# NEPALI

## पहिलोसत्र

### NEPH DSC-1 नेपालीसाहित्यकोइतिहास

**COURSE OBJECTIVES**
**TO ENABLE THE LEARNERS**

1. नेपालीसाहित्यकोपरिचय (साहित्य, भाषा, नेपालीसाहित्य)
2. नेपालीसाहित्यकोपृष्ठभूमिरविकासकोविशद्चर्चा।
3. नेपालीकविताकोपरिचयरविकासकोचर्चा।
4. नेपालीआख्यानकोपरिचयरविकासकोचर्चा।
5. नेपालीनिबन्धकोपरिचयरविकासकोचर्चा।
6. नेपालीनाटककोपरिचयरविकासकोचर्चा।
7. नेपालीसमालोचनाकोविकासक्रम।
8. नेपालीपत्रपत्रिकाकोइतिहास।
9. नेपालीसङ्घसंस्थाकोइतिहास।

**COURSE OUTCOME**

1. नेपालीसाहित्यकोआधारभूतअवधारणादिन्छ।
2. नेपालीसाहित्यकोविहङ्गमक्षेत्रकोव्याख्यागर्छ।
3. नेपालीकविताक्षेत्रकोवृहद्याख्यागर्छ।
4. नेपालीआख्यानक्षेत्रकोवृहद्याख्यागर्छ।
5. नेपालीनिबन्धक्षेत्रकोवृहद्याख्यागर्छ।
6. नेपालीनाटकक्षेत्रकोवृहद्याख्यागर्छ।
7. नेपालीसमालोचनाक्षेत्रकोवृहद्याख्यागर्छ।
8. नेपालीपत्रपत्रिकाक्षेत्रकोवृहद्याख्यागर्छ।
9. नेपालीसङ्घसंस्थामाथिवृहद्दृष्टिकोणदिन्छ।

### NEPH DSC-2नेपालीकविता

**COURSE OBJECTIVES**
**TO ENABLE THE LEARNERS**

१. कविताकातत्त्वकोपरिचय।
२. नेपालीकविताकाविविधरूपरप्रवृत्तिहरूकोअध्ययन।
३. नेपालीकविहरूकोपरिचय, कृतिरप्रवृत्ति।

**COURSE OUTCOME**

१. कविताकोसैद्धान्तिकक्षेत्रकोव्याख्यागर्छ।

२. नेपालीकविताकाविविधस्वरूपकोविस्तृतव्याख्यागर्छ।
३. नेपालीकविहरूबारेजानकारीप्राप्तगर्छ,
उनीहरूकोकाव्यिकगुणबारेजानकारीपाउँछरनेपालीकविताकाविविधआयामबारेसठिक दृष्टिकोणनिर्माणगर्छ।

## दोस्रोसत्र

**NEPH DSC-3 साहित्यकातत्त्वहरू**

**COURSE OBJECTIVES**
**TO ENABLE THE LEARNERS**

१. साहित्य, साहित्यकोअर्थरपरिभाषा, साहित्यकोप्रयोजनरहेतु।
२. साहित्यकाप्रमुखविधाहरूकोपरिचय।
३. छन्द, अलङ्कार, शब्दशक्ति।
४. रस, काव्यगुण, काव्यदोष, बिम्ब, प्रतीक।

**COURSE OUTCOME**

१. साहित्यबारेसैद्धान्तिकक्षेत्रकोजानकारीदिन्छ।साहित्यसृजनाहुनेकारकतत्त्वहरूबारेज्ञान सञ्चारगर्छ।
२. कविता, कथा, उपन्यास, नाटक, निबन्धआदिविधाकासंरचकघटकहरूकोविश्लेषणगर्छ।
३. काव्यमाअथवासाहित्यमाछन्द, अलङ्काररशब्दशक्तिकोमहत्त्वबारेजानकारीदिन्छ।
४. काव्यमाअथवासाहित्यमारस, काव्यगुण, काव्यदोष, बिम्ब,
प्रतीककोमहत्त्वबारेजानकारीदिन्छ।

## दोस्रोसत्र

**NEPH DSC-4 प्रमुखसाहित्यिकसिद्धान्तरवादहरू**

**COURSE OBJECTIVES**
**TO ENABLE THE LEARNERS**

१. साहित्यसिद्धान्तकोपरिचय।
२. अलङ्कारवाद, शास्त्रीयतावाद, स्वच्छन्दतावाद, यथार्थवाद, अतियथार्थवाद, मनोविज्ञानवाद, अस्तित्ववाद, अनुकरणसिद्धान्त, कल्पनासिद्धान्तरवस्तुगतसमीकरणसिद्धान्त।

**COURSE OUTCOME**

१. साहित्यसिद्धान्तबारेअवधारणानिर्माणगर्छ।
२. साहित्यचिन्तनकाविविधधाराकोपरिचयदिन्छरसाहित्यसम्बन्धीविभिन्नविद्वान्हरूकोचिन्तनबारेवृहद्अवधारणानिर्माणगर्छ।

## तेस्रोसत्र

**NEPH DSC-5सामान्यभाषाविज्ञान**

**COURSE OBJECTIVES**
**TO ENABLE THE LEARNERS**

१. भाषाकोअर्थ, प्रकृतिरविशेषता।
२. भाषाकापारिवारिकरआकृतिमूलकवर्गीकरण
३. भाषाविज्ञानकाप्रमुखविभागहरूकोपरिचय

**COURSE OUTCOME**

१. भाषाकोपरिचयदिँदैयसकाप्रकृतिरविशेषताबारेजानकारीगराउँछ।
२. विद्यार्थीहरूमासंसारकाभाषाहरूकोअध्ययनरवर्गीकरणगर्नेआधारनिर्माणगर्छ।
३. भाषाकाध्वनि, रूप, वर्ण, वाक्य, अर्थबारेवृहद्ज्ञानदिन्छ।

**NEPH DSC-6 नेपालीकथा**

**COURSE OBJECTIVES**
**TO ENABLE THE LEARNERS**

१. आधुनिकनेपालीकथाकाप्रमुखप्रवृत्तिहरूकोअध्ययन
२. परालकोआगो, परिबन्ध, धनमतीकोसिनेमास्वप्न, माछाकोमोल, मैयासाहेब, चौकिदार।
३. मेरोएउटानागाहुकी, रातभरिहुरीचल्यो, ज्योतिबिनाकोउज्यालो, पासाङहरूकोकथा, निर्वासित, चर्केकोछाना, टोटलाकोफूल, सन्तोषबाबुकोडायरीमाथि।

**COURSE OUTCOME**

१. नेपालीकथाकाविविधस्वरूपकोविस्तृतव्याख्यागर्छ।
२. नेपालीकथामासामाजिक, स्वच्छन्दतावादीधाराकोअवधारणानिर्माणगर्छ।
३. नेपालीकथाक्षेत्रमाभारतेलीनेपालीकथाकोविकासक्रम, प्रवृत्तिरयोगदानबारेचर्चागर्छ।

**NEPH DSC-7 नेपालीउपन्यास**

**COURSE OBJECTIVES**
**TO ENABLE THE LEARNERS**

१. आधुनिकनेपालीउपन्यासकोपृष्ठभूमिरविकासकोरूपरेखा।
२. उपन्यासकोपरिभाषा, स्वरूपरऔपन्यासिकतत्त्वहरूकोपरिचय
३. भ्रमर, लङ्गडाकोसाथी, तीनघुम्ती, पर्खालभित्ररबाहिर, जुनेलीरेखा।

**COURSE OUTCOME**

१. नेपालीउपन्यासकापृष्ठभूमिरविकासबारेविस्तृतव्याख्यागर्छ।
२. उपन्यासकोपरिचयरयसकासंरचकघटकहरूबारेजानकारीदिन्छ।
३. नेपालीउपन्यासमास्वच्छन्दतावादी, अस्तित्ववादी, प्रगतिवादी, उपनिवेशवादी, मनोविश्लेषणधाराकोविस्तृतविश्लेषणगर्छ।

## चौथोसत्र

**NEPH DSC-8नेपालीनिबन्ध**

**COURSE OBJECTIVES**
**TO ENABLE THE LEARNERS**

१. निबन्धकोपरिभाषा, स्वरूपरप्रकारहरू
२. नेपालीनिबन्धसाहित्यकाविकासकोसङ्क्षिप्तसर्वेक्षण
३. नेपालीनिबन्धहरू

**COURSE OUTCOME**

१. निबन्धकोविधागतस्वरूपरक्षेत्रबारेव्याख्यागर्छ।
२. साहित्यमानेपालीनिबन्धकोस्थिति, विकासरइतिहासबारेअवधारणानिर्माणगर्छ।
३. नेपालीनिबन्धकाविविधस्वरूप, प्रवृत्ति, लेखनविधिबारेविस्तृतविश्लेषणगर्छ।

**NEPH DSC-9 नेपालीभाषाविज्ञान**

**COURSE OBJECTIVES**
**TO ENABLE THE LEARNERS**

१. नेपालीभाषाकोउत्पत्तिरविकासकोसर्वेक्षण
२. नेपालीभाषाकाशब्दवर्गरव्याकरणिककोटिहरू
३. नेपालीभाषाकोशब्दभण्डार
४. नेपालीभाषाकोशब्दनिर्माणप्रक्रिया
५. नेपालीभाषाकोवर्णविन्यास
६. नेपालीभाषाकोअध्ययनपरम्परारनेपालीव्याकरणकोइतिहास

**COURSE OUTCOME**

१. नेपालीभाषाकोउत्पत्तिरविकासबारेविस्तृतजानकारीदिन्छ।
२. नेपालीभाषाकाव्याकरणबारेजानकारीप्राप्तगर्छअनिनेपालीभाषाकोशुद्धाशुद्धीप्रक्रियाबारेजानकारीदिन्छ।
३. नेपालीभाषामाभएकारआएकाशब्दहरूकोपरिचयदिन्छ।
४. नेपालीभाषामाशब्दहरूकसरीनिर्माणभएकाछन्त्यसबारेविस्तृतज्ञानप्राप्तगर्छ।
५. नेपालीभाषाकास्वररव्यञ्जनवर्णबारेआधारभूततथ्यहरूकोज्ञानप्राप्तगर्छ।
६. नेपालीभाषाकोअध्ययनपरम्पराराय्समादेखापरेकाविविधविचारधाराबारेज्ञानदिँदैसुरुदेखिअहिलेसम्मदेखापरेकाविविधमोडहरूकोविवरणबारेजानकारीदिन्छ।

**NEPH DSC-10 समकालीननेपालीकविता**

**COURSE OBJECTIVES**
**TO ENABLE THE LEARNERS**

१. समकालीनशब्दकोअर्थ, परिभाषारअवधारणा
२. समकालीननेपालीकविरकविताहरू

**COURSE OUTCOME**

१. समकालीनताबारेजानकारीदिनेकामगर्छ।
२. नेपालीकविताधारामासमकालीनप्रवृत्तिपरिचयदिनेरत्यसक्षेत्रमाएउटागहनअवधारणानिर्माणगर्छ।

**BACHELORS OF BUSINESS ADMINISTRATION**

PAPER 102 CORE 1

PRINCIPLES OF MANAGEMENT AND ORGANISATION BEHAVIOUR

COURSE OBJECTIVES:

The objectives of the course are to enable the student

1. To acquaint the students with organizational theories.
2. To introduce the concept of organizational structure and types of structures in an organization.
3. To understand the concept and nature of management and principles of management.
4. To learn what managers do and challenges and opportunities of organizational behaviour and foundation of individual and group behaviour.
5. To provide knowledge on learning, theories of learning, attitude, personality, perception and their theories.

