external forces and their associated Landforms.
	GGUT-112:Principles of Climatology	<ul style="list-style-type: none"> ❖ Understand the importance of Atmosphere. ❖ Understand heat balance. ❖ Understand the types of winds. ❖ Understand the structure, composition of Atmosphere.. ❖ Understand weather phenomena winds, humidity and precipitation.
	GGUT-113:Principles of Economic Geography	<ul style="list-style-type: none"> ❖ Students Understand about the Nature and Scope, approaches of Economic Geography and recent trends of economic geography. ❖ Understand the fundamental theories in economic geography. ❖ Understand about the basic Economic Processes- Production, Exchange, Consumption and its applications. ❖ Review, understand and apply the modes of economics development by various models. ❖ Understand the economies scale, transportation and communication and nature and role of international trade in economic development of India.
	GGDT-114:Principles of Population and Settlements Geography	<ul style="list-style-type: none"> ❖ The present paper shall enhance the knowledge of students about the historical development, patterns, types and functional systems of rural settlements. ❖ The basic ideas about the rural settlements, historical development during ancient, medieval and modern times, morphology of rural settlements, functions and rural settlement planning in India. ❖ To understand the fundamental Concepts Related to Population such as density, over, Optimum & under population, fertility, mortality and population for future Perspectives.
	GGUP-115:Practical in Physical and Human Geography	<ul style="list-style-type: none"> ❖ Data implement through the various method like, Morphometric Analysis;- Hypsometric curve, Altimetric curve, histogram, Climograph, Slope Analysis, Wentworths Method. ❖ Topographical Information: - Relative Relief, Absolute Relief, Block Diagram, Cross Profile etc. ❖ Graphs and Diagrams
MA/MSc. I Sem. IInd	GGUT-121:Geoinformatics-I	<ul style="list-style-type: none"> ❖ To understand the basic concepts of Geographical Information System and GPS. ❖ To know various components of GIS and to learn about map projection and coordinate system. 3. To know

		<p>various applications of GIS and GPS in various fields.</p> <ul style="list-style-type: none"> ❖ Students will become familiar with modern techniques of geography. ❖ Students will be prepared to apply their skills in professional careers.
	GGUT-123: Synoptic Climatology	<ul style="list-style-type: none"> ❖ To represent meteorological elements diagrammatically and interpretation of results. ❖ To analyse interrelationship between various meteorological elements. ❖ To analyse present and future trends of meteorological elements. ❖ To identify various sources of climate data.
	GGUT-127: Monsoon Climatology	<ul style="list-style-type: none"> ❖ To recognize the importance of climate on human life. ❖ To identify and categorize climate types and climatic regions of the world. ❖ To understand the regional and seasonal variations of weather systems in India. ❖ To get comprehensive knowledge about causes and impacts of atmospheric pollution, ozone layer depletion, acid rain and el-nino;
	GGDT-130: Geography of Tourism	<ul style="list-style-type: none"> ❖ To understand the concepts and components in tourism geography. ❖ To get comprehensive knowledge of different types of infrastructure and tourism. ❖ To know about pattern & tourism in the world and impact of globalization. ❖ To understand different elements of marketing in tourism.
	GGDP-133: Practical in Map Projections	<ul style="list-style-type: none"> ❖ Acquire knowledge and clear concepts of the different types of map projection. ❖ Acquire knowledge of applicability of different projections. ❖ Gain knowledge in theoretical concept, plotting of, Mercator's Projection, Mollweide's Projection, Simple Conical Projection with two Standard Parallels, Sinusoidal Projection and UTM Projection.
	GGUP-134:Practical of Statistical Techniques for Geography	<ul style="list-style-type: none"> ❖ To understand the importance and use of statistical techniques in geography. ❖ To form frequency distributions tables and graphically interpret the results. ❖ To measure central tendency and dispersion of data. 4. To examine relationship between two or more variables with correlation and regression analysis. ❖ To apply comprehensive knowledge of statistics for analysis of geographical data.
	GGUT-235 Geoinformatics II	<ul style="list-style-type: none"> ❖ To apply photogrammetry & Remote Sensing techniques to generate geospatial data. ❖ To understand digital data analysis techniques of remote sensing data.



		<ul style="list-style-type: none"> ❖ To know about different types of digital image processing techniques. ❖ To apply Comprehensive knowledge of GIS software and GPS for analysis of geographical data and to solve real world problems. ❖ To understand the use and importance of satellite images and aerial photographs. ❖ To apply the knowledge of remote sensing and DIP in various thematic studies and problem solving.
MA/Msc.IInd Semester IIIrd	GGUT-236 Geographical Thoughts	<ul style="list-style-type: none"> ❖ Understand the historical development of geographical thought according to Greek, Roman, Indian, German, French, British and American school. ❖ Understand the dualisms in geography such as determinism and possibilism, systematic Vs regional and physical Vs human geography. ❖ Understand recent trends, scientific methods, quantitative revolution and computer application in geography. ❖ Understand the definition, need, and signification of applied geography.
	GGUT-238 Applied Climatology	<ul style="list-style-type: none"> ❖ To get complete information about Atmospheric Disturbances in terms of cyclones and anti-cyclones. ❖ To identify and categorize climate types and climatic regions of the world. ❖ To understand the regional and seasonal variations of weather systems in India. ❖ To assess future risks of climate change and the adaptation and mitigation options. ❖ To know about the history, recent trends, impacts and dynamics of climate change on earth.
	GGDP-241 Practical in Geoinformatics	<ul style="list-style-type: none"> ❖ To learn the representation of geographic data using various computational methods. ❖ To compute statistical parameters with the help of computer. ❖ To prepare and design maps and graphs with the help of computer software. ❖ To apply computational techniques relevant in the discipline of Geography.
	GGUT-243 Watershed Management	<ul style="list-style-type: none"> ❖ To understand Necessity of watershed management. ❖ To understand the Problems in watershed management. ❖ To understand the Characteristics of watersheds: Size , Shape , Physiography , Climate, Drainage, Land use, Vegetation, Geology and Soils, Hydrology etc. ❖ Application of Remote Sensing and GIS in watershed management.

		❖ Importance of watershed management in national development.
	GGUP-246 Practical in Climatology	<ul style="list-style-type: none"> ❖ Study and Analysis of IDWR Study of IDWR and analysis of Temperature, Air Pressure, etc. for various stations. ❖ Computation of water balance in different rainfall zones and irrigation scheduling. ❖ To understand and implement Climate Architecture Analysis
MA.MSc.II Semester IV	GGUT-249 Geography of India	<ul style="list-style-type: none"> ❖ Understand the about the physiographic division of India. ❖ . Understand the India Drainage system of India Rivers. ❖ Understand the climatic variation in India and climatic region of India. ❖ Understand the variation in industrial development in India. ❖ Examine and understand the developed and underdeveloped states in India.
	GGUT-250 Oceanography	<ul style="list-style-type: none"> ❖ Understand the meaning, nature and scope, modern trends in Oceanography. ❖ Understand the ocean floor and relief of the ocean bottom. ❖ Understand the tides, tide generating forces, types of tides and tidal effects in coastal areas. ❖ Get knowledge about distribution of lithogenous, biogenous, and hydrogenous sediments on ocean floor. ❖ Understand the characteristics and properties of factors affecting on formation of sea waves.
	GGUT – 251 Research Methodology	<ul style="list-style-type: none"> ❖ Examining the introduction of research, motivation in research, types of research, significance of research, research process and criteria of good research. ❖ To understand the research problems, selecting research problems, literature review and to study the hypothesis, its types, sources, formation of hypothesis and utility of hypothesis in scientific research. ❖ To understand the research design, need, features, basic principal and developing of research plan, and sampling design and its basic types, steps, characteristics of sampling design. ❖ Study about type's data and methods of data collection and study the processing and analysis of data using different statistical methods.
	GGUT- 252:	❖ To understand the concepts and principles of soil



	Geography of Soil	<p>formation.</p> <ul style="list-style-type: none"> ❖ To study the role of essential nutrient for plant growth and development. ❖ To enable the students to realize the Soil and environmental problems. ❖ To know the significance of soil conservation and methods of Soil reclamation.
MA.MSc.II Semester IV	GGDP-257 Interpretation of Topographical Maps and GPS Survey	<ul style="list-style-type: none"> ❖ To understand the Indexing systems and conventional signs and symbols of S.O.I. toposheets. ❖ Interpretation of S.O.I toposheets. ❖ To understand the field surveying methods ❖ Knowledge on the definition of GIS; various components of GIS; structure of GIS; data input; verification, storage and output in GIS and application of GIS as a tool
	GGUT-258 Geography of World	<ul style="list-style-type: none"> ❖ To understand Origin and Evolution of the Earth-Big-bang theory ❖ To understand the Regional geography of World. ❖ To understand 21st century challenges and opportunities in the world.
	GGUP – 259 Dissertations	<ul style="list-style-type: none"> ❖ Recognize the objectives and significance of research work. ❖ Formulate research design and methods. ❖ Organize and carry out field visits, collect field data and/or conduct review of literature. ❖ Effective writing, maintaining research ethics and academic integrity. ❖ Preparation and dissemination of research output having scientific and/or social relevance.



[Signature]
HEAD
DEPARTMENT OF GE

[Signature]
CO-ORDINATOR
IQAC
G.M.D. Arts, B.W. Commerce
And Science College, Sinnar

[Signature]
Principal
G. M. D. Arts, B. W. Commerce and
Science College, Sinnar, Dist. Nashik

BA Geography Sem V 2023-2024 CO PO & PSO Attainment

Direct Total Attainment			Indirect Total Attainment	
	Internal	External	CO	Level
CO1	3	3	CO1	3
CO2	3	1	CO2	3
CO3	3	2	CO3	3
CO4	3	2	CO4	2
CO5	3	3	CO5	3
CO6	3	3	CO6	3
Attainment	3.00	2.33	Final Direct Attainment	2.83
Weightage	30%	70%		
Direct Total Attainment	0.90	1.63		
Final Direct Attainment	2.53			
Weightage	70%		30%	
Direct Total Attainment	1.77		0.85	
Final Direct Attainment	2.62			

Level of Attainment	Base Value (level)	PO/ PSO Attainment Value
Low	1	2.62
Medium	2	
High	3	

Programme: BA Geography Sem VI				
Name of the Exam : Internal & External Exam-2023-24				
Direct Total Attainment			Indirect Total Attainment	
	Internal	External	CO	Level
CO1	3	3	CO1	3
CO2	3	1	CO2	2
CO3	3	1	CO3	3
CO4	3	1	CO4	2
CO5	3	2	CO5	3
CO6	3	FALSE	CO6	3
Attainment	3.00	1.33	Final Direct Attainment	2.67
Weightage	30%	70%		
Direct Total Attainment	0.90	0.93		
Final Direct Attainment	1.83			
Weightage	70%		30%	
Direct Total Attainment	1.28		0.80	
Final Direct Attainment	2.08			

Level of Attainment	se Value (lev	PO/ PSO Attainment Value
Low	1	2.08
Medium	2	
High	3	

BA Geography SEM III 2022-23 Attainment of CO, PO & PSO

Direct Total Attainment			Indirect Total Attainment	
	Internal	External	CO	Level
CO1	3	FALSE	CO1	3
CO2	3	3	CO2	3
CO3	3	1	CO3	2
CO4	3	3	CO4	3
CO5	3	FALSE	CO5	3
Attainment	3.00	1.40	Final Direct Attainment	2.80
Weightage	30%	70%		
Direct Total Attainment	0.90	0.98		
Final Direct Attainment	1.88			
Weightage	70%		30%	
Direct Total Attainment	1.88		0.84	
Final Direct Attainment	2.72			

Level of Attainment	Base Value (level)	PO/ PSO Attainment Value
Low	1	2.72
Medium	2	
High	3	

Programme:MA/M.Sc. SEM-IV

Name of the Exam : Internal & External Exam-2022-23

Attainment of CO, PO & PSO

Direct Total Attainment			Indirect Total Attainment	
	Internal	External	CO	Level
CO1	3	FALSE	CO1	3
CO2	3	FALSE	CO2	3
CO3	3	FALSE	CO3	3
CO4	3	2	CO4	2
CO5	3	3	CO5	3
Attainment	3.00	1.00	Final Direct Attainment	2.80
Weightage	30%	70%		
Direct Total Attainment	0.90	0.70		
Final Direct Attainment	1.60			
Weightage	70%		30%	
Direct Total Attainment	1.12		0.84	
Final Direct Attainment	1.96			

Level of Attainment	se Value (lev	PO/ PSO Attainment Value
Low	1	1.96
Medium	2	
High	3	



Maratha Vidya PrasarakSamaj's

G.M.D. Arts, Commerce and Science College Sinnar

Program Outcome/ Program Specific Outcome/ Course Outcome

Department of History – 2023-24

Programme Outcomes: B.A. (History)	
PO1	After graduation with B.Ed. course, student can chose teaching career .
PO2	Graduates can select Museum curator, Historians, Tourism, History Expert etc. as their career options.
PO3	Eligible to appear for any competitive exams conducted by UPSC, MPSC, Indian Railway Board, etc for entering into the government services.
PO4	It will develop self awareness to enrich decision making ability among the students.
PO5	Personal development will increase the clarity and effectiveness in Knowing themselves and their strengths.

Program Specific outcome : B.A. (History)	
PSO1	Jobs in Government: policy analysts, government historians, intelligence analysts, museum curators, administrative and programs specialists, communication specialists, and corporate communication managers.
PSO2	Travel and Tourism Expert: Work as a tourist guide at historical and religious places.
PSO3	School Teacher: Work as a teacher in schools and high schools
PSO4	College Teacher: Work as a assistant professor in colleges
PSO5	Archivist: A history graduate can find employment with Archaeological Survey of India or with private firms related to archaeology.
PSO6	Researcher: Many Government and non-government institutes along with research centre offer several career options for qualified geographers with numerous specializations.
PSO7	Competitive Examinations: For History graduates, the option of public service and NET/SET is always open.
PSO8	Social Work: NGOs and Social Welfare Organizations also employ BA History graduates.
PSO9	Exhibit Designer / Content Creator.
PSO10	Writer/Subject Matter Expert 11. Journalist: Journalism is a common career for History graduates.

PSO11	Understand background of our religion, customs institutions, administration and so on.
PSO12	Understand the present existing social, political, religious and economic conditions of the people.
PSO13	Analyze relationship between the past and the present is lively presented in the history.
PSO14	Develop practical skills helpful in the study and understanding historical events.
PSO15	History installs the feeling of patriotism in the hearts of the pupils.