COURSE OUTCOMES

After the completion of the course student are expected to -

1. Acquire knowledge about organisational theories

2. Describe the basic knowledge about organizational structures
3. Be familiar with what managers do and what challenges and opportunities organizational behaviour has.
4. Understand the nature and principles of management
5. Acquire knowledge on basic concepts and theories of learning, personality, attitude and perception.

Paper-103
CORE 2

BUSINESS REGULATORY FRAMEWORK

COURSE OBJECTIVES:

The objectives of the course are to enable the student

- To acquire knowledge about Essential Elements of Contract and Special Contracts of Bailment and Agency
- To make aware about different Category of Goods and how make use of Negotiable instruments in Business Transaction.
- To know about formation of companies, Memorandum and Articles and Registration of Companies.
- To create awareness about Partnership Business Setup with a Limited Liabilty.
- To stop malpractices by businessman and to protect Consumer .To Setup provision to regarding different for information.

COURSE OUTCOMES:

After the completion of the course students are expected to:

- Acquire Knowledge about Valid ,Void and Illegal Contracts .To know the role of Consideration related to Agreements as per business law.
- Describe the Basic Consumer and Industrial Goods and Learn the Principle of Buyer's Beware .to know the Role of Negotiable Instrument in Business Transaction.

- Acquire knowledge about how Pvt and Pub Co is formed with Company Norms and how business can be formed by limited liability.
- Protect Consumer under different grievances handling method and to remove Defects and Defeciences in Business to safe guard Consumer Interest and how to get the Information about their area of Interest.

PAPER 104 GENERAL ELECTIVE 1

MANAGERIAL ECONOMICS

COURSE OBJECTIVES:

The objectives of the course are to enable the student

- To understand the two important factors of economics – demand and supply and their interactions.
- To explain various theories on consumer behavior.
- To understand the optimum level of production for the producer both in long rung and short run.
- To explain the various concepts of costs (FC, VC AND MC) and their structure both in the long run and in the short run.
- To explain the concept on various forms of market.
- To analyze the effect of changes in demand, cost and tax upon on various forms of market.

OUTCOMES:

After the completion of the course students are expected to ;

- Understand the concept of demand and supply, factors affecting demand and impact upon them by changes in price of the product, income of consumers and prices of related goods.
- Analyse the optimum level of production and the decisions made by a producer in different forms of market.
- Learn various types of cost and their behaviour in long run and short run.
- Distinguish between various forms of market and their characteristics and the ultimate effect upon the profits.
- have a clear picture on factor market.

Paper 301.Core 5.

INCOME TAX LAW and PRACTICE

COURSE OBJECTIVES

The objectives of the course are to enable the student

- To Segregate Concept of Different Income Heads and Total Income on the Basis of Residential status.

- To know how the total Income is computed from Salary and House property after deductions under different sections provided by Income Tax.
- To make the proper segregation of Income from Profession and Business while Calculating the Total Income .
- To Consider how Income is Generated from Capital Gains differentiating Long Term assets and Short term Assets as well as the Securities .
- To Understand the Tax Liability and Deduction from Gross Total Income .

COURSE OUTCOMES

After the completion of the course students are expected to ;

- Know the Concept of Assessment year ,previous year and Residential Status while Calculating the Income Under different heads.
- Compute the Income from Salary after deducting the Amount provided as per the Income Bracket provided by income tax Act and the percentage of calculation to be considered
- Calculate of Income from House Property in Municipal Area and metro city with standard Deductions. .
- Acquire the Calculation of inome from differentiating Between Business and Profession.
- Compute of Income from Capital Gains Considering the Short term and Long Term Capital Asset Including securities taking into Consideration the time period which defines the Asset to be a short term or a long term.
- Acquire the Concept of Total Income and how to Carry Forward of losses
- Calculate the Tax Liabilty of Individual and the Firm.

PAPER 302 CORE6
COST AND MANAGEMENT ACCOUNTING

**Course objectives:**

The objectives of the course are to enable the student

- To understand Cost Accounting and Management Accounting and their importance.
- To value the inventory by various methods used in issuing stock to stores.
- To analyze the importance of various methods of Labor Costing and to realize the importance of labor as means of production.
- To make the apportionment and absorption of expenses by various bases of apportionment.
- To understand various methods of costing for different kinds of production means.
- To analyze the importance of budgeting and the impact on Cost Accounting.
- 7To analyze the importance of Standard Costing and the effect upon cost effectiveness.
- To get a clear picture upon Marginal Costing and effects on Marginal production upon fixed and variable expenses.

Outcomes:

After the completion of the course students are expected to

- Distinguish between Cost Accounting and Management Accounting and their relations.
- Highlight the importance of inventory valuation under different methods and for which firm it would be more appropriate.
- Understand the importance of Labor and how to have cost efficiency by managing this important factor of production.
- Segregate the expenses upon various overheads by using different basis.
- Use various costing methods for different types of costing.
- Prepare various types of budget and be able to compare with actual cost.
- Prepare standard costing and realize the importance of variance analysis.
- Check the effect of marginal production upon fixed cost, variable cost and profit.

PAPER 304 GE-03

QUANTATIVE TECHNIQUES FOR MANAGEMENT

OBJECTIVES: To acquaint students with the construction of mathematical models for managerial decision situations and use computer software packages to obtain a solution wherever applicable. The emphasis is on understanding the concepts, formulation and interpretation.

COURSE OBJECTIVES:

The objectives of the course are to enable the student

- To formulate mathematical formulae from simple and complex business situations.
- To find out the optimum solution of a problem.
- To solve equations by replacing few variables.
- To understand transportation and networking problems and methods implemented to solve different situations.

OUTCOME:

After the completion of the course students are expected to

- Analyze the problems and identify the type and the appropriate methods to solve it.
- Distinguish between real and dummy variables and their use while calculating optimum solutions.
- Formulate linear programming problems and their solution using different methods.
- Formulate transportation problems and solve it by using different methods.
- Network analysis and its solution.

PAPER 303 CORE 7

FINANCIAL MANAGEMENT

OBJECTIVES: To acquaint students with the techniques of Financial Management and their applications for business decision making.

COURSE OBJECTIVES:

The objectives of the course are to enable the learners

- To define meaning of various terms used in finance.
- To acquaint with the various concepts of Financial Management.
- To highlight the stages involved in Financial Management.
- To learn about the term capital and the risk of arranging capital from different sources.
- To make appropriate use of capital and have a good idea on risk and return.
- To evaluate various cost involved in investing capital through various techniques and methods like discounting and non-discounting.
- To understand the concept of capital structure and the importance of leverage.
- To get a clear concept on dividend policy and show how it affects the value of the firm.
- To understand the various theories on dividend.
- To analyze the concept of working capital management.

OUTCOME:

After the completion of the course students are expected to

- Have a thorough knowledge on various aspects of Financial Management.
- Analyze various sources of capital and the importance of capital structure.
- Analyze and take decisions on various investment projects.
- Understand various dividend policy adopted by various firms and what impact they make on the value of the firm.
- Make a optimum working capital

Paper 305 SEC1

ENTREPRENEURSHIP DEVELOPMENT

OBJECTIVES: The purpose of the paper is to orient the learner toward entrepreneurship as a career option and creative thinking and behaviour

COURSE OBJECTIVES:

The objectives of the course are to enable the learners

- To learn the elements, importance, dimensions of entrepreneurship.
- To know the dimension of entrepreneurship – intrapreneurship, netpreneurship, international entrepreneurship, technopreneurship, cultural entrepreneurship.
- To acquire knowledge on availability and access of finance, marketing assistance and technology for new ventures.
- To familiarise role of industries, entrepreneur's association and self-help groups. Concept , role and functions of business incubators, angel investors, venture capital and private equity fund
- To acquire knowledge on importance of business plan, project proposal, designing business process, preparation of project report.
- To learn how to mobilise resources for start-up. Preliminary contracts with the vendors, suppliers and basic start-up problems.

COURSE OUTCOMES

After the completion of the course students are expected to

- Acquire knowledge on elements, important dimensions of entrepreneur and entrepreneurship.
- Describe dimensions of entrepreneurship in intra, net, international, technology and cultural entrepreneurship.
- Acquire knowledge on financial dimensions of availability and access.
- Be familiar with industries, self-help groups, role and functions of business incubators, venture capital and private equity fund
- Prepare project report, how to conduct feasibility report and understand the importance of business plan.
- Understand how to mobilise resources for start-up and bring in vendors, suppliers and understand basic start-up problems.

## BACHELORS OF COMPUTER APPLICATIONS

**Program Outcomes (PO):**

1) To provide through understanding of nature,scope and applicationof Computer and computer languages.

2) To develop interdisciplinary approach among the students.

**Program Specific Outcome (PSO):**

After the completion of the course a student is able to

1) To pursue further studies to get specialization in computer Science and Application,economics,mathematics,business Administration

2) To pursue the career in corporate sector can opt for MBA.

3) To work in public sector undertakings and government organization

4) for teaching in school .

5) to work in the IT sector as programmer,system engineer,software tester,junior programmer,web developer,system administrator,software developer etc.

**Course outcomes(CO)**

**BCA Sem 1**

AEC11 : Environmental Science

Objectives

1) To Help the social groups and individuals to acquire knowledge of pollution and environmental degradation.

2) To help social groups and individuals to acquire knowledge of the environment beyond the immediate environment including distant environment.

3) To help social groups and individuals to acquire a set of values for environmental protection

4)To help social groups and individuals to develop skills required for making discriminations in form,shape,sound,touch,habits and habitats. Further,to develop ability to draw unbiased inferences and conclusions.

50 To provide social groups and individuals with an opoortunity to be actively involved at all levels in environmental decision making

Outcomes

1) The types of Environmenatal issues on which decisions might be made.

2) The physical setting of the prospective environmental decision,including its spatial scale.

3) The types of social groups and individuals who might interact in a process leading up to an environmental decision

4) The time frame within which the decision must be made.

C12 + CC12L : Programming in C (Theory and Lab)

Objectives

1. The course is designed to provide complete knowledge of C language.
2. To help students understand the medium of communication between users and the machine.
3. To develop logic in students which will help them to create programs and applications in C.

4. To make students understand the concept of compilation and execution of a program.
5. To help students understand the basic concept of the various branching and looping constructs for efficient programming
6. To develop understanding of arrays, strings, pointers and memory allocation for real life applications.
7. To help students differentiate between a procedural and object oriented language.

Outcomes

1. By learning the concept of C language, students will be able to develop real life applications in C
2. After learning the basic programming constructs, they can easily switch over to any other programming language in future.
3. After learning the language they will have a clearer understanding of the working of system software like compilers, loaders and linkers.
4. To provide confidence in students to switch to new object oriented languages after understanding the drawbacks of procedural language.
5. To get hands on practice on developing small working applications.

CC13 + CC13T : Digital Electronics (Theory and Tutorial)

Objectives

1. To understand the concept of fundamentals of computers, like : software/hardware/firmware, etc, and the generations of computers and computer languages.
2. To provide the concept of number system and their conversions from one system to the other.
3. To give a clear idea of the working principle of the Arithmetic and Logic unit of the computer processor.
4. To help students identify the difference in evaluation of arithmetic operations by a human and a computer.
5. To understand the basic building blocks of a computer system (logic gate)
6. To give the realization of the different circuits operating in the computer system.