Course Outcome (CO)

F.Y.B. A. History (Semester-I)	
Course:	(11171) Early India Form Prehistory to Age of Mauryas (General -1)
CO1	Emphasizes on the factors and forces behind the rise, growth and spread of Civilization and culture of India along with the dynastic history.
CO2	Students understand able to the Philosophy of Jainism and Buddhism.
CO3	Students understand to the contribution of Early Indians to polity, philosophy, literature, art, religion and science and technology.
CO4	The course aimed at helping the student to understand the history of early India from the prehistoric Times to the age of Mauryas
F.Y.B. A. History (Semester-II)	
Course:	(11172) Early India: Post Mauryan Age to the Rashtrakutas. (General -1)
CO1	Under stood the Historical Process of Rise, Development & decline of Great Dynasty in Ancient India.
CO2	Understand the glory of Indian History in the age of Gupta .
CO3	Understood the socio- Economical & cultural transformation in Ancient India and They take interest to visit historical place
CO4	Understood the Historical Process of transformation From Ancient to Medieval. Like caves, Temple, Art Architecture

S.Y.B.A. History	
S.Y.B.A. History General (SEM-III)	
Course	(23174) History of Marathas (semester-III) (1630-1707) (General -2)
CO1.	Student able to understand the regional history of medieval Maharashtra.
CO2.	Students under stood study political, social and conceptual history of the Marathas.
CO3.	To evaluate contribution of Chhatrapati Shivaji Maharaj to the establishment of Swarajya, contribution of successors.
CO4.	Students under stood the Administrative and Military Administration during Marathas
S.Y.B.A. Spl.-1	
Course	(23171) Medieval India: Sultanate Period (semester-III) (Special -1)
CO1.	Student able to understand the key concept related to Sultanate Period.
CO2.	To explain the basic concept framework of Medieval India
CO3.	Students will be able to gather ideas on different regional power. They will

	understand Soc - economic Condition of Delhi Sultan.
CO4.	They will able to learn foundation and administration Sultanate Period.
	S.Y.B. A. Spl.2
	(23172) Glimpses of the Modern World Part-I (semester-III) (Special -2)
CO1.	They will get acquainted with the major nationalist movements, the World War II and its consequences, the Cold War and its Consequences. `
CO2.	Students will enable students to understand the significant impact of the modern concepts
CO3.	They will enable students to understand the significant impact of the modern concepts such as Renaissance, Nationalism, Communism, Imperialism, etc.
CO4.	They will get students acquainted with the major revolutions, and political developments Which led to the World War I and its consequences?
	S.Y.B.A. Skill Enhancement
	(23176) Art and Architecture of Early India (From 3000 B.C. to 12th Century A.D.)
CO1.	Students will get an overall understanding of the emergence and development of the art and architecture in Early India.
CO2.	They will understand the emergence of the Pottery, Terracotta figures, Ornaments, Town Planning, preparation of seals and coins.
CO3.	They will have an understanding of the art and architecture in early India.

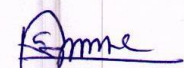
S.Y.B.A. History	
S.Y.B.A. History General (SEM-IV)	
Course	(24174) History of Marathas (1707-1818) (semester-IV) (General -2)
CO1.	To examines the dynamics of Maratha Confederacy and reciprocity and understands changed nature of Maratha Period.
CO2.	To examine roll of Marathas and rationality in national politics in 18th century in India
CO3.	To study administrative system, society and economy of the Maratha period
CO4.	To understand innovative study techniques in the study of History of Maratha to make it value based, conceptual and thought provocative.
	(24171) Medieval India: Mughal Period (semester-IV) (Special -1)
CO1.	Students gained knowledge about political history of Mughal Period
CO2.	To learn Mughal ruler and indicates regarding Deccan Political policies.
CO3.	Students understood Soc-economic Condition of Mughal Period.
CO4.	Students were explaining the various political movements and situation of Mughal Period.
	(24172) Glimpses of the Modern World Part-II (semester-IV) (Special -2)
CO1.	They will enable to understand the significant impact of the modern concepts such as Dictatorship, Cold War, Nationalism, Communism, Imperialism, Polarization, etc.
CO2.	Students traced and analysed the main development of contemporary world and explored the important developments of 20th century world.
CO3.	Students acquired the knowledge of the principles, forces, processes and problems of the recent times

CO4.	Students were able to explain the various political movements and growth of nationalism in different parts of the world
S.Y.B.A. Skill Enhancement	
(24176) Medieval Indian Arts and Architecture (1206 To 1857)	
CO1.	Students will get an overall understanding of the development of the Medieval Art and Architecture.
CO2.	They will understand the changing patterns of the Art and Architecture during the Medieval India.
CO3.	They will have an understanding of the impact of Persian Art on Islamic Art and Architecture in Medieval India.

T.Y.B.A. History	
T.Y.B.A. History General (SEM-V)	
Course:	(35174) Indian National Movement -1885 to 1947 (General-3)
CO1.	It will enable students to develop an overall understanding of Modern India.
CO2.	It will increase the spirit of healthy Nationalism, Democratic Values and Secularism among the Students.
CO3.	Students will understand various aspects of the Indian Independence Movement and the creation of Modern India.
CO4.	Students were able to explain the various political movements ,Mass Movement participant of varies movement and growth of nationalism in different parts of the India
(35171) Introduction to Historiography. (SEM-V) Special Paper-3	
CO1.	Students will be introduced to the information and importance of Historiography.
CO2.	Students will be introduced to the different Methods and Tools of data collection.
CO3.	Students can study the interdisciplinary approach of History .
CO4.	Students will learn about the usefulness of History in the 21st century, its changing perspectives, the new ideas that have been invented, and the importance of History in a competitive World.
CO5.	This curriculum develops Research abilityand process of Research Methodology in History
(35172) Maharashtra in the 19th Century (SEM-V) Special Paper-4	
CO1.	Student will develop the ability to analyse sources for 19th century Maharashtra History.
CO2.	Student will learn significance of Regional History and Socio- religious reformism foundation of the region.
CO3.	It will enhance their perception of 19th Century Maharashtra.
CO4.	Appreciate the skills of leadership and the Socio-religious System of the Maharashtra
Skill Enhancement Courses (SEC 2 C)	
(35176)South Indian Art and Architecture (Semester V)	
CO1.	Students know the Art and Architecture of south India.
CO2.	Students acquaint the development of the Art and Architecture of south India
CO3.	They will understand the changing patterns and impact of Art and Architecture



	in south India
CO4.	Student will understand the impact Persian Art on Islamic Art and Architecture in south India.
T.Y.B.A. History General (SEM-VI)	
(36174) India After Independence- (1947-1991)(Sem.–VI) Gen. Paper-III	
CO1.	It will enable students to develop an overall understanding of the Contemporary India.
CO2.	To increase the spirit of healthy Nationalism, Democratic Values and Secularism among the students.
CO3.	Students will understand various aspects of India's domestic and foreign policies that shaped Post-Independence India.
CO4.	Students were able to explain the Domestic policy , and growth of Indian nationalism in India
CO5.	Students acquired the knowledge of the foreign policy of the recent times.
(36171) Applied History S-3 (Sem. –VI) Special Paper-III	
CO1.	Students will be introduced to the information and importance of applied history.
CO2.	Student will learn about the Historical significance of Archaeology and Archives and opportunities in the field of Archaeology and Archives.
CO3.	Through this course, students will be informed about the opportunities in the field of Media, Museums.
CO4.	Students will learn about the usefulness of history in the 21st Century, its changing Perspectives, the new ideas that have been invented, and the importance of History in a Competitive World.
(36172) History of Maharashtra in the 20th Century(Sem. –VI) Sp. P.-4	
CO1.	Student will develop the ability to analyses sources for 20th Century Maharashtra History.
CO2.	Student will learn significance of regional history and Socio- Religious Reformism foundation of the region.
CO3.	It will enhance their Perception of 20th Century Maharashtra.
CO4.	Appreciate the skills of leadership and the Socio-Religious System of the Maharashtra.
Skill Enhancement Courses	
(36176) Heritage Management(Sem. –VI)	
CO1.	Student will understand overall process of Heritage management.
CO2.	Student will get knowledge about scope of the Heritage management.
CO3.	Student know world Heritage site in Maharashtra.
CO4.	Student know the importance of Government roll in Heritage management


HEAD

DEPARTMENT OF HISTORY
G.M.D. Arts, B.W. Commerce
And Science College, Sinnar


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Principal
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Science College, Sinnar, Dist. Nashik



G.M.D. Arts, B.W. Commerce and Science College, Sinnar.

DIPARTMENT OF MARATHI

B.A. Marathi

Programme Outcomes:

- PO1. Comprehensive study of various literary genres.
- PO 2. Introducing language skills.
- PO 3. To develop critical attitude in students.
- PO 4. Tools for personality development of students.
- PO 5. To make effective and honest citizens for the country.
- PO 6. Introducing language comprehension skills.
- PO 7. To develop social and environmental awareness of students.

Programme Specific Outcomes:

- PSO 1. To study Marathi language, literature and culture.
- PSO 2. To study, inculcate and develop applied language and other skills.
- PSO 3. To study the nature, characteristics and trends of various literary genres.
- PSO 4. Understanding, appreciating and evaluating literary genres.
- PSO 5. Understanding the nature, characteristics and function of language.

Course Outcomes

F.Y.B.A.- Sem - I & II

G1 Marathi Literature and Linguistic Skills Development

- CO 1. To study Marathi language, literature and culture.
- CO 2. To develop literary comprehension, appreciation and evaluation skills.
- CO 3. To develop applied skills of Marathi language.
- CO 4. Developing an understanding of life through the study of literature.

S.Y.B.A. Sem I, II

G2 - Language Skill Development and Modern Marathi Literature Type

CO 1. To study the nature, characteristics and progress of literary forms of novels and prose.

CO 2. Comprehension, appreciation and evaluation of the assigned study book.

CO 3. Developing language skills.

Special 1 - Modern Literature Types

CO 1. To understand the concept of autobiography as a form of literary form.

CO 2. Comprehension, appreciation and evaluation of assigned autobiography.

CO 3. To introduce medieval literary forms.

CO 4. To understand, appreciate and analyze medieval literary forms.

Special 2 - Material thought And Literature Review

CO 1. To study Indian and Western literary thought.

CO 2. To understand the process of creation of materials.

CO 3. To understand the language and style of literature.

CO 4. To introduce the concept and nature of literary criticism.

CO 5. To understand the relationship between literature and review.

CO 6. Study the difference between book introduction, examination and review

TYBA Sem I, II

G3 - Linguistic Skills and Modern Literature Type

CO 1. Developing writing skills for print media.

CO 2. To understand the nature, inspiration, purpose, characteristics and movement of the literary forms of travelogue and poetry.

CO 3. Comprehension, appreciation and analysis of assigned travelogues and poetry collections.

Special 3 - Gross History of Medieval Marathi Literature

CO 1. To understand literary history concepts, forms, motivations and trends.

CO 2. To understand the social and cultural background of the medieval period.

CO 3. To understand the history of Marathi language, literature according to period.



Special 4 - Descriptive Linguistics

- CO 1. Understanding the nature, characteristics and function of language.
- CO 2. To introduce the branches and methods of language study.
- CO 3. Understanding the process of sound generation.
- CO 4. Understanding the nature of sound science.
- CO 5. Explaining the need for language study.

F.Y. B. Com Sem - I

Language, Literature and Skill Development

- CO 1. To get to know the work and thoughts of influential persons in various fields.
- CO 2. To inculcate moral, professional and ideological values in the students.

F.Y. B. Com Sem - II

Language and Skill Development

- CO 1. To understand the nature and need of language practice in various fields.
- CO 2. To explain the place of Marathi language in the field of business and to study the practical use of Marathi.
- CO 3. To study different types of writing and to be able to use actual writing skills.

S.Y. B. Sc Sem - I Applied Marathi

- CO 1. To bring to mind the linguistic and stylistic development of Marathi language.
- CO 2. To develop applied skills of Marathi language.

S.Y. B. Sc Sem - II Marathi Literature

- CO 1. Developing Literary Aptitude.
- CO 2. To make aware of the relationship between Marathi language and literature.
- CO 3. Developing understanding of life.
- CO 4. Enhancing Science Literacy Comprehension

M. A. Marathi

Programme Outcomes:

- PO 1. Enriching students' linguistic, literary and life skills
- PO 2. Developing language skills, employability.
- PO 3. To develop life values.
- PO 4. To develop writing skills required for various formal occasions.
- PO 5. Comprehensive study of folklore.
- PO 6. Developing a review and research perspective.

Programme Specific Outcomes:

- PSO 1. Increasing awareness of the literature on clinical practice.
- PSO 2. To study the motivations and tendencies of literary production in a particular period.
- PSO 3. Introducing Literary Theory.
- PSO 4. Developing Literary Comprehension Skills.
- PSO 5. Developing writing skills for the media.
- PSO 6. To understand the methods and traditions of literary research and criticism.
- PSO 7. To study life values and literary values in literature.
- PSO 8. To understand the scope of the field of study of folklore.

Course Outcomes

MA- Part - I, Sem.- I, II

1. Language Transactions and Linguistic Skills

- CO 1. Developing linguistic awareness and proving it for skillful application.
- CO 2. To create employability skills and competencies after acquisition of linguistic skills in various life domains.

2. History of Marathi Literature

CO 1. Accurate understanding of literature keeping in mind the inspiration and trends of literature production in a particular period.

CO 2. To develop literary and life awareness of students.

3. Historical Linguistics and Sociolinguistics

CO 1. To understand various concepts of linguistics.

CO 2. To introduce the nature and history of language.

CO 3. To study various branches of world language.

CO 4. Comparative Studies Translation Metaphysics Studying the influence of culture.

4. Rural and Dalit Literature

CO 1. To inculcate literary values and life values.

CO 2. To develop the tendency of medical study of literary works.

MA - Part - II, Sem. - III, IV

1. Writing Skills for Media

CO 1. To acquire and develop writing skills for the media.

CO 2. To emphasize the importance of mass media in the society.

2. Literature Review and Literature Research

CO 1. To develop the skills of literature, review transactions.

CO 2. To understand the concept, objectives and methods of criticism.

CO 3. To understand various methods of research in literature.

CO 4. Understanding the tradition of critics and researchers.

3. Study of assigned Arva Chinese literary works

CO 1. To understand the literary types, concepts and forms of Arvachina period.

CO 2. To know the characteristics of ancient literary works.

CO 3. Finding the connection between period and literary production



4. Fundamentals of Folklore and Marathi Folklore

CO 1. To introduce the basics of folklore.

CO 2. To promote the collection, research and evaluation of folk literature in Marathi.

CO 3. To explain social, religious and cultural awareness in folk literature.

CO 4. To study the contribution of scholars of folklore.

CO 5. To know the artistic beauty of folk literature and the nature of various artistic creations.

Dr. D. B. Weljali
HOD


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Tal- Sinnar, Dist- Nashik

Department of Mathematics

Program Outcomes, Program Specific Outcomes, Course specific Outcomes

Course Outcomes

F.Y. B. Sc. (Mathematics) SEMESTER - I

Course Outcomes (CO) of Course MT111: Algebra-

After successfully completing this course, students will be able to:

CO1: Study sets, Relations and Functions.

CO2: Explain algebraic properties of integers, finding gcd by Euclidean Algorithm.

CO3: Recognise technical terms and appreciate some of the uses of algebra.

CO4: collect like terms and simplify expressions term by term.

CO5: Solving problems using first principle of Mathematical induction and strong induction.

Course Outcomes (CO) of Course MT-112: Calculus I-

After successfully completing this course, students will be able to:

CO1: Gain Knowledge of fundamental concepts of real numbers.

CO2: Verify the value of the limit of a function at a point using the definition of the limit.

CO3: Introduction to sequences and series.

CO4: Learn to check function is continuous, understand the consequences of the intermediate value theorem for continuous functions.

Course Outcomes (CO) of Course MT-113: Practical Course based on MT-111 and MT-112 -

CO1: Learn Maxima software.

CO2: Can solve problems of algebra and calculus using maxima software.

CO3: Knowledge of application of mathematics.

Course Outcomes

F.Y. B. Sc. (Mathematics) SEMESTER-II



Course Outcomes (CO) of Course MT- 121: Analytical Geometry-

- CO1:** Introduction to analytical geometry of 2 dimensions.
- CO2:** Study of lines in 2 and 3 dimensions.
- CO3:** Finding equation in various form of line, circle, ellipse, sphere, cones etc.
- CO4:** Give the knowledge of geometry using maxima software.

Course Outcomes (CO) of Course MT-122: Calculus II-

- CO1:** Student understand differentiation and fundamental theorem in differentiation and various rules.
- CO2:** Geometrical representation and problem solving on MVT and Rolls theorem. Finding extreme values of function.
- CO3:** Introduction to Ordinary Differential Equations.

Course Outcomes (CO) of Course MT-123: Practical Course based on MT-121 and MT-122

- CO1:** Learn Maxima software.
- CO2:** Can solve problems of analytical geometry and calculus by using maxima software.
- CO3:** Solution of problems on geometry and calculus.

Course Outcomes

S.Y. B. Sc. (Mathematics) SEMESTER-I

Course Outcomes (CO) of Course MT-231: Calculus of Several Variables-

- CO1:** To find limit and check for continuity of a function of a several variables.
- CO2:** To find partial derivatives.
- CO3:** Study of Chain Rule and homogeneous functions.
- CO4:** Applications of Euler's theorem.
- CO5:** To find extreme values of a function.
- CO6:** To find multiple integral.

Course Outcomes (CO) of Course MT-232(A): Numerical Methods and its Applications-



CO1: Recall definitions and formulae of various numerical methods for finding roots of the equations, interpolation.

CO2: Define concepts of Aitken's process.

CO3: Describe methods of solving algebraic and non-algebraic equations.

CO4: Give original examples for concepts in numerical methods.

CO5: Solve the problems in Numerical methods.

CO6: Apply theorem to find numerical solution.

CO7: Calculate numerical integration.

Course Outcomes (CO) of Course MT233: Practical based on MT231 and MT232-

CO1: A student should get adequate exposure to global and local concerns that explore them many aspects of Mathematical Sciences.

CO2: A student be able to apply their skills and knowledge ,that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.



Course Outcomes

S.Y. B. Sc. (Mathematics) SEMESTR –II

Course Outcomes (CO) of Course MT241: Linear Algebra-

- CO1:** Recall the algebraic properties, commutative, associative laws etc of real numbers.
- CO2:** Define concepts of Vector Spaces, subspaces, span, kernel, linear dependence etc.
- CO3:** Describe spanning of vector space, inner product of vectors, linear transformation for set of vectors.
- CO4:** Give counter examples for set not satisfying properties of subspace.
- CO5:** Solve examples to find inverse of a linear transformation and check whether linear transformation is bijective or not.
- CO6:** Apply dimension theorem to find nullity and dimension of vector space.
- CO7:** Calculate coordinate vector, orthogonally, orthonormality, norm of vectors using formulas.
- CO8:** Explain Gram Schmidt process to convert basis to orthonormal basis.

Course Outcomes (CO) of Course MT242 (A):Vector Calculus-

- CO1:** Define vector equation for lines and planes.
- CO2:** Analyse vector functions to find limits, derivatives, tangent lines, integrals, arc length, curvature, torsion.
- CO3:** Differentiate vector fields.
- CO4:** Compute limits and derivatives of functions of two and three variables.
- CO5:** Calculate work, circulation and flux.
- CO6:** Determine gradient vector fields and find potential functions.
- CO7:** Evaluate line integrals, surface area and surface integrals.

Course Outcomes (CO) of Course MT243:Practical based on MT241, MT242(A)-

- CO1:** List solutions of algebraic and transcendental equations.
- CO2:** Discuss linear independence of a set.
- CO3:** Examples of Vector Calculus.
- CO4:** Solve examples of finding rank, nullity using dimension theorem.
- CO8:** Calculate inner product, norm.



Course Outcomes

T.Y. B. Sc. (Mathematics) SEMESTER-I

Course Outcomes (CO) of Course MT331: Metric Spaces-

After successfully completing this course students will be able to:

- CO1:** Define Metric Spaces, Open Sphere, Closed Sphere etc. by using basic concepts.
- CO2:** Recall all the definitions and concepts by giving examples in Metric space.
- CO3:** Describe the concepts of Boundary point, interior point, Closure by using concept of open and closed sphere.
- CO4:** Solve tricky examples of closure and boundary points using basic definitions.
- CO5:** Illustrate theorems of connectedness and compactness by using basic concept of closed and bounded set.
- CO6:** Classify and apply concepts for solving problems of separated sets, disconnected set by using concept of connected sets.
- CO7:** Draw diagrams and analyse it for solving examples of limit point, cluster points using basic concept of open set and closed set.
- CO8:** Choose appropriate method for solving examples of connected and disconnected set by using concept of separated sets.

Course Outcomes (CO) of Course MT332: Real Analysis – I

After successfully completing this course students will be able to:

- CO1:** Recall the algebraic properties of real numbers, basics of sets, functions and types of function.
- CO2:** Define concepts of sequences, bounded sequence, monotone sequence and Cauchy sequence.
- CO3:** Describe the methods like Cauchy condensation test, Leibnitz test, root test, comparison test, ratio test to check convergence and divergence of sequences and series.
- CO4:** Explain the completeness of a system of real numbers, lub, glb of a sequence and elaborate various concepts as countable set, uncountable set, cantor set using real life examples.
- CO5:** Give examples for both sequences S_n and t_n diverge but addition, subtraction, multiplication of the sequences converges.
- CO6:** Solve the absolute and conditional convergence of series.
- CO7:** Classify the problems on series and apply methods of Cauchy condensation test, Leibnitz test, root test, comparison test, ratio test to check convergence and divergence of sequences and series to solve it.
- CO8:** Classify the sequence into bounded, unbounded and oscillatory type.



Course Outcomes (CO) of Course MT333: Problem Course based on MT 331 & MT 332-
After successfully completing this course, students will be able to:

- CO1:** List sequence as oscillatory, convergent or divergent.
- CO2:** List properties of metric space, convergent sequences, Cauchy sequences.
- CO3:** Explain convergence and divergence of sequence using test.
- CO4:** Describe open and closed sphere and open and closed sets.
- CO5:** Explain convergence and divergence of series using Cauchy condensation test, comparison test, root test, ratio test.
- CO6:** Apply compactness property to solve examples.
- CO7:** Learn properties of real numbers.
- CO8:** Choose appropriate method to solve examples on class 12.

Course Outcomes (CO) of Course MT334: Group Theory
After successfully completing this course, students will be able to:

- CO1:** Define binary operation, Group, Subgroup, cyclic group, normal subgroup.
- CO2:** Describe the concepts of cycle, transpositions of permutation, order of cycle.
- CO3:** Give examples of monoid, group, subgroup, abelian group, normal group, factor group, cyclic group.

Course Outcomes (CO) of Course MT335: Ordinary Differential Equations-
After successfully completing this course, students will be able to:

- CO1:** Learn what an ODE is, what constitutes a solution, what initial value problems are and what constitutes a solution.
- CO2:** They will learn to classify ODEs.

Course Outcomes (CO) of Course MT336: Problem Course based on MT 334 & MT 335-
After successfully completing this course, students will be able to:

- CO1:** Recall and apply Sylow's Theorems to determine the structure of certain groups of small order.
- CO2:** Understand and use the terms homomorphism and isomorphism. Understand, use the properties of and manipulate permutations.
- CO3:** Understand and use the properties of group actions.
- CO4:** Students will learn to visualize and manipulate ODEs in graphical, numerical, and symbolic form.



Course Outcomes (CO) of Course MT337A: Operation Research-
After successfully completing this course, students will be able to:

- CO1:** Formulate and solve problems as networks and graphs.
CO2: Develop linear programming (LP) models for shortest path, maximum flow, minimal spanning tree, critical path, minimum cost flow, and transportation problems.

Course Outcomes (CO) of Course MT337F: Number Theory-
After successfully completing this course, students will be able to:

- CO1:** Analyse hypotheses and conclusions of mathematical statements.
CO2: Apply different methods of proof to verify mathematical assertions including proof by induction, by contrapositive and by contradiction.
CO3: solve systems of Diophantine equations.

Course Outcomes (CO) of Course MT338: Prcatical based on MT337A and Course MT337F-

After successfully completing this course, students will be able to:

- CO1:** Solve the problems using special solution algorithms.
CO2: Remainder Theorem & the Euclidean algorithm

Course Outcomes

T.Y. B. Sc. (Mathematics) SEMESTER-II

Course Outcomes (CO) of MT341: Complex Analysis-
After successfully completing this course, students will be able to:

- CO1:** Define the concepts of derivation of analytic functions.
CO2: Define the concepts of sequences and series of the complex functions.
CO3: Define the concepts of Taylor and Laurent series.

Course Outcomes (CO) of MT342: Real Analysis-II-
After successfully completing this course, students will be able to:

- CO1:** Define the concepts of Sets of measure zero.
CO2: Study Riemann integral.
CO3: Studypoint wise and uniform convergence of series of functions.



Course Outcomes (CO) of Course MT343: Problem Course based on MT 341 & MT 342-
After successfully completing this course, students will be able to:

CO1: Express concepts of convergence sequences and series of the complex functions.

CO2: Solve examples based on Cauchy residue theorem.

CO3: Solve examples of point wise and uniform convergence of series of functions.

Course Outcomes (CO) of Course MT344: Ring Theory-
After successfully completing this course, students will be able to:

CO1: Validate and critically assess a mathematical proof.

CO2: Use a combination of theoretical knowledge and independent mathematical thinking to investigate questions in ring theory and to construct proofs.

Course Outcomes (CO) of Course MT345: Partial Differential equations-
After successfully completing this course, students will be able to:

CO1: Use knowledge of partial differential equations (PDEs), modelling, the general structure of solutions, and analytic and numerical methods for solutions.

CO2: Formulate physical problems as PDEs using conservation laws.

CO3: Understand analogies between mathematical descriptions of different (wave) phenomena in physics and engineering.

CO4: Classify PDEs, apply analytical methods, and physically interpret the solutions.

Course Outcomes (CO) of Course MT346: Problem Course based on MT 344 & MT 345-
After successfully completing this course, students will be able to:

CO1: solve practical PDE problems with finite difference methods, implemented in code, and analyse the consistency, stability and convergence properties of such numerical methods.

CO2: Interpret solutions in a physical context, such as identifying travelling waves, standing waves, and shock waves.

CO3: Write about ring theory in a coherent, grammatically correct and technically accurate manner.

Course Outcomes (CO) of Course MT347A: Optimization Techniques-
After successfully completing this course, students will be able to:



CO1: Programming problems. Learn classical optimization techniques and numerical methods of optimization.

CO2: Know the basics of different evolutionary algorithms.

CO3: Explain Integer programming techniques.

Course Outcomes (CO) of Course MT347F: Computational Geometry-
After successfully completing this course, students will be able to:

CO1: This course provides an introduction to the key concepts, problems, techniques and data structures within computational geometry, including c concepts of points, lines, planes, spheres, duality, subdivisions and degeneracies.

Course Outcomes (CO) of MT348: Practical based on MT347A and MT347F-
After successfully completing this course, students will be able to:

CO1: Apply different optimization techniques to solve various models arising from engineering areas.

CO2: Study two dimensional transformation and three dimensional transformations.

T.Y.B.Sc -PSO

Programme Specific Outcome (PSO)

i) Give the students a sufficient knowledge of fundamental principles, methods and a clear perception of innumerable power of mathematical ideas and tools and know how to use them by modeling, solving and interpreting.

ii) To equip the students sufficiently in both analytical and computational skills in Mathematical Sciences.

iii) To develop a competitive attitude for building a strong academic - industrial collaboration, with focus on continuous learning skills.

iv) Enhancing students overall development and to equip them with mathematical modeling abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.

v) Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study. vi) Enabling students to Gauge the hypothesis, theories, techniques and proofs provisionally.

Programme Outcome:(PO) A graduate of this program are expected to:

i) Gain sound knowledge on fundamental principles and concepts of Mathematics and computing with their applications related to Industrial, Engineering, Biological and Ecological problems.

ii) Exhibit in depth the analytical and critical thinking to identify, formulate and solve real world problems of science and engineering.



iii) Get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.

iv) A student should get adequate exposure to global and local concerns that explore them many aspects of Mathematical Sciences.

v) Apply their skills and knowledge, that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.

vi) Be capable of undertaking suitable experiments/research methods while solving the real-life problem and would arrive at valid conclusions based on appropriate interpretations of data and experimental results.

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DEPARTMENT OF MICROBIOLOGY

B.Sc. Microbiology



❖ Programme Outcomes (POs)

The programme outcomes that the department presently adapts to future graduates are as follows:

PO-1: Microbiology knowledge: Graduates will acquire microbiology specific knowledge including molecular biology, immunology and rDNA technology coupled with hands on skills and leadership skills for a successful career.

PO-2: Problem analysis: Graduates will be able to analyse, solve and troubleshoot problems in implementation of microbiological protocols.

PO-3: Design/development of solutions: Graduates will develop creative thinking and cooperate with each other to solve problems in the field of microbiology.

PO-4: Conduct investigations of complex problems: Graduates will acquire practical skills – which help in planning and designing protocols to validate hypothesis and execute experimental techniques independently as well as assimilate, analyse and interpret subsequent data.

PO-5: Modern tool usage and communication: Graduates will effectively be able to manage resources and time using ICT and computer enabled devices and accomplishes ability to understand and communicate all ideas effectively.

PO-6: Environment sustainability and Ethics: Graduates will get adequate knowledge to use information and implement solutions for environmental protection and remediation. Graduates will be aware of their role and responsibility in handling and use of microbes including genetically modified microorganisms.

PO-7: Lifelong learning: Graduates will carry on learning and adapting in a world of constantly evolving technology.

❖ Programme Specific Outcomes (PSOs)



The overall outcome of graduates specific to B.Sc. Microbiology programme as follows:

PSO1: Microbiology skill: The ability to understand the basic concepts related to the relevant fields of microbiology which will enable them to analyse and develop solutions to microbiology related problems.

PSO2: Microbiology related employability skills: The ability to use the acquired hands-on skills in microbiology, molecular biology, immunology, medical microbiology and screening for useful biomolecules within employment areas.

PSO3: Successful Career and Entrepreneurship: The ability to gainfully become an entrepreneur by using microorganisms to produce biofertilizers, mushrooms and pharmaceutically important biomolecules as well as using practical hands-on training to become employed in diagnostic, industrial, pharmaceutical, food and research and development laboratories

❖ Course Outcomes

F.Y.B. Sc. Microbiology

MB-111 Paper I: Introduction to Microbiology

CO 1: Students will be able to define Microbiology and Microorganisms.

CO 2: They will be able to identify different types of microorganisms.

CO 3: They will be able to describe the importance and applications of microbiology

CO 4: They will be able to memorise and recite the names of microorganisms with genus and species

MB-112 Paper II: Basic techniques in Microbiology

CO 1: Students will be able to define and state the principles various techniques in microbiology.

CO 2: They will be able to describe individual technique in detail.

CO 3: Students will be able to name and list the growth requirements of micro-organisms.

MB-121 Bacterial cell and biochemistry

CO1: Students will be able to define and state the principles about bacterial cell and its biochemistry.

CO2: They will be able to describe genetic material of microorganisms.

CO3: They will be able to define biochemical characterisations of components of microorganism e.g., carbohydrates, lipids, proteins and nucleic acid.



MB-122 Microbial cultivation and growth

CO1: Students will be trained with techniques about how to cultivate microorganisms.

CO2: They will be able to describe solid and liquid medium for the growth of microorganism.

CO3: They will be able to aware with instruments and glasswares related with microbial cultivation.

MB-113 and 123 Practicals

CO 1: Students will be trained to techniques in microbiology like staining, cultivation of microorganisms

CO 2: They will be able to label the different parts of instruments like incubator, Microscope, Autoclave etc.

They will be able to identify types of microorganisms with the help of microscope

S.Y.B.Sc. Microbiology

MB 211 paper I: Medical Microbiology and Immunology

CO 1: Students will be able to organize diseases with respect to system.

CO 2: They will be able to categories disease causing organisms like bacterial, fungal and viral etc.

CO 3: Students will be able to define epidemiology.

CO 4: Students will be able to define the term of Medical and immunology.

CO 5: They will be able to list out components of immune system and describe them in detail.

CO 6: They will be able to distinguish between humoral and cell specific immunity and innate and adaptive immunity.

MB 212: paper II Bacterial physiology and Fermentation Technology

CO 1: Students will be able to restate the importance of microorganisms in Industry.