Outcomes

1. Students will be able to design small digital circuits in the Lab and will be able to clearly understand their working principle.
2. Students can assemble and disassemble a computer after learning about its various components.
3. Students can make a small digital project using the various ICs.
4. Students will be able to identify the different hardware parts and they can also resolve minor technical issues.

5. Students will have knowledge on the different software related issues, so they will be able to fix it.

GE14 + GE14T : Mass Communication and Journalism (Theory and Tutorial)

Objectives

1. To understand how the freedom of press runs in the biggest democratic nation
2. To help the students to understand the constitution of India in a wider prospective
3. To help the students how media today stands as the most powerful weapon in a democratic institute.
4. To make the students aware of the democratic rights and they too can become a strong tool of communication.

Outcomes:

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**BCA Sem2**

AEC21 : MIL Communication

Objectives:

1. To introduce students to the theory, fundamentals and tools of communication and to develop in them vital communication skills which should be integral to personal, social and professional interactions.
2. To make students understand that one of the important links between human beings and an important thread that binds society together is the ability to share thoughts, emotions and ideas, which can be done through verbal communication.
3. Recognition of social and cultural pluralities to assist in rapid globalization
4. Nurturing growth of various speaking skills, such as personal communication, social interactions and professional communication (like: personal interviews, group discussions)
5. Develop writing skills like report writing, note taking, etc

Outcomes :

1. Students will be able to overcome the different communication barriers and will be more confident in dealing with people.

2. After studying this course students will find a difference in their personal and professional interaction.
3. They will be able to learn the art of creative writing after development of their writing skills.
4. Better communication skills will help in the personality development of students
5. Students will regular practice on group discussions will be benefited when facing competitive exams.

## CC22 + CC22L : Programming in Java (Theory and Lab)

### Objectives

1. The course is designed to provide complete knowledge of Object oriented languages, like, Java.
2. To help students understand the concept of a virtual machine.
3. To develop logic in students which will help them to create programs and applications in Java.
4. To make students understand the concept of compilation, interpretation and execution of a program.
5. To help students understand the basic concept of the various branching and looping constructs for efficient programming.
6. To develop understanding of the concept of inheritance, polymorphism, packages, metadata and interfaces.
7. To help students develop network and database related programs.
8. To design graphics based programs.

### Outcomes

1. Students will be able to develop real life applications in Java.
2. After learning the language they will have a clearer understanding of the working of system software like compilers, interpreters, loaders and linkers.
3. To get hands on practice on developing working applications.
4. Students will be able to design live software which would be counted in their professional experience.
5. After getting the fundamental knowledge on a powerful language like java, students can further explore its functionalities.

## CC23 + CC23T : Computer System Architecture (Theory and Lab)

### Objectives

1. To understand the internal architecture of a computer.
2. To give a clear idea of the working principle of the Control unit and the Arithmetic and Logic unit of the computer.

3. To help students understand the operations carried out by a computer system and the circuits involved in performing those operations.
4. To understand the basic building blocks of a computer system and their interconnections.
5. To understand to the process of input and output operations that takes place in a computer.
6. To have a clear understanding of the memory units of a computer and their categorization.

Outcomes

1. Students will be able to identify all the hardware components present in a computer and will be able to assemble and disassemble a computer.
2. Students will be able to design small digital circuits in the Lab and will be able to clearly understand their working principle.
3. Students will be able to identify the different hardware parts and they can also resolve minor technical issues.
4. Students will be able to perform arithmetic operations in binary system and understand the exact evaluation procedure that takes place in a computer.

**GE24 : General Elective 2 (Mass Communication and Journalism)**

Objectives:

1) To install in the Mass communication students the ability to respect deadline and work under constant pressure.

2) to train and encourage the Indian Mass communicators to be effective communicators by being able to think quickly,research creatively and write or broadcast concisely to the mass audience.

3) For daily newscasts or writing a speech for the company CEO or Advertising or public Relations copy to sell or promote a product to the masses.

4) to Produce the Indian Mass communicators who will continue to protect the basic principles of the peoples right to know as the fourth branch of government.

Outcomes:

1)The students should be able to differentiate “soft news” from “ hard news” truth from falsehood,responsible journalism from irresponsible journalism.

2) It is expected that the students should be equipped enough to establish enough to establish his/her own newspaper,magazines,public relations and advertising agency or even his/her own radio and/or television stations.

3) Students can work in the print media as well as broadcasts industry.

4) Students could be employed in the advertising.

5) Students can work public relations, photojournalism and the public sector as press secretaries or media relations personnel for public office holders as well as press attached of the diplomatic corps in india.

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**BCA Sem 3**

CC31 + CC31L: Data Structures (Theory and Practical)

Objectives

1. To understand the concept of how data is stored in Computers and how they are retrieved.
2. To understand the categorization of data structures into linear and non linear.
3. To understand the use of recursion and recursive functions.
4. To help design algorithms that can search and sort data in a list.
5. To help design algorithms which are presented in a form, which is machine and language independent.
6. Use of appropriate data structure enables a computer system to perform its task more efficiently by influencing the ability of computer to store and retrieve data from any location in its memory.
7. To understand basic concept about stacks,queues,lists,trees and graphs
8. To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.

Outcomes:

1.Ability to analyze algorithms and algorithm correctness.

2. Ability to summarize searching and sorting technique.

3. Ability to describe stack,queue and linked list operation

4. Ability to have knowledge of tree and graphs concept.

**CC32 + CC32L: Operating System (Theory and Practical)**

Objectives:

1. To understand the fundamental concepts and techniques of operating systems.
2. To study the concepts in process management and concurrency control mechanisms.
3. To understand the concept of efficient memory managements and related problems.
4. To understand the concept of Synchronization among processes.
5. To help study file management and storage structures used by the operating system.

Outcomes:

1. An ability to understand basic concepts about operating system.
2. An ability to describe process management, scheduling and concurrency control mechanism.
3. An ability to analyze memory management and deadlocks.
4. An ability to compare various file systems and its operating systems example.
5. Ability to implement shell scripting on UNIX Operating System.

**CC33 + CC33 (T): Discrete Structures (Theory and Tutorial)**

Objectives

1. Enable students to gain knowledge on the different system software and their collaborative functioning in the system.
2. Enable the students to understand and create mathematical arguments and solving them with logical skill
3. Enable the students to learn number theory, which is applied in data security and networking
4. Enable the students to learn set theory, graph relation, functions which are used in cryptography and data structures.
5. Enable the students to learn the basic concepts of graph theory.

Outcomes

1. Ability to apply logic and mathematical reasoning in practical applications like computer programming.
2. Ability to employ number theory concepts in cryptography and security.
3. Ability to differentiate set theory concept in designing efficient algorithms both in space and time.
4. Ability to solve various methods of solving recurrence relations.
5. Ability to solve various graph theory problems.

**GE34+Ge34T:Maths(Theory+Tutorial)**

**Objective:**

**1) To help in expression of abstract ideas.**

**2) To enable the students to use in the solution of some of the stiff problems in arithmetic equation and factorization .**

**Outcomes:**

**1) This inculcates in students the power of accurate analysis.**

SEC35 + SEC35L : Website design with HTML and PHP (Theory and Practical)

Objectives

1. To help students understand the platform independence of PHP and its wide functionalities
2. To provide a concept of web designing and its hosting.
3. To train the students in becoming proficient PHP or MySQL web developers.
4. To help students have a basic understanding of web technology and be able to architect, write, debug and complete web applications.
5. To gain PHP programming skills needed to successfully build interactive, data driven sites.

Outcomes

1. Every student develops a project using PHP and feels more comfortable doing the same.
2. Students will be able to implement interactive and responsive web pages using HTML, CSS and PHP.
3. Students will be able to describe and differentiate different wave extensions and web services.
4. Students will be able to build dynamic websites using server side PHP programming and database connectivity.

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**BCA Sem 4**

CC41 + CC41L : Computer Networks (Theory and Practical)

Objectives

1. To help students learn the basic terminologies related to Computer Networking and enumerate the layers of OSI and TCP/IP model.
2. To acquire knowledge of application layer and presentation layer paradigms and protocols.
3. To gain core knowledge of network layer, routing protocols, IP addressing and different switching techniques.
4. To help students understand data link layer concepts, design issues and protocols.
5. To help students read the fundamentals and basics of physical layer and will apply them in real time applications.

Outcomes

1. Students will be able to describe the function of each layer in OSI and TCP/IP model.
2. Students will be able to classify the routing protocols and analyze how to assign the IP addresses for the given network.
3. Students will be able to explain the types of transmission media with real time applications.

4. Students will be able to explain the function of application layer and presentation layer paradigms and protocols.
5. Students will be able to apply network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols.

## CC42 + CC42L : Software Engineering (Theory and practical)

### Objectives

1. To help students learn the nature of software development and software lifecycle process models.
2. To have a clear understanding of the concepts and principles of software design and user centric approach and principles of effective user interfaces.
3. To know the basics of testing and understanding the concepts of software quality assurance and software configuration management process.
4. To understand the needs of project management and project management life cycle.
5. To understand project scheduling concepts and risk management associated to various types of projects.
6. To explain methods of capturing, specifying, visualizing and analyzing software requirements.

### Outcomes

1. Students will be able to define various software application domains and remember different process models used in software development.
2. Students will be able to explain needs for software specification and also to classify different types of software requirements and their gathering techniques.
3. Students will be able to classify different testing strategies and tactics and compare them.
4. Students will be able to convert the requirements model into the design model and demonstrate use of software and user interface design principles.
5. Students will be able to generate project schedule and can construct, design and develop network diagrams for different types of projects.
6. Students will be able to investigate the results of bugs and analyze the principles in software testing to prevent and remove bugs

## CC43 + CC43L : Database Management System (Theory and Practical)

### Objectives

1. To enable students to learn to describe a sound introduction to the discipline of database management system.
2. To give a good formal foundation on the relational model of data and usage of relational algebra.
3. To introduce the concept of basic SQL as a universal database language.

4. To enhance knowledge to advanced SQL topics like embedded SQL,procedures connectivity through JDBC.
5. Two demonstrate the principals behind systematic Database design approaches by covering conceptual design, logical design through normalization.
6. To provide an overview of physical design of a database system by discussing Database Indexing Techniques and storage techniques.

Outcomes:

1. Students will be able to explain the features of Database Management System and Relational Database.
2. Students will be able to design conceptual models of a database using ER Modeling for real life applications and also construct queries in Relational Algebra.
3. Students will be able to create and populate a Relational Database Management System for a real life application with constrants and keys using SQL.
4. Students will be able to analyze the existing design of a database schema and apply concepts of normalization to design an Optimal Database.
5. Students will be able to build indexing mechanisms for efficient retrival of information from a database.

GE 44: General Elective 4 (Mathematics) [Theory and tutorials]

Objective:

1. Students will learn the concept of Set Theory and Relations.
2. The concept of functions and define the recursive functions.
3. To give the concept of Laplace and inverse Laplace transform.
4. To give the concept of Permutation and Combinations.
5. To give the concept of variable and also identify the mapping.

Outcome:

1. Student will be able to  apply the Set theory and Relation concepts.
2. Student will be able to apply the functions and define the recursive functions.
3. Student will be able to apply Laplace and inverse Laplace transform to different applications.
4. Student will be able to identify the permutations and combinations.
5. Student will be able to define variable and also identify the mappings.

SEC 45 TL :Anroid Programming(Theory+Lab)

**Objective:**

1. Students will learn to introduce android platform and its architecture.
2. To learn activity creation and android User Interface (UI) designing.
3. To be familiarized with intent, broadcast receivers and internet services.
4. To integrate multimedia, camera and location based services in android applications.

5. To explore Mobile Security issues.
6. To work with SQLite database and content providers.

**Outcomes:**

1. Students will be able to describe anroid platforms, architecture and features.
2. .Students will be able to design user interface and develop activity for anroid application.
3. Students will be able to design and implement Database application and content providers.
4. Students will be able to use multimedia, camera and location based service in anroid application.
5. Students will be able to discuss various security issues in anroid platform.

# BOTANY

## PROGRAM OUTCOMES, PROGRAM SPECIFIC OUTCOMES, COURSE OUTCOMES OFFERED BY INSTITUTION

### Mechanism of Communication

The learning outcomes of the Programmes and Honour courses is been clearly stated by the college. In order to communicate the learning outcomes to the teachers and students, following mechanism is followed by the institution. All the hard Copies of programs and courses syllabi and learning Outcomes are available in the departments for easy and prompt reference to the teachers and students. The students are also regularly informed and made aware of the same through class discussions.

**Program outcome**

Students will be more articulated, equipped, thorough and confident in the subject. They will be able to communicate scientific concepts, experimental results and analytical arguments clearly and concisely, both verbally and in writing. Besides this, they also learn to design solutions for problem that need specified need with appropriate consideration for the cultural, societal and environmental wellbeing. They realize that individual and team work function effectively in multidisciplinary settings. They will also be able to make effective presentation and give and receive clear instructions. They understand the importance of critical thinking, social interaction, effective citizenship, ethics and environment and sustainability. Ultimately, they acquire the ability to engage in independent and life-long learning.

**Program specific outcome**

Course emphasizes on various knowledge of the classification, distribution, morphology, cell components, physiology, genetics, anatomy and biochemistry of plant kingdom. Students will be familiar with various ecological factors, succession in plant communities various components of ecosystem. Further, practical course will strengthen their understanding of the subject and identification of different flora.

**B.Sc Botany –Course Outcome**

| Course | Outcome |
|---|---|
| **Phycology and Microbiology** | Students would become familiar with the microbes and their impacts on society and environment.<br><br>Students would know about the diverse forms of Algae, their thallus structure, classification, economic importance and their life cycles |
| **Biomolecules and Cell Biology** | This will help the students to understand the various interaction of all the molecules (micro and macro molecules) building up the cellular components and their roles |
| **Mycology and Phytopathology** | The student understands the fungal world which is different from the rest of the plant kingdom.<br><br>Understand the various effective methods of prevention, quarantine and cure of various fungal diseases. |
| **Archegoniate** | Students will have the idea of origin and evolution of different types of reproduction.<br><br>They would understand the differences among bryophytes, pteridophytes and gymnosperms |
| **Morphology and Anatomy of Angiosperms** | Morphological features both vegetative and reproductive helps in identification and differentiation between taxa easy.<br><br>To elaborately understand their differences in internal organizations and the role of various tissues. |
| **Economic Botany** | Students will be aware about the various important plants around us and their role in supplying all the pre-requisite ingredients required for the wellbeing of mankind. |
| **Genetics** | Students would gather the knowledge about the process of heredity.<br>They would get idea about some common genetic disorders and their causes.<br>They will gain the knowledge about role of natural selection, mutation, genetic drift. Genetic variation and Speciation |

# ECONOMICS

**Semester-I**
**Discipline Specific Core Course (DSC-1)**
**Introductory Microeconomics**
**Paper-DSC101**

**Learning Objectives of the Course**

**Chapter-I:** To identify the method and scope of economics and to get the ideas of basic concepts of microeconomics

**Chapter-II:**

1) To study and analyse the factors affecting demand
2) To measure elasticity of demand
3) To prepare demand forecasts
4) To explain the concept of equilibrium , stable and unstable equilibrium

**Chapter-III:** To provide insights into behaviour of consumer and understand the decision making processes that consumers go through as they make a purchase

**Chapter-IV:** To make them understand how a producer take decisions about what to produce and how much to produce and maximizes his profit

**Chapter-V:** To know the concepts of short run and long run costs, shapes of cost functions and how the shape of long run cost function varies depending upon the external economies and diseconomies of scale

**Learning Outcome of the Course**

**Chapter-I:** Explain the role of scarcity, basic concepts of microeconomics and economic decision making problem

**Chapter-II:** Identify the determinants of supply and demand, demonstrate the impact of shifts in both market supply and demand curves on equilibrium price and output.

**Chapter-III:**

**1)** Utility analysis provides insight to the students into an understanding of market demand which further investigates consumer behaviour, i.e., market purchases is based on the satisfaction of wants and needs generated from the consumption of a good
**2)** Students will be able to identify and explain economic concepts and theories related to the behaviour of consumer
**3)** Students will be able to evaluate the consequences of economic activities for individual consumer and basic features of alternative representations of human behaviour in economics.

**Chapter-IV:** Students will learn about the behaviour of producer , their optimization constraints and will understand how shapes of productivity curve changes depending on law of returns to scale or law of variable proportion.

**Chapter-V:** Students will understand about the importance of short run and long run cost in determining producer behaviour and how the shapes of cost curve varies depending on different economic condition

**Semester-I**
**Discipline Specific Core Course (DSC-2)**
**Mathematical Methods for Economics-I**
**Paper-DSC102**
**Course Outline:**

**Learning Objectives of the Course**

**Chapter-I:** The objective of the chapter is to present the basic concepts of sets, relations and functions.

**Chapter-II:** The objective of the chapter is to present the mathematical method of matrices and determinants.

**Chapter-III:** The objective of the chapter is to elucidate the basic formulae of differential calculus and integral calculus.

**Chapter-IV:** The objective of the chapter is to present the interdependence of inputs and outputs of various industries in the economy.

**Learning Outcomes of the Course**

**Chapter-I:** The outcome of the chapter is to proper understanding and application of sets, relations and functions in economic literature.

**Chapter-II:** The outcome of the chapter is to proper understanding and application of matrices and determinants to learn to formulate comparative statics and optimisation problems in microeconomics and macroeconomics using matrix algebra.

**Chapter-III:** The outcome of the chapter is to learning the formulae of differential and integral calculus and the appropriate application in microeconomics and macroeconomics.

**Chapter-IV:** The outcome of the chapter is to understand and investigate the structure of the various countries' economy.

**Semester-II**
**Discipline Specific Core Course (DSC-3)**
**Introductory Macroeconomics**
**Paper-DSC203**
**Course Outline:**

**Learning Objectives of the Course**

**ChapterI**: 1) To understand the nature and scope of importance of macroeconomics dynamics and statistics, transitions from Microeconomic to Macroeconomic theory i.e. from individual unit to aggregate unit.

**Chapter II**:

1) To understand and estimate different methods of measuring national income
2) To discover the flow of income in various sector of economy
3) To understand the importance of national income as an indicator of measuring national income

**Chapter III**:

1) To determine the price effect on the commodities and services in economics

2) To help and understand the price control method of commodities and services in the economy, to provide the real GDP and real value of money to manage the rate of interest in the economy.
3) To get ideas on different types of inflation , deflation and the trade-off between inflation and unemployment

**Chap IV**:

1) To explain fundamental ideas of classical theory
2) To critically analyse the classical theory of income and employment

**Learning Outcomes of the Course**

**Chapter I**: Explain what macroeconomics is and explain why it is important

**Chapter II:**

1) Explain how macroeconomics use in economic models of national income
2) How do national income data reveal the aggregate production of the economy and also help to determine the total expenditure and total income of the country.

**Chapter III:**

1) Appreciate the relation between money and inflation
2) Elucidate the origin of monetary policy

**Chapter IV:** Classical school believed in free enterprise economy, there is no deviation from full employment. The economy experiences full employment permanently and even there are occasional slips from full employment they can be controlled because of wage price flexibility.

**Semester-II**
**Discipline Specific Core Course (DSC-4)**
**Mathematical Methods for Economics-II**
**Paper-DSC204**
**Course Outline:**

**Learning Objectives of the Course**

**Chapter-I:** The objective of the chapter is to present the various methods to solve the continuous time i.e. first-order and second-order differential equations.

**Chapter-II:** The objective of the chapter is to present the various methods to solve the discrete time i.e. first-order and second-order difference equations.

**Chapter-III:** The objective of the chapter is to present the formulation and computation of a decision problem with linear relationship into the mathematical form.

**Chapter-IV:** The objective of the chapter is to present the formulation and computation of a tool of decision under uncertainty i.e. game theory.

**Chapter-V:** The objective of the chapter is to mathematical presentation of the theory of market morphology and some macro models.

**Learning Outcomes of the Course**

**Chapter-I:** The outcome of the chapter is to learn the various methods of solution and the economic application of the first-order and second-order differential equations.

**Chapter-II:** The outcome of the chapter is to learn the various methods of solution and the economic application of the first-order and second-order difference equations.

**Chapter-III:** The outcome of the chapter is to learn the methods of formulation and computation of LPP and able to solve the optimization problem.
**Chapter-IV:** The outcome of the chapter is to learn the methods of formulation and computation of game theory and able to solve the decision under uncertainty where two opponents with conflicting.
**Chapter-V:** The outcome of the chapter is to understand the mathematical presentation of the theory of market morphology and some macro models and solve various problems.

**Semester-III**
**Discipline Specific Core Course (DSC-5)**
**Intermediate Microeconomics-I**
**Paper-DSC305**
**Course Outline:**

**Learning Objectives of the Course**
**Chapter I**:
1)To analyse and understand the basic features of market structure and determine how sellers within the market compete both perfectly and imperfectly, analyse the relationship between different market structure, compare and contrast with one another.
2) To understand why the model of perfect competition used as a parameter especially in the study of characteristics of economic systems and also market structures.
**Chapter II**:
1) To be able identify accurately different market conditions prevailing in different market models depending on the assumptions of model.
2) To present different imperfect competitive markets graphically and mathematically depending on the conditions of profit maximization.
**Chapter III**: To examine the conditions for economic efficiency and to examine the ways in which externalities, public goods and monopolies create market failures.

**Learning Outcomes of the Course**
**Chapter I:**
1) Conceptual understanding of different market structures prevailing in the real world
2) While and how firms come to be price takers, price makers or price shapers depending on the objectives of firms.
3) While a competitive market determines the equilibrium point by staying in tune with the supply and demand curves, a perfectly competitive market does not have that luxury. It must accept the price point and must only decide how much to sell. It can also be both allocatively and productively efficient.

**Chapter II:** Imperfect competition market structures such as monopoly, monopolistic competition, and oligopoly market structures relate and provide a snapshot of how markets work depending on the numbers of sellers, no of buyers, barrier to entry and exit, objective of the firm, cost and price conditions.
**Chapter III:** Attempt to establish criteria or norms with which to judge or evaluate alternative economic states and policies from the viewpoint of efficiency or social welfare

**Semester-III**
**Discipline Specific Core Course (DSC-6)**
**Intermediate Macroeconomics-I**
**Paper-DSC306**
**Course Outline:**

## Learning Objectives of the Course

**Chapter-I:**

1) To discuss the importance of IS-LM framework in developed as well as developing countries
2) To know the characteristics of IS and LM curves, determinants of IS-LM curve, their slopes and shifts due to changes in various macroeconomic variables
3) To know how to integrate goods market and money market equilibrium through IS-LM model
4) To determine the effectiveness of fiscal and monetary policy in IS-LM Framework
5) To make them understand the limitations of IS-LM model, as labour market equilibrium is not taken into consideration under IS-LM model and price is taken as constant.