CO 2: They will be able to give examples of industrially important micro-organisms and their applications.

CO 3: They will be able to explain process of Fermentation.

CO 4: They will be able to distinguish between the types of fermentations.

CO 5: They will be able to illustrate and label different parts of fermenters.

CO 6: They will be able to summarise the role of microorganisms in agriculture.

CO 7: They will be able to inter relate the microorganisms and elemental cycles in nature



MB 221: Bacterial Genetics

CO 1: Students will be able to summarise the development of genetics.

CO 2: They will be able to paraphrase the concept of gene.

CO 3: They will be able to interpret the central dogma of molecular biology

CO 4: They will be able to explain the cellular processes like DNA replication, transcription and translation.

CO 5: They will be able to inter relate the cause of adaptation, evolution and cancer with the change in genetic inheritance.

MB 222: Air, water and soil Microbiology

CO 1: Students will be able to explain both air and water micro flora.

CO 2: They will be able to distinguish between air water micro flora.

CO 3: They will be able to summarise different techniques to measure the air and water micro flora and interpret the results.

MB 212 and 223: Practical course

CO 1: Practical for the second year students will be less defined i.e. kept more flexible, designed to evolve project themes on environment, agriculture and pollution aspects and acquiring laboratory related skills. Practical at this level will also include application of biostatistics principles and computers for data analysis and interpretation, and introduction to scientific writing and report preparation. These aspects can be practiced better while carrying out the mini-projects.

T.Y.B.Sc. Microbiology:

MB 351 and 361: Medical Microbiology

CO 1: Students will be able to organize diseases with respect to system.

CO 2: They will be able to categories disease causing organisms like bacterial, fungal, viral etc.

CO 3: They will be able to match diseases and their causative agents.

CO 4: They will be able to understand the role antibiotics in the irradiation of disease and resistance generate against them.

MB 354 and 364: Genetics and Molecular Biology



CO 1: Students will be able to extend their study from prokaryotic gene expression to eukaryotic gene expression.

CO 2: They will be able to describe and interpret various techniques of gene mapping and able to solve problems based on it.

CO 3: Students will be able to define recombinant DNA technology (RDT) and state their applications. Students will be able to explain the various steps in RDT.

MB 353 and 363: Enzymology and Metabolism

CO 1: Students will be able to extend their study in enzymology with respect to identification and purification of enzyme.

CO 2: They will be able to describe and generalize the role of co enzyme in enzyme catalysis.

CO 3: Students will be able to interrelate between anabolism and catabolism.

CO 4: Students will be able to elaborate their study about bioenergetics.

MB 352 and 363: Immunology

CO 1: Students will be able to define the term immunology.

CO 2: They will be able to list out components of immune system and describe them in detail.

CO 3: They will be able to distinguish between humoral and cell specific immunity and innate and adaptive immunity.

MB 355 and 365: Fermentation technology

CO 1: Students will be able to define fermentation.

CO 2: They will be able to describe process of industrial fermentation.

CO 3: They will be able to understand the role of bioreactor in fermentation.

Co 4: They will be able to explain industrial processes for various products by flow sheet diagram.

MB 356 and 366: Agricultural and Food Microbiology

CO 1: Students will be able to define and analyse the role microorganisms in dairy, food, and environment.

CO 2: They will be able to explain milk and food spoilage due to micro-organisms.

CO 3: They will be able to describe and apply process of food preservation.

MB 357 and 367: Clinical Microbiology (Practical course I)

CO 1: Students will be trained with various techniques in clinical Microbiology like isolation and identification of pathogen by classical and serological methods

MB 358 and 368: Biochemistry and molecular biology (Practical course II)

CO 1: Students will be trained in various biochemical techniques like chromatography, centrifugation, qualitative and quantitative analysis of biochemical biomolecules.



MB 359 and 369: Applied Microbiology (Practical course III)

CO 1: Students will be trained with various techniques carried out in industries like fermentation, food and dairy.

+ Skill enhancement course:

MB 3510: Marine Microbiology

CO 1: Students will be able to define and analyse the role microorganisms in marine environment.

CO 2: They will be able to describe sampling methods for marine water.

CO 3: They will be able to define marine microbes role in bioremediation and bio prospecting.

MB 3511: Dairy Microbiology

CO 1: Students will be able to define and analyse the role microorganisms related with dairy industry.

CO 2: Students will be able to aware with processing techniques and naturally occurring preservative for dairy industry.

MB 3610: Waste management

CO 1: Students will be able to learn basic concept of solid and liquid waste management.

CO 2: Students will be able to aware with how to reduce the environmental and health hazardous wastes.

CO 3: They will be able to describe role of microorganisms in waste management treatment.

MB 3611: Nano biotechnology

CO 1: Students will be able to learn the concept of Nano biotechnology.

CO 2: Students will be able to aware microbial mediated metallic nanoparticles synthesis.

CO 3: They will be able to describe principles and characterization techniques for nanomaterial.

CO-ORDINATOR
IQAC

G.M.D. Arts, B.W. Commerce
And Science College, Sinnar

Principal

G. M. D. Arts, B. W. Commerce and
Science College, Sinnar, Dist. Nashik

HEAD

DEPARTMENT OF MICROBIOLOGY
G.M.D. Arts, B.W. Commerce,
and Science College, Sinnar



Maratha Vidya Prasarak Samajs Nashik

G.M.D. Arts, B.W. Commerce & Science College, Sinnar

DEPARTMENT OF PHYSICS

(Po, POS, CO)

Bachelor of Science (B.Sc.)

Goals:

The department has formulated three broad educational goals for the undergraduate degree programs:

1. Physics Knowledge: To provide students with the basic foundation in Physics and allied subject, the interplay of theory and experiment, and to motivate scientific enthusiasm and curiosity and joy of learning.
2. Problem solving skills: To provide the students with technical skills necessary for successful careers in physics
3. Employment and technical skills: To provide the students with technical skills necessary for successful careers in physics These include to a breadth of experimental techniques using modern instrumentations and communication skills.

Programme Out Comes (PO):

After successfully completing B.Sc. programme, Students will able to:

- PO-1. Demonstrate, solve and an understanding of major concepts in all disciplines of physics.
- PO-2. Solve the problem and also think methodically, independently and draw a logical conclusion.
- PO-3. Employ critical thinking and the scientific knowledge to design, carryout, record and analyze the results of Physics experiments.
- PO-4. Create an awareness of the impact of Physics on the society, and development outside the scientific community.
- PO-5. To inculcate the scientific temperament in the students and outside the scientific community.
- PO-6. Use modern techniques, decent equipment's and Phonics software's

PROGRAMME SPECIFIC OUTCOMES (PSO):

PSO1: Students are expected to acquire a core knowledge in physics, including the major premises of classical mechanics, quantum mechanics, electromagnetic theory, electronics, optics, special theory of relativity and modern physics.



PSO2: Students are also expected to develop written and oral communication skills in communicating physics-related topics.

PSO3: Students should learn how to design and conduct an experiment (or series of experiments) demonstrating their understanding of the scientific method and processes. Not only that they are expected to have an understanding of the analytical methods required to interpret and analyze results and draw conclusions as supported by their data.

PSO4: Students will develop the proficiency in the acquisition of data using a variety of laboratory instruments and in the analysis and interpretation of such data.

PSO5: Students will learn the applications of numerical techniques for modelling physical systems for which analytical methods are inappropriate or of limited utility.

PSO6: Students will realize and develop an understanding of the impact of physics and science on society.

PSO7: Apply conceptual understanding of the physics to general real-world situations.

PSO8: Describe the methodology of science and the relationship between observation and theory.

PSO9: Learn to minimize contributing variables and recognize the limitations of equipment.

PSO10: Discover of physics concepts in other disciplines such as mathematics, computer science, engineering, and chemistry.

PSO11: Develop the following experimental tools: Numerically model simple physical systems using Euler's method, curve fitting, and error analysis.

PSO12: Analyze physical problems and develop correct solutions using natural laws

F.Y.B.Sc. COURSE OUTCOMES (CO) (Sem - I and II):

COURSE CODE AND TITLE: PHY-111 Mechanics and Properties of Matter

CO1. The student will be able to understand motion,

CO 2. The student understands the importance of Work and Energy

CO 3. The student knows Concept of viscous force and viscosity

COURSE CODE AND TITLE: PHY-112 PHYSICS PRINCIPLES AND APPLICATIONS

CO1. To understand the general structure of atom, spectrum of hydrogen atom.

CO2. To understand the atomic excitation and LASER principles.

CO3. To understand the bonding mechanism and its different types. CO4. To demonstrate an understanding of electromagnetic waves and its spectrum.

CO 5. Understand the types and sources of electromagnetic waves and applications.

CO 6. To demonstrate quantitative problem solving skills in all the topics covered.



COURSE CODE AND TITLE: PHY-121 HEAT AND THERMODYNAMICS

CO1. Learning outcomes for Concept of thermodynamic

CO2. The learner will understand the importance Applied Thermodynamics

CO3. The learner understands Heat Transfer Mechanisms

CO4. To understand Concept of heat & temperature

COURSE CODE AND TITLE: PHY-122 ELECTRICITY AND MAGNETISM

CO1: To understand the concept of the electric force, electric field and electric potential for stationary charges

CO2: Able to calculate electrostatic field and potential of charge distributions using Coulomb's law and Gauss's law.

CO3: To understand the dielectric phenomenon and effect of electric field on dielectric. CO4. To Study magnetic field for steady currents using Biot-Savart and Ampere's Circuital laws.

CO5: To study magnetic materials and its properties

S.Y.B.Sc. COURSE OUTCOMES (CO) (Sem - I and II):

COURSE CODE AND TITLE: PH211: MATHEMATICAL METHODS IN PHYSICS

CO1. After the completion of this course students will be able to

CO2. Understand the complex algebra useful in physics courses

CO3. Understand the role of partial differential equations in physics.

CO4. Understand vector algebra useful in mathematics and physics

CO5. Understand the singular points of differential equation.

PH212: ELECTRONICS

CO1. Apply laws of electrical circuits to different circuits.

CO2. Understand the relations in electricity • Understand the properties and working of transistors.

CO 3. Understand the functions of operational amplifiers

CO 4. Design circuits using transistors and operational amplifiers.

CO 5. Understand the Boolean algebra and logic circuits.

COURSE CODE AND TITLE: PH221: OSCILLATIONS, WAVES AND SOUND

CO1. Solve the equations of motion for simple harmonic, damped, and forced oscillators.

CO2. Formulate these equations and understand their physical content in a variety of applications,

CO3. Describe oscillatory motion with graphs and equations, and use these descriptions to solve problems of oscillatory motion.



CO4. Explain oscillation in terms of energy exchange, giving various examples.

CO5. Solve problems relating to undamped, damped and force oscillators and superposition of oscillations.

CO6. Understand the mathematical description of travelling and standing waves.

CO7. Recognise the one-dimensional classical wave equation and solutions to it.

CO8 : Calculate the phase velocity of a travelling wave.

CO9. Explain the Doppler effect, and predict in qualitative terms the frequency change that will occur for a stationary and a moving observer.

CO10. Define the decibel scale qualitatively, and give examples of sounds at various levels.

CO11 Explain in qualitative terms how frequency, amplitude, and wave shape affect the pitch, intensity, and quality of tones produced by musical instruments.

COURSE CODE AND TITLE: PH222: OPTICS

CO1. Describe how light can constructively and destructively interfere.

CO2. Explain why a light beam spreads out after passing through an aperture.

CO3. Summarize the polarization characteristics of electromagnetic waves.

CO4. Understand optical phenomena such as polarisation, birefringence, interference and diffraction in terms of the wave model.

CO5. Analyse simple examples of interference and diffraction phenomena.

CO6. Be familiar with a range of equipment used in modern optics.

T.Y.B.Sc. COURSE OUTCOMES (CO) (Sem - I and II):

SEMESTER I:

COURSE CODE AND TITLE: PH331 : MATHEMATICAL METHODS IN PHYSICS-II

CO1. Introduction to Cartesian, Spherical polar and Cylindrical co-ordinate systems, transformation equations

CO2. Able to appreciate the process The Special Theory of Relativity

CO3. To discuss Special functions

CO4. To understand Differential equations

COURSE CODE AND TITLE: PH332: SOLID STATE PHYSICS

CO1. To explain Special functions

CO2. Understanding . X ray Diffraction and Other Characterization Techniques

CO3. Understanding . Free Electron and Band Theory of Metals

COURSE CODE AND TITLE: PH 333 CLASSICAL MECHANICS



CO1. Understand the mechanics of system of particles

CO2. Get an idea on Motion in Central Force Field

CO3. Help to explore new developments Scattering of particles.

CO4. Enable the students to illustrate Langrangian and Hamiltonian formulation

CO5. Develop an interest in the Canonical Transformation and Poisson's Bracket

COURSE CODE AND TITLE: PH334 ATOMIC AND MOLECULAR PHYSICS

CO1. Understanding on the basic theories and principles of Atomic structure

CO2. Learn current environmental issues based on One and two valence electron systems

CO3. Gain critical understanding Two valence electron systems.

CO4. Expose to the basics and advances in Zeeman Effect, X ray spectroscopy and Molecular spectroscopy

COURSE CODE AND TITLE: PH335: COMPUTATIONAL PHYSICS

CO1. To provide students with knowledge Concepts of programming:

CO2. To enable students to understand the Structure of C program, Character set, key words,

CO3. To enable students to reach Arrays and Pointers and User Defined Function in C

CO4. To provide students with adequate knowledge about Computational Physics

COURSE CODE AND TITLE: PH-336 ELECTIVE I (B) ELEMENTS OF MATERIALS SCIENCE

CO1. Understanding on the details. Defects in Solids

CO2. Explain the fine structure in Phase Metals Molecular Phases and Ceramic Materials CO3. Understanding the structure and function of Phase Diagrams.

SEMESTER II:

COURSE CODE AND TITLE: PH-341: CLASSICAL ELECTRODYNAMICS

CO1. Understand the importance of Electrostatics:

CO2. Get an idea on tools and techniques available for studying Magneto statics:

CO3. To acquire the Concept of electromagnetic.

COURSE CODE AND TITLE: PH-342: QUANTUM MECHANICS

CO1. To study Origin of Quantum Mechanics:

CO2. Learn more about Physical interpretation of wave function

CO3. Outline the basic Schrodinger's equation in spherical polar co-ordinate system

CO4. Compare the different Operators in Quantum Mechanics

COURSE CODE AND TITLE: PH-343: THERMODYNAMICS AND STATISTICAL PHYSICS



CO1. Discuss Assumptions of Kinetic theory of gases

CO2. Explain the Maxwell Relations and Application

CO3. Describe how Elementary Concepts of Statistics

CO4. Distinguish Statistical Distribution of System of Particles: and Statistical Ensembles

COURSE CODE AND TITLE: PH 344 NUCLEAR PHYSICS

CO1. Explain Basic Properties of Nucleus

CO2. Describe the experiments of Radioactivity

CO3. Describe the Meson theory of nuclear forces, Properties of nuclear forces,

CO4. Explain the consequence Introduction to particle Accelerators

COURSE CODE AND TITLE: PH345: ELECTRONICS

CO1. Expose to concepts and process in developmental Special Purpose Diodes and Transistor amplifier

CO2. Understand Operational Amplifier and Timer (IC555)

CO3. Introduction to SOP and POS technique in Combinational circuits CO1. Demonstrate advanced.

COURSE CODE AND TITLE: PH346 ELECTIVE II (K): LASERS

CO1. Knowledge and understanding of Introduction to Lasers:

CO2. Describe the Laser Action and Laser Oscillators

CO3 To understand Characteristics of Laser as well as Types and Applications of Lasers



DEPARTMENT OF PHYSICS

POST-GRADUATE (MSc) SECTION

Preamble of the Syllabus: Master of Science (M.Sc.) in Physics is a post-graduation course of University of Pune.