**Chapter II:**

1) To derive aggregate demand curve and aggregate supply curve from labour, goods and money market equilibrium conditions when price is variable.
2) To identify the fundamental differences and crucial differences between classical and Keynesian model
3) To classify and recognize the concept of full employment and underemployment in the presence and absence of wage flexibility, interest inelasticity of investment demand and liquidity trap.
4) To present and elucidate complete Keynesian model theoretically and graphically.

**Chapter III:**

**Chapter IV:**

1) To make them understand how individuals hold diversified portfolios with the help of Tobin's portfolio choice model and Baumol's model
2) To reveal the determinants of money supply in India, different types of money supply existing in India and relations of high powered money with money supply
3) To describe the components of central bank and commercial bank to control credits, credit creation processes, credit control variables
4) To explain the concepts of deficit financing and monetary policies to control budget deficit

## Learning Outcomes of the Course

**Chapter-I:**

1) Helps to understand drivers of income , savings, investments and employment in an economy
2) IS-LM model portray how the market for economic goods interacts with the loanable funds market or money market and describes how aggregate markets for real goods and financial markets interact to balance the rate of interest and total output in the macro-economy
3) IS-LM model can be used to describe how changes in market preference alter the equilibrium levels of GDP and rate of interest

**Chapter-II:**

1) The concepts of AS and AD curve is important as the students will learn the relationship of the total quantity of output firms will produce and sell i.e. real GDP at different prices and the relationship between the price level for outputs and the quantity of total spending in the economy
2) Keynesian model of income and employment reveals that AD is more likely than AS to be the primary cause of a short run economic event like a recession and wages and prices can be sticky and so, in an economic downturn, unemployment can result.
3) Keynesian model also recommended that the solution to a recession is expansionary fiscal policy, such as tax cuts to stimulate consumption and investment or direct increases in government spending that would shift the AD curve to the right.

**Chapter-III:**

**Chapter –IV:**

5) Students will understand how individuals hold diversified portfolios with the help of Tobin's portfolio choice model and Baumol's model
6) They will learn about the determinants of money supply in India, different types of money supply existing in India and relations of high powered money with money supply
7) They get ideas how banking system works under economy and know about the components of central bank and commercial bank to control credits, credit creation processes, credit control variables
8) Students will learn the concepts of deficit financing and learn how monetary policy is effective in controlling budget deficit.

**Semester-III**
**Discipline Specific Core Course (DSC-7)**
**Statistical Methods for Economics-I**
**Paper-DSC307**
**Course Outline:**

**Learning Objectives of the Course**

**Chapter I:** To explain basic statistical concepts such as statistical collection, species characteristics, statistical series, tabular and graphical representation of data, measures of central tendency, dispersion and asymmetry, correlation and regression analysis

**Chapter II**: To apply knowledge to solve simple measures of central tendencies
**Chapter III**: To calculate basic statistical parameters (coefficient of variation, measures of dispersion, correlation coefficient, construction of Lorenz Curve)to know the degree of the scatter of observation about a central values
**Chapter IV:** To analyse research questions with the use of statistical tests and will be able to identify data and model specification issues.
**Chapter V:** To compute various coefficients to measure the extent of skewness in a distribution and to understand moments as a convenient and unifying method for summarising several descriptive statistical measure

**Learning Outcomes of the Course**

**Chapter I:**
1) Enable them to recognize how to use scientific statistical method in economics.
2) Enable them to understand concepts of sampling methods and sampling procedures in terms of secondary and primary data
3) Make them understand to construct dataset of economic variables

**Chapter II:** Make them understand to calculate, and use descriptive statistics of mean, median, mode and dispersion in solving economic problems
**Chapter III:** Student will understand that while measures of central tendency are used to estimate normal values of a dataset, but, measures of dispersion are important for describing the spread of the data or its variation around a central value
**Chapter IV:** Regression and correlation analysis describes them how to draw relation between different economic variables and how to interpret, it also helps to develop a critical and analytical mind to give explanation on the association of variables in terms of social situation.
**Chapter V:** The students will learn that the measure of skewness and kurtosis can be used to show the characteristics of a frequency distribution and the degree of concentration while the moments on the other hand make them understand the various characteristics of a frequency distribution.

**Semester-III**
**Skill Enhancement Course (SEC-I) Course-I**
**Choice any one from Group-I**
**Paper-SEC301 to SEC302**
**Group-I:**
**SEC-301: Basic Computer Applications**

**Learning Objectives of the Course**
**Chapter I:** To give brief introduction about the basic components of computers.
**Chapter II:** To make them aware regarding fundamentals of storage, Data storage, various storage devices
**Chapter III:** To introduce text manipulation and formatting of text documents. formatting of paragraphs, alignment of text and paragraph, headers and footers, borders and shading,
**Chapter IV:**
1) To inculcate the convenient usage of advanced mathematical formulas and operations in MS excel.

2) To make understand to prepare structured and attractive interview schedule and questionnaire to conduct survey.
3) To enable them to operate on spreadsheet. creation of tables, tabulation, formatting, mathematical functions

**Chapter V:**

1) To educate students to make PPT presentation, slide making and template in various colour scheme, menus of power point, drawing and inserting objects using Clip Art's pictures and charts. Custom Animation, slide transition effects and other animation effects.

**Chapter VI:**

1) To educate about the basic concepts of internet usage and organizing of data.
2) To apply statistical software to find out descriptive statistics
3) To interpret and analyse dataset, depending on statistical equations

**Learning Outcomes of the Course**

**Chapter I:** Explain basic statistical concepts such as statistical collection, species characteristics, statistical series, tabular and graphical representation of data, measures of central tendency, dispersion

**Chapter II:** Enable students for using the computer program MS Excel, apply basic statistical techniques and methods for grouping, tabular and graphical display, analysis and interpretation of statistical data.

**Chapter III:**

1) Apply knowledge to solve simple tasks using computer (MS Excel)
2) Learn to calculate basic statistical parameters (mean, measures of dispersion, correlation coefficient, indexes)

**Chapter IV:** Based on the acquired knowledge to interpret the meaning of the calculated statistical indicators

**Chapter V:** Students will demonstrate knowledge of empirical tools used in the analysis of data, including statistics such as mean, variance, standard deviation, correlation and regression and the graphical and descriptive representation of data

**Chapter VI:** Students will demonstrate the ability to frame dataset and solve problems in economics, using concepts such as optimization, equilibrium, trend of growth and the incentives faced by economic agents. They should demonstrate an understanding of the theoretical tools used to solve economic problems graphically and mathematically by using excel formulas and statistical software.

## DEPARTMENT OF GEOGRAPHY
## ST JOSEPH'S COLLEGE
## FIRST SEMESTER
## GEOGRAPHY
## HONOURS COURSE

**COURSE CODE: GEO-H-DSC-1-01-TH (Geotectonic)**

**Objectives**

The objectives of the course are to enable the students:

- To understand the Earth's tectonic and structural evolution with reference to Geological time scale.

- To learn about the Earth's Interior structure and theories of Isostasy.
- To understand the Earth's movement in the context of plate tectonic and sea floor spreading.
- To learn about the different types of folds, faults, earthquakes, volcanoes and its associated landforms.

**Outcomes**

After the completion the course the students will

- Acquire knowledge about the Earth's structural evolution with the help of different Geological time scale.
- Describes the theories of Isostasy and its significant role for understanding interior of Earth.
- Analyze and sketch the profile of different plate boundaries, its movement, concept of sea floor spreading and resultant landforms.
- Identify the processes of fold, faults, earthquakes, volcanoes and its associated landforms.

**COURSE CODE: GEO-H-DSC-1-01-PR (Practical)**

**Objectives**

The objectives of the course are to enable the students:

- To learn the scales, its types and its application and graphical construction.
- To understand the concept of map projection, its mathematical construction, classification, properties and uses.

**Outcomes**

After the completion the course the students will

- Acquire the knowledge about the scales, its different types and its application with the help of graphical construction.
- Acquire the skill of mathematical construction of different map projection and its uses with properties.

**COURSE CODE: GEO-H-DSC-1-02 TH (Geomorphology)**

**Objectives**

The objectives of the course are to enable the students:

- To understand the nature, scope and fundamental concepts of Geomorphology.
- To learn about the weathering, mass wasting and cycle of erosion by Davis and Penck.
- To know the evolution of erosion and depositional landforms by fluvial, karst, Aeolian, glacial and coastal.
- To learn the process and formation of slopes.

**Outcomes**

After the completion the course the students will

- Acquire knowledge about the nature, scope and the fundamental concepts of Geomorphology.
- Describe the process of weathering, mass wasting, cycle of erosion by Davis and Penck.
- Analyse and sketch the profile of erosional and depositional landforms by Fluvial, Karst, Aeolian, Glacial and Coastal.
- Identifies the forms and process of slopes.

**COURSE CODE: GEO-H-DSC-1-02-PR (Practicals)**

**Objectives**

The objectives of the course are to enable the students:

- To sketch and interpret topographical map of mountain area with the help of cross and longitudinal profile
- To interpret topographical map of mountain area for constructing relief profile and slope map with the help of Wentworth's and Smith method.
- To identify the different types of rocks and minerals.

**Outcomes**

After the completion the course the students will

- Acquires the knowledge of constructing cross and longitudinal profile of river of mountain topography
- Acquires the knowledge of constructing relief profile and slope map with the help of Wentworth and Smith method from the mountain topographical map.

## SECOND SEMESTER
## GEOGRAPHY
## HONOURS COURSE

**COURSE CODE: GEO-H-DSC-2-03-TH (Human Geography)**

**Objectives**

The objectives of the course are to enable the students:

- To understand the concept of Human Geography, major themes and its contemporary relevance.
- To know about the concept of space and society.
- To learn about the influence of race, religion and language upon the cultural region.
- To learn about the population growth and its distribution pattern with special reference to India.
- To understand the population composition and the demographic transition model of India.
- To explore the population resource relationship concept.

**Outcomes**

After the completion the course the students will

- Acquire the knowledge about the concept of Human Geography, the major themes it holds and its contemporary relevance.
- Describe the differences and interrelation between the space and society.
- Acquire the knowledge regarding the cultural region and how race, religion and language influence and impact its evolution.
- Acquires the understanding of India's population growth and its distribution patterns.
- Analyse the population composition structure and the demographic transitional model of India.
- Identifies the significance of population-resource relationship.

**COURSE CODE: GEO-H-DSC-2-03-PR (Practical)**

**Objectives**

The objectives of the course are to enable the students:

- To understand the importance of diagrammatic representation of data i.e. line, bar and circle.
- To draw thematic maps such as Choropleth, Chorochromatic, Dot, Propotional circle and Isopleth.

**Outcomes**

After the completion the course the students will

- They will know the significance of visual representation of data and hence will learn to interpret it.
- They will learn to draw and interpret thematic maps such as Choropleth, Chorochromatic, Dot, Propotional circle and Isopleth.

**COURSE CODE: GEO-H-DSC-2-04-TH (Settlement Geography)**

**Objectives**

The objectives of the course are to enable the students:

- To understand the origin and growth of rural and urban settlement.
- To know the classification of settlement pattern with its morphological structure.
- To learn about the trends and patterns of world urbanization with special reference to India.
- To understand the different urban growth theories i.e. Concentric Zone Theory, Sector Theory and Multiple Nuclei Theory.

**Outcomes**

After the completion the course the students will

- Acquires the knowledge of origin and growth of rural and urban settlement.
- Describes the different settlement patterns with its morphological structure.
- Acquires the understanding of trends and patterns of world urbanization with special reference to India.
- Helps to comprehend the different urban growth theories and analyze it with the recent pattern of growing cities.

**COURSE CODE: GEO-H-DSC-2-04-PR (Practicals)**

**Objectives**

The objectives of the course are to enable the students:

- To understand the significance of levelling and surveying with the help of Dumpy level and Theodolite instrument.
- To know the preparation and interpretation of thematic map by conventional method.

**Outcomes**

After the completion the course the students will

- Acquires the knowledge of constructing slope and height of an object with the help of Dumpy level and Theodolite instrument.
- Describes the basic understanding of preparing and interpreting thematic map by conventional method.

## THIRD SEMESTER
## GEOGRAPHY
## HONOURS COURSE

**COURSE CODE: GEO-H-DSC-3-05-TH (Climatology)**

**Objectives**

The objectives of the course are to enable the students:

- To understand the features of atmospheric composition and structure, insolation and temperature, factors and distribution of heat budget and inversion of temperature.
- To learn about atmospheric circulation like types of winds, forces affecting its circulation, jet streams and the origin and mechanism of monsoon.
- To provide knowledge regarding atmospheric moisture example evaporation, humidity, condensation, fog, clouds and precipitation.
- To understand the phenomenon of cyclone like tropical cyclone and extra tropical cyclone.

**Outcomes**

After the completion the course the students will

- Acquires the knowledge about the atmospheric composition and structure, insolation and temperature, factors and distribution of heat budget and inversion of temperature.
- Comprehend the knowledge about the atmospheric pressure and circulation like different types of winds, jet streams and origin and mechanism of monsoon.
- Describe the different atmospheric moisture like evaporation, humidity, condensation, clouds and precipitation.
- Identify the types and features of different cyclones.

**COURSE CODE: GEO-H-DSC-3-05- PR (Practicals)**

**Objectives**

The objectives of the course are to enable the students:

- To provide knowledge regarding meteorological instrument such as recording of Maximum and Minimum Thermometer, Hygrometer and Fortin's Barometer.
- To represent the information about the interpretation of Indian daily weather report (summer and winter) and also to construct the Climograph and Hythergraph with the help of climatic data.

**Outcomes**

After the completion the course the students will

- Obtain the understanding of different meteorological instruments.
- Acquire knowledge about the weather map and climatic data by constructing Climograph and Hythergraph.

**COURSE CODE: GEO-H-DSC-3-06-TH (Statistical Methods in Geography)**

**Objectives**

The objectives of the course are to enable the students:

- To understand the significance of statistics in Geography.
- To learn about the significance of Geographical matrix and the various source of data.
- To understand different sampling methods i.e. purposive, random, systematic and stratified.
- To learn about the concept of probability and normal distribution.

**Outcomes**

After the completion the course the students will

- Acquires the knowledge of statistics in Geography.
- Acquires the significance of geographical data matrix and the source of various data.
- Obtains the basic understanding of different sampling methods for field study.
- Describe the concept of probability and normal distribution.

**COURSE CODE: GEO-H-DSC-3-06-PR (Practical)**
**Objectives**
The objectives of the course are to enable the students:

- To enable them to do calculation by using proper statistical techniques such as measures of central tendency and cartographic techniques.
- To make them comprehend the co relation between the variables by using methods like Rank Correlation, Product Moment Correlation.
- To help them know how to predict data using Regression Analysis.

**Outcomes**
After the completion the course the students will

- Use statistical techniques such as measures of central tendency and cartographic techniques.
- Compute co-relation between the variables using Rank Correlation, Product Moment correlation.
- Acquire the knowledge to predict trend using Regression Analysis.

**COURSE CODE: GEO-H-DSC-3-07-TH (Geography of India)**
**Objectives**
The objectives of the course are to enable the students:

- To learn about the physiographic division, soil characteristics, vegetation and climate of India
- To learn about mineral resources, power resources, agricultural production and industrial development of India
- To understand the social make up of India with reference to race, caste, religion, language and tribes.
- To learn about the regionalization of India in terms of physiography, Socio-cultural aspects and Economic criteria.

**Outcomes**
After the completion the course the students will

- Acquire knowledge about the various physiographic features, soil characteristics, vegetation and climatic condition of India
- Classify different mineral resources, power resources, agricultural production and industrial development of India
- Gain knowledge of social make up of India with reference to race, caste, religion, language and tribes
- Describe the regionalization of India in terms of its physiography, socio-cultural aspects and economic criteria.

**COURSE CODE: GEO-H-DSC-3-07-PR (Practicals)**
**Objectives**

The objectives of the course are to enable the students:

- To collect and analyze the monthly temperature and rainfall data of five selected stations from different physiographic regions of India
- To measure the arithmetic growth rate of population and to construct the Lorenz Curve and Gini's Coefficient by comparing two decadal datasets of India.

**Outcomes**

After the completion the course the students will

- Acquires the skill of interpreting monthly variation of temperature and rainfall of five stations in India.
- Acquires the knowledge of growth rate of population with the help of Lorenz Curve and Gini's Coefficient.

## SKILL ENHANCEMENT COURSE- SEC

### COURSE CODE: GEO-SEC-A-3-01-TH (Rural Development)

**Objectives**

The objectives of the course are to enable the students:

- To understand the concept of Rural development with its basic elements and measurement.
- To learn about the different paradigms of Rural Development with reference to Gandhian approach and Lewis Model of Economic Development.
- To understand the area based approach of rural development with special reference to Drought Prone Area Programmes and PMGSY.
- To understand Target Group Approach to Rural Development with special reference to SJSY, MNREGA and Jan Dhan Yojana.
- To understand the basic concept of Rural Governance with special reference to Panchayati Raj System.

**Outcomes**

After the completion the course the students will

- Acquires the understanding of Rural Development with its basic elements and measurement.
- Understand the evolution of different paradigms of rural development with reference to Gandhian approach and Lewis Model of Economic Development.
- Describe the concept of Area based approach of rural development with special reference to Drought Prone Area Programmes and PMGSY.
- Describe and sketch the concept and significance of Target group approach in India with special reference to SJSY, MNREGA and Jan Dhan Yojana.
- Acquires the understanding of Rural Goverance in India with reference to Panchayati Raj System.

## FOURTH SEMESTER
## GEOGRAPHY
## HONOURS COURSE

### COURSE CODE: GEO-H-DSC-4-08-TH (Economic Geography)

**Objectives**

The objectives of the course are to enable the students:

- To develop concepts related to Economic Activities: Primary activities, Secondary activities and Tertiary activities.
- To understand the factors that affects the location of economic activity with special reference to Agriculture (Von Thunen Theory), Industry (Weber's theory).

**Outcomes**

After the completion the course the students will

- Learn some important concepts related to Primary, Secondary and Tertiary economic activities.
- Describe the factors that affects the location of economic activity with reference to agriculture (Von Thunen Theory) and industry (Weber's theory).

**COURSE CODE: GEO-H-DSC4-08-PR (Practicals)**
**Objectives**

The objectives of the course are to enable the students:

- To analyze transport network analysis: connectivity and accessibility.
- To represent the state wise variation in occupational structure and work participation using proportional divided circles.

**Outcomes**

After the completion the course the students will

- Acquire knowledge about transport network analysis.
- Learn graphical presentation of the state wise variation in occupational structure and work participation using proportional divided circles.

**COURSE CODE: GEO-H-DSC4-09-TH (Regional Planning and Development)**
**Objectives**

The objectives of the course are to enable the students:

- To learn about the concept of region, its evolution and types i.e. formal, functional and planning region.
- To understand the different characteristics of ideal planning region, its delineation and regionalisation in the context of Indian Agro Ecological Zones.
- To learn about the different theories and models of regional planning example Growth Pole Model of Perroux and Centre Model of Myrdal and Rostow in the context of India.
- To learn about the measurement of Development, economically, socially and environmentally.

**Outcomes**

After the completion the course the students will

- Describe the concept of region and sketch the understanding of its evolution and types
- Acquire the knowledge of identifying various ideal planning region and the regionalisation in the context of Indian Agro Ecological Zone.
- Comprehends the concept of different regional planning theories and models.
- Indicators of measuring development with reference to economic, social and environmental.

**COURSE CODE: GEO-H-DSC4-09-PR (Practical)**
**Objectives**

The objectives of the course are to enable the students:

- To construct the delineation of formal region with the help of weighted index method and the delineation of functional region with the help of breaking point analysis.
- To measure the inequality by Location Quotient and regional disparity by Sopher Index.

**Outcomes**

After the completion the course the students will

- Acquires the skills of delineating formal region by weighted index method and functional region with breaking point analysis.
- Comprehends the knowledge of measuring inequality by Location Quotient and regional disparity by Sopher Index.

**COURSE CODE: GEO-H-DSC-4-10-TH (Field Work and Research Methodology)**

**Objectives**

The objectives of the course are to enable the students:

- To understand the role, value, data and ethical value of field work.
- To define the field and identify the case study in terms of rural or urbal area, physical or human or environmental.
- To learn about various field techniques for the collection of data.
- To understand the significance of research problems, objectives and hypothesis

**Outcomes**

After the completion the course the students will

- Comprehends the value, role, data and ethics of field work.
- Acquires the art of defining and identifying the field study.
- Learn the various techniques of data collection for the field study.
- Acquires the knowledge of understanding the significance of research problems, objectives and hypothesis.

**COURSE CODE: GEO-H-DSC-4-10-PR (Practicals Field Survey)**

**Objectives**

The objectives of the course are to enable the students:

- To use the various research field tools for collection of primary and secondary data.
- To design field report for writing the research report

**Outcomes**

After the completion the course the students will

- Gains the concept of using various research tools for collecting the field data
- Acquires the understanding of designing field report for writing the research report.

**SKILL ENHANCEMENT COURSE-SEC**

**COURSE CODE: GEO-SEC-A-4-02-TH (Tourism Management)**

**Objectives**

The objectives of the course are to enable the students:

- To understand the concept, nature, scope and inter relationship of tourism with recreation and leisure and to understand its geographical parameters according to Robinson.
- To understand the types and nature of tourism.
- To gain the knowledge of recent trends of tourism with reference to international, regional and domestic
- To learn about the tourism in India with a case study of Himalayan, desert or coastal areas.
- To learn about the National Tourism Policy

**Outcome**

After the completion the course the students will

- Acquire the concept, nature, scope and inter relationship of tourism with recreation, leisure and its basic concept of geographical parameters according to Robinson.
- Gains the knowledge regarding types of tourism.
- Describe the recent trends in tourism with reference to international, regional and domestic.
- Acquires the knowledge of tourism in India with reference to Himalayan, desert and coastal region.
- Learn about the National Tourism Policy of India.

## SOCIOLOGY

### Syllabus, Learning Objectives and Outcome

**B. A. Sociology Honours:**

1st Semester:

CORE COURSE- 01

**Introduction to Sociology-I**

Course Objectives:

The objectives of the course are to enable the students

To know the nature of the discipline

To develop the sociological orientation

To provides a foundation for the other more detailed and specialized courses in sociology

To understand inter link of sociology with other social sciences.

After the completion the course the students will

- Become familiar with the nature of the discipline, its history and place of the discipline in scientific world.
- Interlink sociology with other disciplines of social science
- Understand the distinctiveness of sociological approach from other social sciences

- Learn some basic concepts of sociology and can differentiate the sociological meaning of such concepts from ordinary usages.
- Develop the holistic meaning of culture in sociology and anthropology
- Understand the differences of scientific meaning of culture and meaning of culture in ordinary usages.