The credit system to be implemented through this curriculum, would allow students to develop a strong footing in the fundamentals and specialize in the disciplines of his/her liking and abilities. The students pursuing this course would have to develop in depth understanding various aspects of the subject. The principles in Physics will be studied in depth. Students will have deeper understanding of laws of nature through the subjects like classical mechanics, quantum mechanics, electrodynamics, statistical physics etc. Students' ability of problem solving will be enhanced. Students can apply principles in physics to real life problems.

Programme Outcomes (PO):

After successfully completing M.Sc. programme, Students will able to :

- PO-1. Demonstrate, solve and an understanding of major concepts in all disciplines of physics.
- PO-2. Solve the problem and also think methodically, independently and draw a logical conclusion.
- PO-3. Employ critical thinking and the scientific knowledge to design, carryout, record and analyze the results of Physics experiments.
- PO-4. Create an awareness of the impact of Physics on the society, and development outside the scientific community.
- PO-5. To inculcate the scientific temperament in the students and outside the scientific community.
- PO-6. Use modern techniques, decent equipments and Phonics software's

PROGRAMME SPECIFIC OUTCOMES (PSO):

PSO1: Students are expected to acquire a core knowledge in physics, including the major premises of classical mechanics, quantum mechanics, electromagnetic theory, electronics, optics, special theory of relativity and modern physics.

PSO2: Students are also expected to develop written and oral communication skills in communicating physics-related topics.

PSO3: Students should learn how to design and conduct an experiment (or series of experiments) demonstrating their understanding of the scientific method and processes. Not only that they are expected to have an understanding of the analytical methods required to interpret and analyze results and draw conclusions as supported by their data.



PSO4: Students will develop the proficiency in the acquisition of data using a variety of laboratory instruments and in the analysis and interpretation of such data.

PSO5: Students will learn the applications of numerical techniques for modelling physical systems for which analytical methods are inappropriate or of limited utility.

PSO6: Students will realize and develop an understanding of the impact of physics and science on society.

PSO7: Apply conceptual understanding of the physics to general real-world situations.

PSO8: Describe the methodology of science and the relationship between observation and theory.

PSO9: Learn to minimize contributing variables and recognize the limitations of equipment.

PSO10: Discover of physics concepts in other disciplines such as mathematics, computer science, engineering, and chemistry.

PSO11: Develop the following experimental tools: Numerically model simple physical systems using Euler's method, curve fitting, and error analysis.

PSO12: Analyze physical problems and develop correct solutions using natural laws

COURSE OUTCOMES (COS)

SEMESTER-I

COURSE CODE AND TITLE: PHYUT501: CLASSICAL MECHANICS

CO1: Define basic terms Constrained Motion and Lagrangian formulation

CO2: Explain the applications of Variational Principle and Hamilton's formulation.

CO3: Explain the structure and functions of Canonical Transformations and Poisson Brackets

CO4: Explain the importance of tools and techniques Non inertial frames of References ,

Central Force COURSE CODE AND TITLE: PHYUT502: ELECTRONICS:

CO1: Label the Applications of special function ICs

CO2: Explain Regulated power supply

CO3: Explain the ultrastructure and functions of various cell organelles.

CO4: Explain the concepts Digital Logic circuits I: Combinational Logic

CO5: Illustrate the Digital Logic circuits II: Sequential Logic:

CO6: Illustrate the types, development and causes of Data Converters

COURSE CODE AND TITLE: PHYUT503: MATHEMATICAL METHODS IN PHYSICS:

CO1: Define the : Linear spaces and operators

CO2: Identify Matrix representation, Similarity transformations,



CO3: Discuss Special Function

CO4: Explain the principles Fourier series and Integral transforms

COURSE CODE AND TITLE: PHYUT504: ATOMS AND MOLECULES

CO1: Explain the Atomic structure and atomic spectra :.

CO2: Explain Molecular Spectra – Rotational and vibrational spectra for diatomic molecules, Electronics spectra of diatomic molecules.

CO3: Explain the concept ESR- Principles of ESR, ESR spectrometer

CO4: Explain Crystal Diffraction and Lattice Vibrations of Solids.

COURSE CODE AND TITLE: PHYUT505: EXPERIMENTAL TECHNIQUES IN PHYSICS I

CO1 : Signal and Signal Analysis

CO2 :important and fields applications of vacuum

CO3 :Principles of pumping concept,

CO4 :Vacuum Measurements and Low Temperature Technique

SEMESTER-II

COURSE CODE AND TITLE: PHYUT601: ELECTRODYNAMICS

CO1: Multipole expansions and time varying fields

CO2: Energy, force, momentum relations and electromagnetic wave equations 1

CO3: Inhomogeneous wave equations.

CO4: Relativistic Mechanics and Covariance

COURSE CODE AND TITLE: PHYUT602: SOLID STATE PHYSICS

CO1: Band Theory of Solids

CO2 Diamagnetism and Paramagnetism

CO3: Ferromagnetism, Antiferromagnetism and Ferrimagnetism 1 C

CO4: Superconductivity.

COURSE CODE AND TITLE: PHYUT 603: QUANTUM MECHANICS I

CO1: To do Revision and general formalism

CO2: to understand Representation of States – Dirac notation.

CO3: To study and verify Approximation Methods

CO4: To Introduction to WKB approximation,

COURSE CODE AND TITLE: PHYUT604: LASERS



CO1: To understand Interaction of radiation with matter

CO2: To study Different types of gas lasers

CO3: To discuss industrial applications:

COURSE CODE AND TITLE: PHYUT605: EXPERIMENTAL TECHNIQUES IN PHYSICS II

CO1: To understand Radiation Sources, Detectors and Sensors

CO2: To discuss Structural Characterization and Thermal Analysis.

CO3: To verify Morphological and Magnetic Characterization

CO4: To discuss Spectroscopic Analysis

PROPOSED STRUCTURE OF M. SC. (PHYSICS) SYLLABUS (C.B.C.S.)

From Academic Year 2019-2020 Preamble:

The curriculum for the M. Sc. (Physics) programme is designed to cater to the requirement of Choice Based Credit System following the University Grants Commission (UGC) guidelines. In the proposed structure, due consideration is given to Core and Elective Courses (Discipline specific - Physics), along with Ability Enhancement (Compulsory and Skill based) Courses. Furthermore, continuous assessment is an integral part of the CBCS, which will facilitate systematic and thorough learning towards better understanding of the subject. The systematic and planned curricula divided into two years (comprised of four semesters) shall motivate the student for pursuing higher studies in Physics and inculcate enough skills for becoming an entrepreneur.

Objectives: To foster scientific attitude, provide in-depth knowledge of scientific and technological

concepts of Physics.

To enrich knowledge through problem solving, minor/major projects, seminars, tutorials, review of research articles/papers, participation in scientific events, study visits, etc.

PO 1 : To familiarize with recent scientific and technological developments

PO 2 : To create foundation for research and development in Physics

PO3 : To help students to learn various experimental and computational tools thereby developing analytical abilities to address real world problems.

PO4 : To train students in skills related to research, education, industry and market

PO 5 : To help students to build-up a progressive and successful career in Physics.

COURSE CODE AND TITLE: PHCT-111: MATHEMATICAL METHODS IN PHYSICS

CO1: Explain Complex Analysis

CO2: Explain Vector Space and Matrix Algebra



CO3: Explain the concept Special Functions and Fourier Series and Integral Transforms

COURSE CODE AND TITLE: PHCT-112: CLASSICAL MECHANICS

CO1: To do Analytical Dynamics (Lagrangian and Hamiltonian Dynamics)

CO2: To understand Lagrangian formulation of motion under central forces. Kepler problem.

CO3: To study and verify Moment of inertia tensor. Euler angles. Euler equation of motion for rigid body motion,

COURSE CODE AND TITLE: PHCT-113: QUANTUM MECHANICS

CO1: Inadequacy of classical Physics, wave packets and uncertainty relations

CO2: To understand Representation of States – Dirac notation.

CO3: To study Angular Momentum

CO4: To Introduction Approximation Methods,

COURSE CODE AND TITLE: PHCT-114 ELECTRONICS

CO1: To understand Semiconductor Devices and its Applications

CO2: To understand Special Function ICs and their Applications.

CO3: To study Digital Logic Circuits I: Combinational Logic

CO4: To Introduction Data Converters

COURSE CODE AND TITLE: PHCT-121, ELECTRODYNAMICS

CO1 Inadequacy of Multiple expansions and time varying fields

CO2: To understand Energy, Force, Momentum relations and Electromagnetic wave equations

CO3: To study Inhomogeneous Wave Equations

CO4: To Introduction Relativistic Mechanics and Covariance

COURSE CODE AND TITLE: PHCT-122 SOLID STATE PHYSICS

CO1 : Inadequacy of Crystal Structure of Solids

CO2: To understand Electronic Structure of Solids

CO3: To study Magnetism and Superconductivity

CO4: To Introduction Dielectric Properties of Solids

COURSE CODE AND TITLE: PHCT-123 STATISTICAL MECHANICS

CO1 : Brief discussion on probability distributions

CO2: To understand Classical Statistical Mechanics

CO3: To study Applications of Statistical Mechanics and Quantum Distribution Functions

CO4: To Introduction Ideal Bose and Fermi Systems

COURSE CODE AND TITLE: PHCT-124 :ATOMS AND MOLECULES



CO1: Brief discussion on Atomic models, Hydrogen atom, and quantum numbers.

CO2: To understand Molecules

CO3: To study Spectroscopic Techniques

CO4: To study Resonance spectroscopy

COURSE CODE AND TITLE: PHCT-231 PHYSICS OF SEMICONDUCTOR DEVICES

CO1 : Brief discussion Properties of semiconductor CO2: To understand Types of semiconductor, direct and indirect band gap semiconductors

CO3: To study : Junction Transistor and Field Effect Devices

CO4: To study Metal and Metal Insulator semiconductor devices

COURSE CODE AND TITLE: PHCT-232 LASER FUNDAMENTALS AND APPLICATIONS

CO1 : Brief discussion Interaction of radiation with matter

CO2: To understand Types Three and four level system and rate equations

CO3: To study Principle, Construction, Energy level diagram and working

CO4: To study Industrial applications

COURSE CODE AND TITLE: PHCT-233: EXPERIMENTAL TECHNIQUES IN PHYSICS-I

CO1 : Inadequacy of Signal, Signal Analysis and Sensors

CO2: To understand Vacuum Physics and Vacuum Techniques

CO3: To study Vacuum Measurement and Low Temperature Techniques

COURSE CODE AND TITLE: PHOP234-L: PHYSICS OF THIN FILMS

CO1 : To overview Introduction to Thin Films

CO2: To understand Deposition Techniques and Measurement of Thickness

CO3: To study Properties of Thin Films

CO4: To study Applications of Thin Films

HEAD
DEPARTMENT OF PHYSICS
G.M.D. Arts, B.W. Commerce
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Maratha Vidya Prasarak Samaj's
G.M.D. Arts, B.W. Commerce and Science College,
Sinnar,
Tal- Sinnar, Dist- Nashik

Program Outcomes, Program Specific Outcomes, Course specific Outcomes

Department of Political Science (2023-24)

Program Outcomes	Program specific outcomes	Course outcomes
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B.A. Political Science

PO (Program Outcome) of Bachelor of Arts (B.A.)

Student seeking admission for B.A. programme is expected to imbue with following quality which helps them in their future life to achieve the expected Goals.

- a. Realization of human values.
- b. Sense of social service.
- c. Responsible and dutiful citizen.
- d. Creative ability.

PO (Program Outcome) of Master of Arts (M.A.)

- ❖ Students aware about the Political Process.
- ❖ The concepts & ideas in Political Theory will be developed.
- ❖ Students will aware about the Role & different Political Ideologies & their impact in Politics.
- ❖ Students will understand the traditional & Modern Political Thoughts.
- ❖ Students will able to understand the International Issues.

PSO (Program Specific Outcomes) B.A. (Political Science)

On completion of B.A (Political Science), Students are able to:

1. Understand the contribution of the main traditions of western political thinkers to political thought.
2. Understand the processes and dynamics of Indian government and politics. It also familiarize with the vital contemporary emerging issues of center-state. relation,



political parties, emergence of new leadership at different levels, demand for autonomy movement, ethnic conflicts etc.

3. Acquaint with the basic concepts, principles and dynamics of public administration.
4. Familiarize with important theories and issues of international relations.
5. Understand the basic concept and ideological orientations of political science discipline.
6. Understand the contribution of the main traditions of Indian Political Thought.
7. An understanding the evolution, development and trends of India's foreign policy.
8. Acquaint with the basics of International Law and the new trends in the realm of International law.
9. Understand the basic concept and issues concerning human rights and challenges.
10. Understand the women's issues and problems.
11. Familiarize with the problems and prospects of rural development of India.
12. Understand the cultural, social, political, economic and constitutional environment as a historical perspective of Indian Administration.

PSO (Program Specific Outcomes)M.A. (Political Science)

PSO1: Students will aware about interdisciplinary Orientation of Tradition of Political Thought.

PSO2: Students understand impartment concept of Administrative Theory.

PSO3: To provide students an understanding of the basic concepts of Political Institutions in India.

POS4: To study one State in an in-depth manner to understand how the become Indian foreign Policy.

PSO5: To provide the knowledge of comparative political analysis.

PSO6:.Understand the more knowledge of theory of international relation.

PSO7:To provide the knowledge of Public policy

PSO8:Understand the basic concept Politics and media

CO (Course outcomes) Class: -F.Y.B.A. (Sem. I & II)INTRODUCTION TO INDIAN CONSTITUTION

1. The students are acquainted with the important features of the Constitution of India
2. The student is aware with the basic framework of Indian Government
3. The students becomes familiar to the working of the Constitution of India
4. Understanding of basic concept of Indian Constitution.
5. Understanding the Structure & Functions of Indian Political System.
6. Knowledge of Fundamental Rights & Duties.

CO (Course outcomes) Class: -S.Y.B.A. General (Sem. III & IV)AN INTRODUCTION TO POLITICAL IDEOLOGIES

- 1Understand the Role of Political Ideologies.

2. To get knowledge of Political Ideologies.
3. Understand the Philosophical basis of the Ideologies.
4. Develop ability to critically analyze of various Ideologies.

CO (Course outcomes) Class: -S.Y.B.A. Special(S-1)(Sem. III & IV)WESTERN POLITICAL THOUGHT

1. Students are introduced to classical tradition in political theory from Plato to Marx with the view to analyze and understand political events and problems of their time and solution
2. Students are aware about the negligence of women's concerns and issues
3. Students can know the change within the Western political tradition

CO (Course outcomes) Class: -S.Y.B.A. Special(S-2)(Sem. III & IV)POLITICAL JOURNALISM

This course is designed to acquaint student with the-

1. Complex relationship between the communication media and power politics.
2. Critical appraisal of practices of political image management camping, propaganda.
3. Indian context of political Journalism.

CO (Course outcomes) Class: -T.Y.B.A General 3 (Political Science) Local Self Government in Maharashtra(Sem. V & VI)

1. Students are introduced to structure of Local Self Government of Maharashtra
2. Students are familiar to awareness of the various Local Self Institutions, function, and Composition and importance
3. Students can know the role of Local Government and Local Leadership in development

CO (Course outcomes) Class: -T.Y.B.A General 3 (Political Science) MODERN POLITICAL ANALYSIS (Sem. V & VI)

1. This course will introduce the overall scope of the sub-discipline of Modern PoliticalAnalysis.
2. The focus of the course will be on the Modern Political Analysis of power.
3. The emphasis is on the nature of power in modern societies- more in the form of organizationsand social formations than as individual power.
4. Students are also expected to understand different forms of justifications of power and the role of ideology in this regard. State will be studied as a repository of power in society while class and patriarchy are two instance of how

CO (Course outcomes) Class: -T.Y.B.A. Special (S-3)(Sem. V & VI)

1. Students are introduced to essence of Public Administration, its effectiveness in translating the governing philosophy into programmes, policies and activities and making it a part of Community living.
2. Students are familiar to personnel public administration in the historic context highlighting several of its categories which develops administrative salience and capabilities to deal with the process of Changes
3. Students can know the paradigm of democratic legitimacy
4. The importance of legislative and judicial control over administration is given to students
5. Understand the Concept of Governance
6. Knowledge about Bureaucracy.
7. Introduce about various Methods of Recruitment & Training.
9. Generate interest in budgetary process in India.