CORE COURSE: 02

**Indian Society- I**

Course Objectives:

The objectives of the course are to enable the students

To introduce the processes and modes of construction of knowledge of India
To learn Social Organization of India Society
To understand Social institution of Marriage and Family in India
To acquire knowledge about the Tribes in India

After the completion the course the students will

- Know how the idea of India has been historically constructed.
- Differentiate the nature of common sense knowledge about the social world and the scientific understanding of social phenomena.
- Become familiar with the ideological basis and institutional arrangements of two great traditions of India i.e. Hindu and Islamic tradition.
- Become aware of the diverse nature of Indian culture.

2nd Semester:

CORE COURSE: 03

**Introduction to Sociology-II**

Course Objective:

The objective of the course is to enable the students

- To provide a general introduction to sociological thought
- To understand the theories of Social Change
- To give a flavour of how over a period of time thinkers have conceptualized various aspects of society.

After the completion the course the students will

- Know plurality of sociological perspectives.
- Become familiar with the basic theoretical orientations in sociology and distinctiveness of such theoretical orientation.

CORE COURSE: 04

## Indian Society- II

Course Objective:

The objective of the course is to enable the students

- To draw attention to the variety of ideas and debates about India
- To critically engages with the multiple socio-political forces and ideologies which shape the terrain of the nation.
- To learn the various movement of change
- To familiarise with some current social issues of Indian society

After the completion the course the students will

- To know the different ideas and debates about Indian society which emerged during colonial period but still continuing after independence
- To become familiar with some burning social issues of Indian society.
- To analyse the problems of marginal sections of Indian population.
- To understand the diverse socio-economic and political forces that have been reshaping the Indian society after independence.

3rd Semester:

CORE COURSE- 05

## Rethinking Development

Course Objective:

The objective of the course is to enable the students

- To examine the ideas of development from a sociological perspective
- To introduce different approaches to understanding development
- To trace the trajectory of Indian experience with development from an interdisciplinary perspective.

After the completion the course the students will

- Critique views about the different approaches of development.
- Become familiar with the different debates and theories of development.
- Know the trajectory of India's path of development and problem involved therein.

CORE COURSE- 06

## Sociology of Religion

Course Objective:

The objectives of the course are to enable the students

- To the understanding of the importance of religion in society.
- To understand social significance of religious institutions and interface of religion with other aspects of society
- To link between social and religious issues through different registers mentionedin the outline.

After the completion the course the students will

- Learn the sociological understanding of religion.
- Acquire knowledge about the social significance of religious institutions and interface of religion with other aspects of society.
- Become familiar with major religious groups in India.
- Be aware of some contemporary problems emerging in society centering the religious institutions.

CORE COURSE- 07

**Sociology of Gender**

Course Objectives:

The objectives of the course are to enable the students

- To introduces gender as a critical sociological lens of enquiry in relation to various social fields.
- To interrogates the categories of gender, sex, sexuality, gender role, inequalities etc,
- To study the theories of feminism and initiatives taken for empowerment of women

After the completion the course the students will

- Become aware of the fact that how the gender differences are socially constructed and get rid of gender stereotyping which are otherwise taken for granted.
- Learn the complexity involves in the relationship between three forms of stratification gender, class and caste, their overlapping as well as differences in Indian context.
- Critique the nature of gender inequalities in Indian society.
- Understand about this burning social issue related to sociology of gender.

SEC-01

**Sociology of Media**

**[ Credits: 2 ]**

Course Objective:

The objectives of the course are to enable the students

- To introduce the students to certain major themes of outlining the interconnections between media and society.
- To know the theoretical approaches to Media
- To focus on the production, control and reception of media and its representations.

After the completion the course the students will

- Realize the growing significance of media in the context of framing the life world by the system world.
- Develop a critical view on relation of media production and power relation in capitalist world order.
- Become conscious about alternative role of media

**B. A. Sociology Programme:**

1st Semester:

CORE-01

**Introduction to Sociology**

**[ Credits: 6 ]**

**Course Objectives:**

The objectives of the course are to enable the students

- To introduce to the discipline of sociology.
- To relationship of Sociology with other SocialSciences
- To familiarize the origin and history, fundamental concepts and concerns of the Sociology

After the completion the course the students will

- Become familiar with the nature of the discipline, its history and place of the discipline in scientific world.
- Become aware of the interlink ages of sociology with other social science disciplines as well as can understand the distinctiveness of sociological approach from other social sciences.
- Learn some basic concepts of sociology and can differentiate the sociological meaning of such concepts from ordinary usages.

CORE-02

**Sociology of India**

Course Objectives:

The objectives of the course are to enable the students

- To provide an outline of the institutions and processes of Indian society.
- To encourage students to view the Indian reality through a sociological lens.
- To learn the key concepts and institutions which are useful for the understanding of Indian society.

After the completion the course the students will

- Be familiar with the major social institutions in India.
- Become aware of the nature of diversity of Indian society.
- Become familiar with some burning social issues of Indian society.
- Become aware of the problems of marginal section of Indian population.

CORE-03
**Sociological Theories**

Course Objectives
The objectives of the course are to enable the students

- To understand the classical sociological thinkers Who's theories, thought, work has shaped the discipline of sociology.
- To learn how over a period of time thinkers have conceptualized various aspects of society.

After the completion the course the students will

- Know plurality of sociological perspectives.
- Become familiar with the basic theoretical orientations in sociology and distinctiveness of such theoretical orientation.

## DEPARTMENT OF HISTORY

## CORE IV:- SOCIAL FORMATIONS AND CULTURAL PATTERNS OF THE MEDIEVAL WORLD

**Course objectives:-**

i. To introduce the concept of the Roman Empire, its formation, consolidation and contribution of slaves in ancient Rome.
ii. To discuss the religion and culture of Rome.
iii. To look into the problems ailing the Roman Empire.
iv. To introduce the economic developments in Europe from the $7^{th}$ to the $14^{th}$ centuries and explain the evolution of production, towns and cities as well as technological developments and the resulting crisis of feudalism.
v. To discuss the religion and culture of medieval Europe.
vi. To discuss the societies in Central Islamic lands with respect to the tribal background, the Caliphal states and rise of Sultanates, religious developments, Shariah, Minha and Sufism and urbanization and trade.

**Course outcome:**

**i.** The students would be able to understand the foundation and consolidation of the Roman Republic and its evolution into Empire.
**ii.** The students would gain knowledge of the religion and culture prevailing in ancient Rome.
**iii.** The students would understand the problems and crisis that led to the disintegration of the Roman Empire.
**iv.** The students would understand clearly the economic developments in Europe during the $7^{th}$ to $14^{th}$ centuries, the evolution of production,

towns and trade as well as technological developments leading to the crisis in feudalism.

v. The students will be made aware about the rise of Christianity and the role of the Church and its impact on the society.

vi. The students will be able to fully comprehend the rise of Islamic state from the tribal background to the Caliphate with its religious and economic implications and growth of urbanization.

## DEPARTMENT OF HISTORY
## THIRD SEMESTER
## HONOURS COURSE

### CORE VI:- RISE OF THE MODERN WEST -1

### Course Objectives:-

i. To introduce the topic on the transition from feudalism to capitalism.

ii. To discuss the colonial expansions, voyages and explorations of the European nations, colonization.

iii. To explain the concept of Renaissance, its origin, art and humanism.

iv. To discuss the Reformation movement- its origin, course and result.

v. To explain the economic developments of the $16^{th}$ century and the gradual shift of balance from the Mediterranean to the Atlantic; the Commercial Revolution and the Price Revolution.

vi. To discuss the Emergence of the State system in Spain, France, England and Russia.

**Course Outcome:-**

i. The students would be able to understand the gradual shift from the feudal society to a capitalist economy in Europe.

ii. The students would learn about the voyages and explorations undertaken and discovery of new territories, establishment of colonies and mining and plantation economies.

iii. The students would gain knowledge about Renaissance and its origins and its effects on the social, cultural, economic and religious life of Europe.

iv. The students would be made aware of the reasons behind the emergence of the Reformation movement, its course and effects in various parts of Europe.

**v.** The students would be acquainted with economic developments of 16th century Europe, the Commercial revolution and the Price Revolution.

**vi.** The students would gain knowledge of about the rise of the European state system in Spain, France, England and Russia.

## DEPARTMENT OF HISTORY
## THIRD SEMESTER
## HONOURS COURSE

### CORE II:- SOCIAL FORMATIONS AND CULTURAL PATTERNS OF THE ANCIENT WORLD

### COURSE OBJECTIVES:-

**i.** To teach the students about evolution of humankind: Paleolithic and Mesolithic cultures.

**ii.** To explain food production and the beginning of agriculture and animal husbandry.

**iii.** To make a comparative study of the Bronze Age Civilization with reference to the Shang in China and Ancient Egypt (Old Kingdom) its economy, society, political and religious set up.

**iv.** To understand the history of nomadic groups in Central and West Asia. To make them aware of the advent of iron and its implication and the debates therein.

**v.** To teach the students about the slave society in ancient Greece and also its agrarian economy, urbanization and trade.

**vi.** To make the students understand the meaning of 'Polis' in ancient Greece especially the city state of Athens and Sparta. It also includes aspects of Greek Culture.

### Course Outcome:-

i. The students will have a thorough knowledge about the evolution of humankind, the Paleolithic and Mesolithic culture.

ii. Students will be aware of the food production and the beginnings of agriculture and animal husbandry.

iii. Students will be able to compare and discuss the Bronze Age Civilizations of Egypt (Old Kingdom and the Shang (China) civilization, its economy, society and political, religious set up.

iv. Students will be able to discuss and debate about the early nomadic groups in Central and West Asia, the discovery of the metal iron and its usefulness.

v. The students will know about the slave society in ancient Greece, its agricultural economy, growth of towns and commerce.

vi. The class will be well versed with the term "Polis" and discuss the city state of Athens and Sparta. Students will understand the Greek culture especially literature and architecture.

## DEPARTMENT OF HISTORY
## THIRD SEMESTER
## HONOURS COURSE

### CORE VII:- HISTORY OF INDIA IV (c. 1206-1550)

**Course Objectives:-**

**i.** To make the students understand the sources of the Sultanate History- Epigraphy and Political Structures.
**ii.** To brief the students about the foundation, expansion and consolidation of the Sultanate of Delhi. To give them knowledge of the different theories of kingship as well as the emergence of provincial dynasties like Bahamani, Vijaynagar, Gujarat, Malwa, Jaunpur and Bengal.
**iii.** To make the students familiar with the society and economy of the Delhi Sultanate.
**iv.** To give the students the knowledge of the religion, society and culture of the Delhi Sultanate existing during the rule of the Delhi Sultans.

**Course Outcomes:-**

**i.** The students would gain knowledge of the sources related to the Delhi Sultanate history.
**ii.** The students will become familiar with the foundation, expansion, and consolidation of the Sultanate of Delhi.
**iii.** The students would learn about the society and economy existing during the era of the Delhi Sultanate and become familiar with terms like Iqta, market regulations and growth of urban centers.
**iv.** The students will gain knowledge of the religion, society and culture existing during the times of the Delhi Sultans as well as gain perspective of Sufism and Bhakti movements.