CO (Course outcomes) Class: -T.Y.B.A. Special (S-4) (Sem. V & VI)

1. Students are introduced to concepts and dimensions of international relations
2. Students are familiar to different theories highlighting the major debates and different aspects of balance of power within.
3. Students can know the various aspects of conflict and conflict resolution, collective security and specificity of the long period of post Second World War and phase of the Cold War. Of Detente and Deterrence leading to theories of rough parity in armaments.

MA-1 CO (Course outcomes)

CO (Course outcomes) Class: -M.A.-I, (SEM – I)

POL 501 MJ : Western Political Thought:

This course is meant to serve as a window on the major thinkers have shaped political discourse in different parts of the world over the last three millennia. It stresses the great diversity of social contexts and philosophical visions that have informed the ideas of key political thinkers across epochs. The chief objective is to project the history of political thought as a series of critical, interconnected and open-ended conversations about the ends and means of the good life

CO (Course outcomes) Class: -M.A.-I, (SEM – I)

POL 502 MJ : Administrative Theory:

Public Administration is an essential part of a society. In last few years the profession of Public Administration is going through changes. Present paper aims to make aware the students

about Evolution & Importance of the Public Administration. Paper introduces changing trends in the field of Public Administration.

CO (Course outcomes) Class: -M.A.-I, (SEM – I)

POL 531 RM : Research Methodology

The course strives to make students aware about basics of research and various research methods in political science. It will help students to understand the nature of social science research and its theoretical foundations. This will make students research oriented so they become equipped

with skills to analyze issues in discipline and apply those skills to enrich their knowledge.

CO (Course outcomes) Class: -M.A.-I, (SEM – I)

POL 512 MJ : Political Institutions in India:

The course introduces the student to the leading institutions of India's political system and to the changing nature of these institutions. Apart from explaining the structure and functions of the main institutions the course will try to acquaint students with the idea of institutional balance of power as discussed in the Indian constitution and as developed during the functioning of Indian democracy over the past seven decades.

CO (Course outcomes) Class: -M.A.-I, (SEM – I)

POL 503 MJ : Theories and Issues in International Politics:

Students need a brief history of international politics to understand why we study the subject and how current scholarship is informed by what preceded it. Theories provide interpretative frameworks for understanding what is happening in the world and the levels of analysis. Competing theories are presented..

CO (Course outcomes) Class: -M.A.-I, (SEM – II)

POL 551 MJ : Comparative Political Analysis:

The purpose of this course is to acquaint the student with the sub-discipline of comparative politics. It expects the students to understand the comparative methodology and dynamics of domestic politics across countries.

CO (Course outcomes) Class: -M.A.-I, (SEM – II) PO-C5

POL 552 MJ : Public Policy:

The purpose of this course is to provide students an understanding of the basic concepts, theories and process of public policy. The course also seeks to help students understand public policy processes and actors involved in it by studying specific policies. It attempts to help students understand and analyze policy making in practical context.

CO (Course outcomes) Class: -M.A.-I, (SEM – II) PO-C6

POL 553 MJ : India's Foreign Policy:

This paper encourages the student to undertake an in depth analysis of India's foreign policy. It seeks to probe and ascertain the major issues and debates in the field of Indian foreign policy and explores India's complex relationships, both bilateral and multilateral, with other countries.

CO (Course outcomes) Class: -M.A.-I, (SEM – II)

POL 581 FP : Field Project

1. To motivate students to apply the knowledge acquired through research methodology. 2. To impart the analytical skills required to identify and formulate a research problem for the project. 3. To familiarize students with the different stages of completion of field project. 4. To encourage students to critically understand, evaluate, and present verbal and written observations from their chosen field project topic.

CO (Course outcomes) Class: -M.A.-I, (SEM – II)

POL 563 MJ : Indian Administration – Structure and Organization:

1. To introduce the students to the evolution of Indian Administration.
2. To acquaint them with the Principles and structure of Indian Administration.
3. To provide comprehensive understanding of administrative development.

MA-II CO (Course outcomes)

CO (Course outcomes) Class: -M.A.-II, (SEM – III) PO-C7

Modern Political Thought:

The purpose of this course is to introduce to the student political ideas, views and concerns of leading Indian thinkers. The course encourages students to understand and decipher the diverse and often contesting ways in which the ideas of nationalism, democracy and social transformation were discussed in pre and post-independence India.

CO (Course outcomes) Class: -M.A.-II, (SEM – III) PO-C8

Political Sociology:

This Course will introduce the overall scope of the sub-discipline of political sociology. The focus of the course will be on the political sociology of power. The emphasis is on the nature of power in modern societies-more in the form of organizations and social formations than as individual power. Students are also expected to understand different forms of justifications of power and the role of ideology in this regard.

CO (Course outcomes) Class: -M.A.-II, (SEM – III) PO-C9

World Politics-New Developments:

1. The objectives of this course are to introduce the students to the contemporary issues and debates in the world politics.
2. The students would also be made aware of the dimensions of the making of the foreign policy as well as the role of Non- State Actors in World Politics.
3. They would also learn about the emerging New World Order and the challenges to it.

CO (Course outcomes) Class: -M.A.-II, (SEM – III) PO-O9

Indian Administration – Structure and Organization:

1. To introduce the students to the evolution of Indian Administration.
2. To acquaint them with the Principles and structure of Indian Administration.
3. To provide comprehensive understanding of administrative development.

CO (Course outcomes) Class: -M.A.-II, (SEM – IV) PO-C10

Fundamentals of Political Theory:

This course introduces the students to the evolution, importance to the study of Political Theory. It introduces Political Theory as a distinctive area of inquiry. It is the integral area to the study of politics. It highlights debates in the field and places them in a historical perspective.

CO (Course outcomes) Class: -M.A.-II, (SEM – IV) PO-C11

Political Process in India:

The course will introduce to the student the key issues and details of the political process in post-independence India. It will also try to develop among students a perspective to understand and analyses Indian politics.

CO (Course outcomes) Class: -M.A.-II, (SEM – IV) PO-C12

Politics and Society:

This Course expects students to understand the interface of politics with social structures and processes and how the nature of power is shaped by social factors.

CO (Course outcomes) Class: -M.A.-II, (SEM – IV) PO-O13

Twentieth Century Political Thought:

This Course provides glimpses of certain prominent intellectual currents that have shaped global political discourse in the twentieth century and beyond. It does so by focusing on major representative thinkers. The chief objective is to project the contemporary resonance and rich diversity of key perspectives, frameworks and agendas articulated by these seminal theorists and schools of thought.

Mr. Arun A. Pote
Head of Department

Dr. P.V. Rasal
Principal


CO-ORDINATOR
IQAC
G.M.D. Arts, B.W. Commerce
And Science College, Sinnar


Principal
G. M. D. Arts, B. W. Commerce and
Science College, Sinnar, Dist. Nashik



M. V. P. Samaj's G. M. D. Arts, B. W. Commerce and Science College, Sinnar
Course Outcome, Program Outcome, Program Specific Outcome

DEPARTMENT OF ZOOLOGY

B.Sc. Zoology

Goals:

- To motivate the students for their fruitful life.
- To develop the broad knowledge about the biology of animals.
- To impart entrepreneurial skills through application-oriented subjects.
- To provide the best education for students to achieve their goals.
- To promote research and learning.
- To create awareness about health-related problems by curriculum

Program Outcomes:

- PO-1:** Apply the knowledge of various branches of Zoology meant both for a graduate course and higher studies.
- PO-2:** Acquire basic skills in the observation and study of nature, biological techniques and scientific investigation.
- PO-3:** Develop positive attitude towards sustainable development.
- PO-4:** Understand the unity of life with the rich diversity of organisms and their ecological and evolutionary significance.

Program Specific Outcomes:

At the end of course student will be able to

- PSO-1:** Learning the diversity of animal world, their habit, habitat, life history and evolution.
- PSO-2:** Learn to study morphology, anatomy, physiology, reproduction and development of organisms.
- PSO-3:** Learn heredity by study of cytology and genetics.
- PSO-4:** Learn about predators, parasites and pathogens, and diseases affecting animal world and find solutions for prevention.
- PSO-5:** Ecological knowledge with help to know the reasons of environmental degradation and help them to formulate ways for its up keeping.
- PSO-6:** Fundamental mathematical tools like statistics, models are used to analyses complex biological situations.
- PSO-7:** Theoretical knowledge associated with practical skills, seminar presentations, undertaking project works will help them to acquire in depth knowledge in the field of zoology.

Program Specific Outcomes:

F. Y. B. Sc. Zoology

Paper-I, Animal Diversity I

At the end of course student will be able to

- CO 1.** To understand the Animal diversity around us.
- CO2.** To understand the underlying principles of classification of animals.
- CO3.** To understand the terminology needed in classification.
- CO4.** To understand the differences and similarities in the various aspects of classification.
- CO5.** To classify invertebrates and to be able to understand the possible group of the invertebrate observed in nature.
- CO 6.** To understand our role as a caretaker and promoter of life.
- CO 7.** The student will be able to understand classify and identify the diversity of animals.
- CO 8.** The student understands the importance of classification of animals and classifies them effectively using the six levels of classification.
- CO 7.** The student knows his role in nature as a protector, preserver and promoter of life which he has achieved by learning, observing and understanding life

Paper-II, Animal Ecology

By the end of this course students will able to

- CO 1:** The learners will be able to identify and critically evaluate their own beliefs, values and actions in relation to professional and societal standards of ethics and its impact on ecosystem and biosphere due to the dynamics in population.
- CO 2:** To understand anticipate, analyse and evaluate natural resource issues and act on a lifestyle that conserves nature.
- CO 3:** The Learner understands and appreciates the diversity of ecosystems and applies beyond the syllabi to understand the local lifestyle and problems of the community.
- CO 4:** The learner will be able to link the intricacies of food chains, food webs and link it with human life for its betterment and for non-exploitation of the biotic and abiotic components.
- CO 5:** The working in nature to save environment will help development of leadership skills to promote betterment of environment

Paper-III, Practical Zoology

At the end of course student will able to

- CO 1.** Familiarity with non-chordate world.
- CO 2.** Identify and classify invertebrates.
- CO 3.** Able to appreciate the process of evolution.
- CO 4.** Understand the basis of life processes

S. Y. B. Sc. Zoology

Paper-I, Animal Diversity III

After completion of course student will able to

- CO 1.** The students will be able to understand, classify and identify the diversity of higher vertebrates.
- CO 2.** The students will able to understand the complexity of higher vertebrates
- CO 3.** The students will be able to understand different life functions of higher vertebrates.
- CO 3.** The students will be able to understand the linkage among different groups of higher vertebrates.
- CO 4.** The student will become aware regarding his role and responsibility towards nature as protector, to understand his role as a trustee and conservator of life which he has achieved by learning, observing and understanding life.\

Paper-I, Animal Diversity - IV, Sem II

After completion of course student will able to

- CO 1.** The students will be able to understand, classify and identify the diversity of higher vertebrates.
- CO 2.** The students will able to understand the complexity of higher vertebrates
- CO 3.** The students will be able to understand different life functions of higher vertebrates.
- CO 4.** The students will be able to understand the linkage among different groups of higher vertebrates.
- CO 5.** The student will become aware regarding his role and responsibility towards nature as a protector, to understand his role as a trustee and conservator of life which he has achieved by learning, observing and understanding life.

Paper-II, Applied Zoology I, Sem I

After completion of course student will able to

- CO 1.** The learner understands the basics about beekeeping tools, equipment, and managing bee hives.
- CO 2.** The learner understands the basic information about fishery, cultural and harvesting methods of fishes and fish preservation techniques.
- CO 3.** The learner understands the biology, varieties of silkworms and the basic techniques of silk production.
- CO 4.** The learner understands the types of agricultural pests, Major insect pests of agricultural importance and Pest control practices.

Paper-II, Applied Zoology II, Sem. II

After completion of course student will able to

- CO 1.** The learner understands the basics about beekeeping tools, equipment, and managing bee hives.
- CO 2.** The learner understands the basic information about fishery, cultural and harvesting methods of fishes and fish preservation techniques.

CO 3. The learner understands the biology, varieties of silkworms and the basic techniques of silk production.

CO 4. The learner understands the types of agricultural pests, Major insect pests of agricultural

Paper-III, Zoology Practical Paper

After completion of practical course student should be able to

CO 1. The learner understands the basics about beekeeping tools, equipment, and managing beehives.

CO2. The learner understands the basic information about fishery, cultural and harvesting methods of fishes and fish preservation techniques.

CO3. The learner understands the biology, varieties of silkworms and the basic techniques of silk production.

CO4. The learner understands the types of agricultural pests, Major insect pests of agricultural importance and Pest control practices.

T.Y.B.Sc. Zoology

Paper I, Pest Management Sem V

At the end of course students will able to

CO 1. Define pest management.

CO 2. Describe the economic, ecological, and sociological benefits of IPM.

CO 3. Distinguish positive and negative impacts of pesticide use.

CO 4. Understand problems resulting from misuse, overuse, and abuse of chemical pesticides.

CO 5. Define and describe pesticide resistance and how it develops.

CO 6. Identify ecological and biological characteristics important in development of pest populations.

CO 7. Identify 10 tactics commonly used in IPM and be able to distinguish them.

CO 8. Understand society's role in IPM decisions.

CO 9. Describe different groups of pests and compare them to weeds and plant pathogens.

CO 10. Analyse and compare management tactics to determine the best approach to reducing pest populations, weeds, and disease presence.

CO 11. Locate appropriate, scientifically valid sources of information on specific tactics to manage insect pests, weeds, and diseases.

CO 12. Know and how to develop an IPM program.

Paper I, Medical & Forensic Zoology Sem VI

At the end of course students will able to

CO 1. The students will be able to understand the basics principles of Medical and Forensic Zoology.

CO 2. The students will be able to understand scientific methods in crime detection.

CO 3. The students will be able to understand the advancements in the field of Medical and Forensic Zoology.

CO 4. The students will be able to understand modern tools, techniques and skills in forensic investigations.

CO 5. The students will be able to describe the fundamental principles and functions of forensic science and its significance to human society.

Paper II, Histology Sem V

At the end of course students will be able to

CO 1. The students will be able to understand, classify and identify the different types of tissue.

CO 2. The students will understand the complexity of various tissues in an organ.

CO 3. The students will be able to learn structure & functions of various tissues.

CO 4. The students will understand the various diseases related to organs.

CO 5. The student will be able to know the role of glands in mammals.

Paper II, Animal Physiology Sem VI

At the end of course students will be able to

CO 1. Learners shall be able to understand basic concepts and significance of Animal Physiology

CO 2. The students will learn about the physiological process

CO 3. The students will learn about the physiological diseases their biological and clinical significance.

CO 4. The students will be able to understand, interpret structure and importance of proteins, carbohydrates and lipids

CO 5. Learners will be able to understand process of physiological reactions

Paper III, Biological Chemistry Sem V

At the end of course students will be able to

CO 1. Learners shall be able to understand basic concepts and significance of biochemistry

CO 2. The students will learn about the pH and Buffers.

CO 3. The students will learn about the chemical structures of carbohydrate, and their biological and clinical significance.

CO 4. The students will be able to understand, interpret structure and importance of proteins, carbohydrates and lipids

CO 5. Learners will be able to comprehend variations in enzyme activity and kinetics.

Paper III, Molecular Biology Sem VI

At the end of course students will be able to

CO 1. Learners shall be able to understand basic concepts and significance of Molecular Biology

CO 2. The students will learn about the DNA & RNA



- CO 3. The students will learn about the chemical structures of DNA .
- CO 4. The students will be able to understand, interpret structure and importance of Replication, Transcription
- CO 5. Learners will be able to comprehend variations in Central Dogma

Paper IV, Genetics Sem V

At the end of course students will be able to

- CO 1. Learners shall be able to understand basic concepts and significance of Genetics
- CO 2. The students will learn about the Genes & Alleles
- CO 3. The students will learn about the Types of mutations .
- CO 4. The students will be able to understand, interpret structure and importance of Replication, Transcription
- CO 5. Learners will be able to comprehend variations in Central Dogma

Paper IV –Entomology Sem VI

At the end of course students will be able to

- CO 1. Understand basic concepts in Entomology and its scope.
- CO 2. Learn morphology and anatomy of Insects.
- CO 3. Understand the concept of social organization in Insects.
- CO 4. Understand the development process of Insects.
- CO 5. Identify disease causing insect vectors.
- CO 6. Will be able to design and implement pest controlling methods against pests.

Paper V – Developmental Biology Sem V

At the end of course students will be able to

- CO 1. Understand basic concepts in Entomology and its scope.
- CO 2. Learn morphology and anatomy of Insects.
- CO 3. Understand the concept of social organization in Insects.
- CO 4. Understand the development process of Insects.
- CO 5. Identify disease causing insect vectors.
- CO 6. Will be able to design and implement pest controlling methods against pests.

Paper V – Techniques in Biology Sem VI

At the end of course students will be able to

Paper VI – Parasitology Sem V

At the end of course students will be able to

- CO 1. The students will be able to learn about basics and scope of Parasitology.
- CO 2. The students will be able to learn the types of host and parasite with examples.
- CO 3. The students will be able to learn about the morphology, life cycle, pathogenicity and treatment of common parasites (Protists and Platyhelminthes).

- CO 4.** The students will be able to learn about host -parasite relationships and their effects on host body.
- CO 5.** The students will be able to learn about the arthropod parasites and their role as vector.

Paper VI – Evolutionary Biology Sem VI

At the end of course students will be able to

- CO 1.** Students will be able to learn most of the essential aspects of Evolutionary Biology in detail which will help them in acquiring better understanding regarding the subject.
- CO 2.** Explain important processes, principles and concepts and critically evaluate theories and empirical research within evolutionary biology
- CO 3.** Apply evolutionary theory and concepts to address empirical and theoretical questions in evolutionary biology.
- CO 4.** Independently investigate evolutionary questions using literature and analyses of empirical data.
- CO 5.** Communicate the principles, theories, problems and research results associated with questions that lie within the evolutionary framework to students

Paper VII – Aquarium Management Sem V

At the end of course students will be able to

- CO 1.** The students will be able to understand the Aquarium Management practices.
- CO 2.** The students will be able to understand the Aquarium Management techniques.
- CO 3.** The students will be able to understand Aquarium Management techniques.
- CO 4.** The students will be able to understand feeding requirement and food ingredients.
- CO 5.** The students will be able to understand the Aquarium disease and their pathogens.
- CO 6.** The students will be able to understand market value of Aquarium Management.

Paper VIII – Poultry Management Sem V

At the end of course students will be able to

- CO 1.** The students will be able to understand the Poultry farming practices.
- CO 2.** The students will be able to understand the poultry breeding techniques.
- CO 3.** The students will be able to understand poultry rearing techniques.
- CO 4.** The students will be able to understand feeding requirement and food ingredients.
- CO 5.** The students will be able to understand the poultry disease and their pathogens.
- CO 6.** The students will be able to understand market value of poultry products.

Paper VII – Environmental Impact Assessment Sem V

At the end of course students will be able to

- CO 1.** The students will be able to understand the Environment
- CO 2.** The students will be able to understand the Pollution
- CO 3.** The students will be able to understand Sustainable Development
- CO 4.** The students will be able to understand Environmental Protection acts

CO 5. The students will be able to understand the concept of Environmental Impact Assessment

CO 6. The students will be able to understand market EIA Process

Paper VIII – Project Sem VI

At the end of course students will able to

CO 1. The students will be able to understand planning the project

CO 2. The students will be able to understand selecting a suitable title

CO 3. The students will be able to understand Significance of the work

CO 4. The students will be able to understand Hypothesis, Objectives

CO 5. The students will be able to understand reviewing the available literature

CO 6. The students will be able to understand Methodology to be used

CO 7. The students will be able to understand Outcomes of the Project work

CO 8. The students will be able to understand Conclusion and Discussion

CO 9. The students will be able to understand Future plans

Zoology Practical Paper I

At the end of course students will able to

CO 1. Determination of serum urea

CO 2. Determination of serum uric acid

CO 3. Hemoglobin estimation using Sahli's haemoglobinometer.

CO 4. Preparation of haemin and haemochromogen crystals.

CO 5. To estimate the blood glucose level from given sample.

Zoology Practical Paper II

At the end of course students will able to

CO 1. Lab safety techniques & sterilisation

CO 2. Absorption spectra of DNA isolated from Liver

CO 3. Principle & application of Spectrophotometer & PCR

CO 4. Study of external characters of any Insect (Grasshopper / Cockroach / Plant bug).

CO5. Study of Insect Head, its articulations and types of mouthparts and their modifications.

Zoology Practical Paper III

At the end of course students will able To

CO 1. Compound and Stereo microscope: Components, usage and maintenance.

CO 2. To observe different kind of cells under compound microscope and its

CO 3. Measurement using micrometer scale or by image analysis software

CO 4. Tissue collection, fixation & Block preparation.

CO 5. Sectioning, staining & mounting.

CO 6. Submission of any three permanent

CO 7. Slides from three different organs.

M. Sc. Entomology

Goals:

- To motivate the students for their fruitful life.
- To develop the broad knowledge about the biology of animals.
- To impart entrepreneurial skills through application-oriented subjects.
- To provide the best education for students to achieve their goals.
- To promote research and learning.
- To create awareness about health-related problems by curriculum

Program Outcomes:

After successfully completing the M.Sc. Zoology program students will be able to:

- PO-1. Zoology knowledge:** Apply the knowledge of Zoology, Life Sciences and allied subjects to the understanding of complex life processes and phenomena.
- PO-2. Problem analysis:** Identify, review research literature, and analyse complex situations of living forms.
- PO-3. Design/development of solutions:** Design processes/strategies that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO-4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions in real situations.
- PO-5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and ICT tools for understanding of the subject.
- PO-6. The Postgraduate and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO-7. Environment and sustainability:** Understand the impact of the natural and anthropogenic activities in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. Identify a range of invertebrates and vertebrates and justify their conservation.
- PO-8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the work/research practice.
- PO-9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO-10. Communication:** Communicate effectively on complex life activities with the scientific community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO-11. Project management and finance:** Demonstrate knowledge and understanding of Zoology and management principles and apply these to one's own work, as a member and leader in a team.
- PO-12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes:

- PSO-1.** Understand the biological diversity and grades of complexity of various animal forms through their systematic classification and comparative structural studies.
- PSO-2.** Learn how earth was formed and how life started and evolved on the planet through process of organic evolution.
- PSO-3.** Understand the roles of plants, animals and microbes in the sustainability of the environment and their interaction among themselves and deterioration of the environment due to anthropogenic activities.
- PSO-4.** Understand the concepts and principles of biochemistry, immunology, physiology, ethology, endocrinology, developmental biology, cell biology, genetics, molecular biology and microbiology.
- PSO-5.** Develop technical skills in biotechnology, bioinformatics and biostatistics.
- PSO-6.** Delve into the wonderful world of insects, their success on the planet and their diversity .
- PSO-7.** Acquire knowledge on harmful and beneficial insects, their adaptations for life and control measures.
- PSO-8.** Perform laboratory procedures as per standard protocols in the areas of animal diversity, systematics, cell biology, genetics, biochemistry, molecular biology, microbiology, physiology, immunology, developmental biology, environmental biology, ethology, evolution and Entomology.

Course Outcomes:

M.Sc. Part- I Semester-I (Entomology)

ZOUT 111 Biochemistry and Biochemical Techniques

At the end of course students will able to

- CO1:** Define basic terms in biochemistry and biochemical techniques.
- CO2:** Explain the applications of the various biochemical techniques.
- CO3:** Explain the structure and functions of various biomolecules.
- CO4:** Explain the importance of tools and techniques in biology.
- CO5:** Illustrate the importance of pH, buffer and water in living systems.
- CO6:** Illustrate the principle, working and applications of basic techniques used in biology.
- CO7:** Draw the structures of various carbohydrates and amino acids.
- CO8:** Classify enzymes with examples.

Biochemical techniques:

- CO1:** Explain the importance and applications of techniques in biochemistry.
- CO2:** Explain the principle and applications of various chromatographic techniques with examples.
- CO3:** Explain the principle, working, materials used and applications of electrophoresis.

- CO4:** Describe the concept of light, electromagnetic spectrum and its application in absorption spectroscopy.
- CO5:** Illustrate the importance of radioactive compounds and radioactivity in biology.
- CO6:** Demonstrate the principle and working of Warburg's apparatus.
- CO7:** Demonstrate the principle, working, applications of centrifugation.
- CO8:** Justify the applications of radioactivity compounds in biology.

ZOUT 112 Cell Biology and Developmental Biology

At the end of course students will able to

- CO1:** Label the various cell parts
- CO2:** Sketch and label various types of cells and cell organelles.
- CO3:** Explain carbon as backbone of biomolecules.
- CO4:** Explain the ultrastructure and functions of various cell organelles.
- CO5:** Explain the concepts of cell signalling.
- CO6:** Illustrate the chemistry and organization of cytoskeleton.
- CO7:** Illustrate the types, development and causes of tumor.
- CO8:** Diagrammatically represent the cell cycle phases and its regulation.

Developmental Biology:

- CO1:** Define the terms in developmental biology
- CO2:** Explain the significance of model organism for developmental studies.
- CO3:** Explain the types of eggs, concept of fertilization and cleavage pattern.
- CO4:** Explain the concept of mesoderm induction and pattern formation with examples.
- CO5:** Describe neural competence and induction.
- CO6:** Explain the concept of growth and differentiation.
- CO7:** Illustrate postembryonic development.
- CO8:** Compare and contrast spermatogenesis and oogenesis

ZOUT 113 Genetics and English in Scientific Communication.

After successfully completing this course, students will be able to:

- CO1:** Define the basic terminologies in genetics.
- CO2:** Identify genetic disorders based on Karyotypes and traits.
- CO3:** Explain the concept of Mendelian genetics, gene, gene regulation and multiple alleles.
- CO4:** Discuss Linkage and crossing with their types and significance.
- CO5:** Explain the principles of Population genetics.
- CO6:** Illustrate the modified Mendelian laws of inheritance.
- CO7:** Justify the inheritance of qualitative and quantitative traits.
- CO8:** Solve the problems based on gene frequency.

English in Scientific Communication:

- CO1:** Write the outline of a scientific paper.
- CO2:** Write the title, abstract, discussion and citations of a given scientific article.
- CO3:** Prepare a scientific presentation using PowerPoint.
- CO4:** Explain language as a tool for effective scientific communication.
- CO5:** Use the formal elements of specific types of scientific writing.

- CO6:** Critically analyze data from research; incorporate it into assigned writing clearly, concisely, and logically; and attribute the source with proper citation.
- CO7:** Practice the unique qualities of professional rhetoric and writing style, such as sentence conciseness, clarity, accuracy, honesty, avoiding wordiness or ambiguity, using direct order organization, readability, coherence and transitional devices.
- CO8:** Justify the importance of plagiarism check and Proof-read given article.

ZODT 114 Freshwater Zoology Semester I

After successfully completing this course, students will be able to:

- CO1:** Enlist the diagnostic features of shrimps.
- CO2:** Explain the types of aquatic habitats.
- CO3:** Discuss the aquatic adaptations of common freshwater forms.
- CO4:** Explain the adaptations in freshwater Turtles and Crocodiles.²⁶
- CO5:** Illustrate the physicochemical properties of water.
- CO6:** Demonstrate the effect of pollutants on freshwater bodies
- CO7:** Justify the presence of zooplanktons and aquatics forms in freshwater bodies.

ZODP 114 Practical Freshwater Zoology Semester I

After successfully completing this course, students will be able to:

- CO1:** Identify commercially important freshwater fish.
- CO2:** Identify the aquatic adaptations in common freshwater forms.
- CO3:** Prepare the culture of *Paramecium* and *Daphnia*.
- CO4:** Estimate the hardness and chloride content in water samples.
- CO5:** Analyze the Zooplanktons from local freshwater bodies.
- CO6:** Evaluate the bio-indicators of pollution in freshwater.

ZOUP 115 Basic Zoology Lab-1 Semester I

After successfully completing this course, students will be able to:

- CO1:** Identify the developmental stages of chick embryo, cell structures and phases of cell division
- CO2:** Identify the grammatical mistakes from the given paragraph and common errors in written and spoken presentations.
- CO3:** Write a scientific project and research article along with its proof reading.
- CO4:** Demonstrate the working of different microscopes, colorimetric and spectrophotometric methods, cell fractionation and ligature in *Drosophila* larvae,
- CO5:** Determine the gene distance and order, genotype and phenotype ratios and allelic frequencies from the given data.
- CO6:** Estimate sugar and protein by suitable biochemical method, and isolate protein from biological source.
- CO7:** Prepare acid and base solutions of desired strength, buffers, bacterial Culture, chick embryo culture and *Drosophila* culture.
- CO8:** Prepare temporary slide of various cells to demonstrate the cell morphology and cell division, giant chromosome and pedigree analysis chart.
- CO9:** Calculate % retention and % elution of amino acids on given ion exchanger.

ZOUT 121: Molecular Biology and Bioinformatics. Semester II

After successfully completing this course, students will be able to:

- CO1:** Explain the DNA structure & types, topology, Physical properties; chromatin structure and organization.
- CO2:** Discuss genome organization, DNA and Protein sequencing with their application in evolutionary studies.
- CO3:** Explain the mobile DNA elements.
- CO4:** Explain mechanism of DNA damage and repair.
- CO5:** Illustrate the process of DNA replication, transcription, translation and their regulations.
- CO6:** Illustrate the database tools with their significance.
- CO7:** Schematically represent the processes of central dogma.
- CO8:** Justify the post translational and post transcriptional modifications.

ZOUT 122 Endocrinology and Parasitology. Semester II

After successfully completing this course, students will be able to:

Endocrinology:

- CO1:** Discuss the roles of Pituitary gland and pineal body.
- CO2:** Explain hormonal regulation of biomolecules and mineral metabolism.
- CO3:** Describe the role of osmoregulatory and gastrointestinal hormones.
- CO4:** Explain the role of hormones in moulting, change in body colour of crustaceans; yolk synthesis in amphibians; insect development.
- CO5:** Explain the hormonal regulation of metabolism.
- CO6:** Illustrate the mechanism of hormone action and role of hormone receptors.
- CO7:** Justify hormones as coordination molecules.
- CO8:** Justify the significance of biological clocks and rhythm

Parasitology:

- CO1:** Define the terminologies of parasitology.
- CO2:** Explain the concepts of animal association with examples.
- CO3:** Describe the role of parasites in public health and hygiene.
- CO4:** Explain the morphology and life cycle of common parasites.
- CO5:** Explain the pathogenicity and control measures of common parasites.
- CO6:** Illustrate the process of parasitic infections to human.
- CO7:** Justify the importance of control strategies against parasitic infections.
- CO8:** Justify the significance of vectors and disease transmission

ZOUT 123 Comparative Animal Physiology & Environmental Biology. Semester II

After successfully completing this course, students will be able to:

Comparative Animal Physiology:

- CO1:** Explain the physiology of processes like digestion, respiration, muscle contraction and excretion.
- CO2:** Describe the mechanism of thermoregulation in both poikilotherms and

homeotherms.

CO3: Explain the mechanism of chemical communication in vertebrates.

CO4: Comment on the structure and functions of various sense organs.

CO5: Illustrate the concept of osmotic regulation in various animals with suitable examples.

CO6: Compare the physiology of regulatory mechanisms in various groups of animals.

CO7: Justify the survival strategies of organism in varied climatic conditions.

CO8: Justify the evolution of various life processes in living forms.

Environmental Biology:

CO1: List the endangered, endemic and extinct animal species of India.

CO2: Identify various types of natural resources, human impact on these resources, and common resource management practices.

CO3: Explain the structure and impact of biogeochemical cycles, ecosystems and energy transformation across trophic levels.

CO4: Describe concepts in population ecology and their significance.

CO5: Discuss environmental hazards and risks and the socio-economic implications.

CO6: Illustrate the impact of climate and anthropogenic factors on biodiversity with reference to India.

CO7: Illustrate the wildlife management practices and their significance.

ZODT 124: Ichthyology Semester II

After successfully completing this course, students will be able to:

CO1: Identify the common fishes in India.

CO2: Explain the general characters and evolution of fishes.

CO3: Explain the fish morphology and anatomical modifications.

CO4: Illustrate the physiology of reproductive and endocrine organs in fish.

CO5: Discuss the signs, symptoms and control measures of common diseases in fish.

CO6: Justify the role of respiratory and excretory organs in survival of fishes.

CO7: Classify fishes upto order level.

CO8: Setup aquarium and manage it.

ZOUP 125 Basic Zoology Lab-2

After successfully completing this course, students will be able to:

CO1: Identify the various parasites and parasitic stages of common parasites, nitrogenous waste products of animals, freshwater planktons and slides of endocrine glands.

CO2: Explain the principle and significance of gonadectomy, thyroectomy and pancreactomy.

CO3: Demonstrate the role of eye stalk and insulin in sugar level in crab.

CO4: Demonstrate the retro cerebral complex in cockroach.

CO5: Demonstrate the RBCs of common vertebrates and effect of various osmolarities.

CO6: Demonstrate the effect of body size, oxygen consumption and Insulin on aquatic animal.

- CO7:** Determine the bleeding and clotting time, heartbeat of crab, species richness in selected area, physico- chemical properties of soil and water.
- CO8:** Perform Sterilization of lab equipment, prepare microbial culture, Isolate Bacterial, liver DNA and RNA from given sample, quantify and resolve them using electrophoretic procedures, analyse protein sample by PAGE and SDS PAGE and construct phylogenetic tree using tools in bioinformatics.

M. Sc. Part- I Semester-II (Entomology)

- PO1. Zoology knowledge:** Apply the knowledge of Zoology, Life Sciences and allied subjects to the understanding of complex life processes and phenomena.
- PO2. Problem analysis:** Identify, review research literature, and analyse complex situations of living forms.
- PO3. Design/development of solutions:** Design processes/strategies that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions in real situations.
- PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and ICT tools for understanding of the subject.
- PO6. The Postgraduate and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7. Environment and sustainability:** Understand the impact of the natural and anthropogenic activities in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. Identify a range of invertebrates and vertebrates and justify their conservation.
- PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the work/research practice.
- PO9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10. Communication:** Communicate effectively on complex life activities with the scientific community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11. Project management and finance:** Demonstrate knowledge and understanding of Zoology and management principles and apply these to one's own work, as a member and leader in a team.
- PO12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

ZOUT 231: Entomology- I Semester III

After successfully completing this course, students will be able to:

- CO1:** Define entomology and Insects and understand origin and evolution of insects and their relation to other arthropods.
- CO2:** Give outline of Classification of insects up to family with distinguishing characters and examples of each order and family.
- CO3:** Explain the structure, chemical composition and functions of Integument and Derivatives of Integument.
- CO4:** Explain the structure, modifications of insect body regions and their appendages.
- CO5:** Explain the Comparative anatomical and histological structure of various body systems.
- CO6:** Explain the location structure and functions of various Endocrine and Exocrine glands.
- CO7:** Explain the location and structure of Light and Sound producing organs in various insects

ZOUT 232: Fundamentals of Systematics and Economic Zoology Semester III

After successfully completing this course, students will be able to:

Fundamentals of Systematics

- CO1:** Explain principles, methods of biological classification and diversity in kingdom Animalia.
- CO2:** Explain the importance of taxonomic keys and taxonomic characters.
- CO3:** Explain the principles of zoological classification and nomenclature
- CO4:** Discuss the various taxonomic procedures and molecular phylogenetics & phylogeography.
- CO5:** Illustrate the methodologies used in systematics.

Economic Zoology

- CO1:** Illustrate the lac culture, apiculture, prawn culture, vermiculture, Poultry, dairy industry and Piggery.
- CO2:** Explain the role of insects of economic importance.
- CO3:** Explain parasitic roundworms of animal and plants.
- CO4:** Signify the role of parasitic and soil protozoan in human welfare.
- CO5:** Justify the use of animals in pharmaceutical research.
- CO6:** Explain coral reef and its significance.

ZOUT 233: Research Methodology and Insect Physiology and Biochemistry Semester III

After successfully completing this course, students will be able to:

Research Methodology

- CO1:** demonstrate knowledge of research processes (reading, evaluating, and developing)
- CO2:** perform literature reviews using print and online databases.
- CO3:** select and define appropriate research problem and parameters to prepare a project proposal.
- CO4:** identify, explain, compare, and prepare the key elements of a research proposal/report.

- CO5:** compare and contrast quantitative and qualitative research paradigms
- CO6:** Use sampling methods, measurement scales and instruments, and appropriate uses of each.
- CO7:** Justify the rationale for research ethics,

Insect Physiology and Biochemistry

- CO1:** Explain the structure, Chemistry of integument and sclerotization.
- CO2:** Describe the process of digestion and metabolism
- CO3:** Explain the characteristics of haemolymph and types of haemocytes.
- CO4:** illustrate the structure, physiology and biochemistry of flight muscle.
- CO5:** Demonstrate the process of excretion, detoxification and water balance
- CO6:** Justify the role of insect hormones in physiological processes.

ZODT 234: Immunology Semester III

After successfully completing this course, students will be able to:

- CO1:** List the primary and secondary immune organs.
- CO2:** Explain the concepts of immunity, self-nonsel immune response, autoimmune disease.
- CO3:** Explain the theories of antibody synthesis and generation of antibody diversity.
- CO4:** Explain the principle and application of the common techniques used in Immunology
- CO5:** Illustrate the events and dynamics of inflammation
- CO6:** Compare the MHC molecules and diseases associated with HLA.
- CO7:** Differentiate between active and passive immunization
- CO8:** Compare the three pathways of complement fixation pathway.

ZODP 234: Zoology Practical Paper-3 (Immunology) Semester III

After successfully completing this course, students will be able to:

- CO1:** Identify the pattern of identity of antigen- antibody reaction.
- CO2:** Identify the microscopic structure of the lymphoid organs.
- CO3:** Demonstrate immunoelectrophoresis technique.
- CO4:** Demonstrate the double diffusion techniques.
- CO5:** Detect the human blood groups by antigen -antibody reactions
- CO6:** Prepare the human blood smear to identify various blood cells.

ZOUP 235: Special Lab I Semester III

After successfully completing this course, students will be able to:

Module-I: Animal Physiology-I

- CO1:** Demonstrate the effect of body size and salinity on oxygen consumption in given animal.
- CO2:** Demonstrate the effect of starvation on liver and muscle glycogen in given animal
- CO3:** Demonstrate the effect of exercise on breathing, pulse rate and blood lactate level.
- CO4:** Demonstrate the effect of pH, temperature and inhibitors on salivary amylase.
- CO5:** Map the taste buds on human tongue

Module-II: Fundamentals of Systematics and Economic Zoology

- CO1:** Identify museum specimen/pictures of minor phyla, Invertebrates, Protochordates and Vertebrates.
- CO2:** Identify animals with the help of taxonomic keys.
- CO3:** Collect and preserve animal samples using common methods.
- CO4:** Write scientific report of field/ institutional visit.
- CO5:** Compare the methods of collection and curation of insects.
- CO6:** Identify the poultry breeds.
- CO7:** Identify edible freshwater fish from nearby area.
- CO8:** Demonstrate the apiculture equipment.
- CO9:** Demonstrate the methods of prawn culture.
- CO10:** Compare various fishing tools, crafts and gears.

Module-III: Research Methodology and Insect Physiology and Biochemistry

- CO1:** Use MS excel in presentation and analysis of data using common statistical tests.
- CO2:** Suggest a suitable title for a research article.
- CO3:** Write the abstract, key words, result, discussion, conclusion and citations of references.
- CO4:** Write a research project to seek funding.
- CO5:** Conduct a scientific survey.
- CO6:** Perform protein purification experiment.
- CO7:** Demonstrate the heart and haemocytes of cockroach.
- CO8:** Demonstrate the effect of starvation on glycogen in insects.
- CO9:** Demonstrate the effect of temperature on water loss in cockroach.
- CO10:** Detect the amino acids in insect haemolymph by chromatographic method.
- CO11:** Determine the oxygen consumption in dragon fly nymph
- CO12:** Perform the assay of amylase activity in midgut of insect

M.Sc. Zoology, Part II, Semester – IV

ZOUT 241: Entomology- II (Special Paper) (4 Credits: 60 Lectures) Semester IV

After successfully completing this course, students will be able to:

- CO1:** Explain Gametogenesis, Fertilization and oviposition.
- CO2:** Explain embryonic developmental stages such as Cleavage, Blastoderm and Germ band formation; Gastrulation, Blastokinesis, differentiation of germ layers, Segmentation and Appendages formation and organogenesis.
- CO3:** Explain post-embryonic developmental stages such as Nymph, Naiad, larva, Pupa and Metamorphosis.
- CO4:** Explain specialized reproductive mechanisms.
- CO5:** Explain Hadorn's experiments with imaginal disc, Regeneration and Aging.
- CO6:** Explain Occurrence, Initiation, Preparations for diapauses and its Controls.

ZOUT 242: Mammalian Reproductive Physiology and Aquaculture Semester IV

After successfully completing this course, students will be able to:

Mammalian Reproductive Physiology

- CO1:** Explain the male and female reproductive systems and sexual dimorphic characteristics
- CO2:** Explain the sexual cycles with examples
- CO3:** Illustrate the reproductive dysfunctions.
- CO4:** Diagrammatically represent the hormonal regulation of reproductive processes like pregnancy, lactation and parturition.
- CO5:** Prepare the flow chart to demonstrate the hormonal coordination of reproductive Processes
- CO6:** Justify the artificial control of reproduction.

Aquaculture

- CO1:** Identify the fish diseases and the causative organisms
- CO2:** Mention the various composite fish culture with significance of each type.
- CO3:** Describe the methods of freshwater prawn culture and its management.
- CO4:** Explain the methods of pearl culture and pearl harvesting.
- CO5:** Illustrate the preparation and management of fish culture ponds.
- CO6:** Demonstrate the methods of packaging and transport of fish and brood fish.
- CO7:** Illustrate techniques of fish harvesting, preservation & processing.
- CO8:** Compare the techniques used in fishery development.

ZODT 243: Pest Control Semester IV

After successfully completing this course, students will be able to:

- CO1:** Explain the Pest, nature of damage caused by pests and pest control.
- CO2:** Explain medical, veterinary, Household and stored grain pests.
- CO3:** Explain the Principles and methods of pest control including Biological control measures.
- CO4:** Explain the Integrated pest management (IPM)
- CO5:** Explain the Non- insect pest and their control: Rat, Bandicoots, Crabs, Snails, Slugs, Birds and Squirrels.
- CO5:** Explain the principle and working of pesticide appliances.

ZODP 243: Zoology Practical Paper- 4 Semester IV

After successfully completing this course, students will be able to:

Animal Physiology- II

- CO1:** Determine the bleeding and clotting time of human blood.
- CO2:** Demonstrate the invertebrate heart.
- CO3:** Calculate the heartbeats of *Daphnia/Drosophila* larva.
- CO4:** Determine serum urea and protein and glucose in human blood and urine.
- CO5:** Justify the effects of various physical and chemical factors on frog heart and muscle.

Entomology- II

- CO1:** Identify the histological structure of male and female reproductive system of insect.



- CO2: Identify the eggs of different insects.
- CO3: Identify the different embryonic stages of insects.
- CO4: Identify the different post-embryonic stages of insects.
- CO5: demonstrate various body organs, systems and appendages of housefly and butterfly.

Histology and Histochemistry

- CO1: Identify the various tissues with the help of permanent slides.
- CO2: Demonstrate the effect of fixatives on tissues.
- CO3: Detect the biomolecules with histochemical staining methods.
- CO4: Sketch and label the microscopic details of tissues.
- CO5: Prepare the permanent histological slides.

Pest Control

- CO1 : Identify beneficial and harmful insects.
- CO2 : Identify and classify insect pest of agricultural, veterinary and public health importance.
- CO3 : Know the effects of contact insecticides and fumigants on behavior of insect pests.
- CO4 : Determine the LD₅₀
- CO5 : Behavior of insects to repellants and attractants.
- CO6 : Know the principle and working of pesticide appliances.⁴⁵
- CO7 : Identify and know the role of biological controlling agents.
- CO8 : Know the non-insect pests.

ZODT 244: Apiculture Semester IV

After successfully completing this course, students will be able to:

- CO1: Explain the basic concepts of apiculture like systematics, colony organization, polymorphism, morphology and foraging.
- CO2: Explain the tools and management of apiary.
- CO3: Explain the importance of institutions pertinent to apiculture.
- CO4: Discuss the setup of beekeeping business.
- CO5: Illustrate the bee keeping as occupation.
- CO6: Justify the presence of bees to increase the agriculture productivity

ZODP 244: Zoology Practical Paper- 5 Semester IV

Module- I : Practicals corresponding to ZOUT 242 MRP,

Module- II: Practicals corresponding to ZOUT 242 Aquaculture and

Module- III: Practicals corresponding to ZODT 244 Apiculture

After successfully completing this course, students will be able to:

Mammalian Reproductive Physiology

- CO1: Identify the histological slides of reproductive organ/tissues.
- CO2: Explain the various types of placenta in mammals.
- CO3: Comment on merits and demerits of contraceptive devices/methods.
- CO4: Illustrate the technique of gonadectomy.

CO6: Distinguish the male and female anatomical features of reproductive system in mammals.

Aquaculture


- CO1: Identify Indian oysters.
- CO2: Identify the common freshwater fish used in culture farming.
- CO3: Demonstrate the processing and storing methods for fish and prawn.
- CO4: Test the freshness of fish/prawn by histological methods.
- CO5: Test the freshness of fish/prawn by biochemical methods.
- CO6: Prepare the culture of Daphnia and rotifers.
- CO7: Estimate the productivity of water bodies.

Pollution Biology

- CO1: Identify the bioindicators from given water sample.
- CO2: Write a report on eutrophication of water body.
- CO3: Determine the LC50 value for the given compound
- CO4: Determine the biomass of given sample.
- CO5: Analyze pH and salinity of given sample.
- CO6: Estimate calcium and magnesium, sulphate from polluted water.

Apiculture

- CO1: Identify the honey bees
- CO2: explain the bee morphology and behaviour
- CO3: Illustrate the bee enemies
- CO4: Justify the rearing techniques and bee management


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