**Criteria 2.6.1: Programme outcomes, Programme specific outcomes & course outcomes for all the programmes ofere by the institution.**

**PAPER I: HISTORY OF INDIA- I**

**COURSE OBJECTIVES**

1. The relevant sources for the study of Ancient India, and also gives an overview of the principal historiographical issues, understanding the Settlement pattern, urban centres, when textual and written sources abounded.
2. The successive phases of the early farming culture of southern India and their salient features, the nature of settlements, economy and other traits of these cultures, and the characteristic features of the Early Iron Age
3. Deals with the origins of agriculture and beginnings of domestication of animals before the stage when metals came to be used. the characteristic features of the Neolithic stage of culture,
4. The archaeological evidence in the forms of new types of stone tools, cultivated plants etc. which demonstrates the beginning of cultivation.
5. The history and evolution of Indus valley civilization.
6. Detailed information about the various Janapadas and Mahajanapadas which came into prominence and the political scenario leading to the birth and consolidation of Magadha as an empire.

**PAPER OUTCOME**

1. The students will trace the roots of Indian history. It will make them understand about the different sources that were available for understanding the ancient Indian history.
2. The students can make understanding of the pre historic society of Indian subcontinent right through different stone ages.
3. This makes students aware about the transformation of the society after the Neolithic civilisation. The domestication of the plants and animals which altered process of human civilisation and development of the human settlements.
4. About their nature of contact among the Harappans towns and surrounding areas and also their exchange activities with the contemporary West Asian Civilization.
5. The sources will enable us to study the Epic Age. They will learn the changes in socio-political and economic and religious structures during the epic period.
6. The students also will learn about the emergence of mew religions and philosophy of Lord Buddha and Mahavira.
7. It will explain about the literature that flourished during that age i.e. sangam literature and how it shaped to the formation of Tamil society and culture.

**PAPER III: HISTORY OF INDIA II**

**Course Objectives**

1. It explains the transformation in the social and economic pattern in the ancient India with the formation of state after the consolidation of Magadha Empire.
2. It discusses about the rise of Buddhism and patronisation by the Mauryans, which finally altered the political and social structure of the Mauryans.
3. It emphasizes on the nature of polities of the Gupta Empire and its contemporaries, it discusses about the change in the land ownership pattern through during the post-guptas.

4. It will discuss about the changing social and cultural patterns with the development of the brahmanical traditions.
5. It elucidates the Mauryan and post maurayan art and architecture with special patronage by the Mauryans.

**Course Outcome**

1. This paper explains the student about the formation of empire in the indian subcontinent with the rise of Magadha under Mauryans.
2. It explains the social stratification that took place after the proliferation of varna and jati and further makes good understanding on the topics like gender, marriage and property relation in the period.
3. It explains the students about the dynamic of the society and economy after the advent of the guptas and the later guptas with the initiation of systems like brahmadeya and agrahara.
4. It helps the student to understand the religious transformation that took after the recvivalism by the mighty guptas in the brahmanical tradition and the roots of theistic cults in india.
5. Students can understand the cultural development with the intensification that happened after the flourishing of the art and architecture after the mauryans and the guptas.

**PAPER V: HISTORY OF INDIA III (c. 750 -1206)**

**COURSE OBJECTIVES**

1. It deals with the social, economic, political, religious and cultural condition of Early Medieval India (from 750-1206).
2. This paper has been dissected into five distinctive units and objective of each unit is to make students understand the different historical developments which had taken place in India from 750-1206.
3. It meticulous gives details on the growth of the Rajputs in India- their origin, geographical expressions and also about the character and nature of their role and governance.
4. It will provide the students meticulous details about all the major political developments which has taken place between 750-1206. It deals with political fragments India witnessed after the death of Harshavardhana.
5. the generis of the regional empires like Rashtrakutas, Palas, Senas, Pratiharass, Rajputs and Cholas.
6. The students will understand about the Agrarian structure of the Early Medieval India along with the structure and the dynamics of the society.
7. The students will be able to trace the multi-religious and multi-cultural composition of Indian population such as Bhaktism, Tranticism, Puranic Traditions.

**COURSE OUTCOME**

1. This part will help the students to understand how the new Islamic culture has started in India and its diffusion and amalgamation with natives and the major post Islam social, regional and cultural development in India.

2. This segment will provide crystalline knowledge about the foundation of the Muslim rule in India and vice-versa the beginning of medieval or muslim history in India.
3. The students to explore the agricultural patterns, crops, the types of the landlords, peasants etc. it does talk about the varna fold division as because of which students will be able to understand the overall social composition, concept of caste, slavery such as untouchables, tribes, peasants etc.
4. The students will create the entire dynamics of process of urbanization in early medieval India and also the growth of merchant class particularly guilds in south India.
5. The students will study all the major cultural development of the early medieval India such as growth of regional language, literature, along with the genesis and development of the regional art and architecture.

**Criteria 2.6.1: Programme outcomes, Programme specific outcomes & course outcomes for all the programmes ofere by the institution.**

**SKILL ENHANCEMENT COURSE: (SEC)**

**PAPER-I UNDERSTANDING HERITAGE**

**COURSE OBJECTIVE**

a. This course will enable students to understand the different facets of heritage and their significance.

b. It highlights the legal and institutional frameworks for heritage protection in India as also the challenges facing it.

c. The implications of the rapidly changing interface between heritage and history will also be examined.

**COURSE OUTCOME**

a. It helps the student to understand the heritage and heritage sites of India, it will further enhance the knowledge of them in understanding various legal and institutional law and ordinance that keeps these places intact to their originality.

b. The field survey helps the students to understand heritage sites and know more about the importance of heritage in making the culture and society of the place.

c. The course will develop the minds of the students towards inquisitiveness and makes them question and dig out the hidden facts of the places.

**Criteria 2.6.1: Programme outcomes, Programme specific outcomes & course outcomes for all the programmes ofere by the institution.**

**DSC**

**PAPER-1: HISTORY OF INDIA FROM EARLIEST TIMES UP TO 300 CE.**
**COURSE OBJECTIVES:**

7. The relevant sources for the study of Ancient India, and also gives an overview of the principal historiographical issues, understanding the Settlement pattern, urban centres, when textual and written sources abounded.
8. The archaeological evidence in the forms of new types of stone tools, cultivated plants etc. which demonstrates the beginning of cultivation.
9. The history and evolution of Indus valley civilization.
10. Detailed information about the various Janapadas and Mahajanapadas which came into prominence and the political scenario leading to the birth and consolidation of Magadha as an empire.
11. The social, political economic and cultural history of Mauryans, Parthians, Sakas, Sathavanas and Kushanas
12. The history of south India and land of Tamils

**COURSE OUTCOME**

8. The students will trace the roots of Indian history. It will make them understand about the different sources that were available for understanding the ancient Indian history.
9. This makes students aware about the transformation of the society after the Neolithic civilisation. The domestication of the plants and animals which altered process of human civilisation and development of the human settlements.
10. About their nature of contact among the Harappans towns and surrounding areas and also their exchange activities with the contemporary West Asian Civilization.
11. They will learn the changes in socio-political and economic and religious structures during the epic period.
12. The students also will learn about the emergence of mew religions and philosophy of Lord Buddha and Mahavira.
13. They will learn about the political and administrative history of Mauryan Age, it will further explain about the Ashokan Policies and Dhamma.
14. The student will learn the Post Mauryan dynastic histories and aspects of Polity, Society, Religion, Arts &Crafts, Coins, Commerce and Towns.
15. It will explain about the literature that flourished during that age i.e. sangam literature and how it shaped to the formation of Tamil society and culture

**DEPARTMENT OF POLITICAL SCIENCE**

**COURSE OUTLINE, OBJECTIVES**

**&**

**OUTCOMES**

**B.A Program in Political Science**

**SEMESTER 1:**

**CC 01/DSC101: UNDERSTANDING POLITICAL SCIENCE**

**Course Objectives**: This foundation course attempts to familiarizes students with central debates in political theory in the discipline of Political Science and permits them an overview of the works of some of the discipline's most pertinent concepts. It does so by pointing out long term intellectual traditions of thought as well as implications for contemporary politics and Political Science. Students will learn to critically engage with concepts and canonical texts, to compare them analytically, and to translate what they mean for the present. In so

doing, students will acquire the critical analytical vocabulary to address political questions in a reflected and theoretically informed way. Since the course Understanding Political Science is an introduction to political theory, it is the study that helps us develop working answers to contentious questions. The course is divided into thematic parts: which examines the problems of foundations – what politics is at its beginning; the question of 'science' and 'art', the state - its purpose and meanings; the problem of political rule and the many difficulties involved in having or sharing political power, as well as interrelations among core concepts.

**Learning Outcomes:** The student will be able to appreciate the centrality and importance of 'politics' concepts, and institutions in the more ordinary and everyday aspects of our lives – the politics and policies that determine how we interact at work and in our more private worlds with family and friends, as well as in the public sphere. Throughout, students will be better equipped to employ and use a variety of resources – philosophic, literary, cultural, cinematic, and historical – to understand and develop conceptual ways of engaging with our political world, unraveling, critiquing and understanding those very assumptions we choose to live by.

**CC 02: PERSPECTIVES ON PUBLIC ADMINISTRATION**

**Course Objectives**: This course introduces the history and practice of public administration at the global, national, state, and local levels. Topics include concepts of public policy, organizational theory, intergovernmental administration, human resources, the ethics of public service, and the general principles of impact of the information age. Public Administration also includes studies in law, public policy, organizational theory and a variety of other subjects. Classic confrontation between "politics" and "administration" will be examined in this course. The historical context of the "Good Government Movement" of the Nineteenth Century; the rise of the professions in public management; the issues of responsiveness and patronage; issues of gender will be taught and application made to current state and local government administrative practice. The political process and public policy making will also be examined. While elected officials are the most visible part of our government, it is the daily government workers, or "bureaucrats," who do the majority of governmental tasks and functions. Some of these bureaucrats are public administrators and have a difficult job. They have to come up with implementing solutions to the most daring of society's challenges. They advise elected officials of the strengths and weaknesses of public

programs. A public administrator manages public agencies, sets budgets, and creates government policies. A course in public administration seeks to prepare students to successfully problem-solve and find solutions to various administrative issues.

**Learning Outcomes:** Students can earn a master's or doctoral degree in public administration as the course will provide a sound academic foundation to students. Internships and graduate assistantships are usually available, most commonly at the bachelor's and master's levels. Graduates can also work as urban and regional planners, city managers and more. Public administration attempts to decipher how decisions in government are made as well as administrating government projects to carry out those decisions so students will develop a diverse and multidisciplinary background in public policy, management, sociology, and political theory. Students will develop a strong understanding of finance and accounting, administrative skills and abilities, information about government workings as well as organizational capability. There are a lot of job opportunities in non-profit firms, local government bodies, state government, public service organizations, such as healthcare agencies as well as animal welfare and various non-profit firms at the local, national and international level. After the successful completion of the course, aspirants are eligible to apply for government jobs as a profile for association executives or as a budget analyst with various social groups and also in the Union or state civil services.

**SEMESTER 2:**

**COURSE CC 03/DSC 301: INDIAN GOVERNMENT AND POLITICS**

**Course Objectives:** The course explains the complexities of the Indian political process and its effects on the constitutional institutions of India. Adopting a multi-disciplinary approach, it takes a fresh look at the socio-political and economic scenario of contemporary India and unearths new areas of inquiry by posing pertinent questions on the nature of Indian politics. The strength of the course lies in its focused content, which thoroughly analyses the political happenings in India and studies how the political institutions have emerged and changed since the end of colonial rule in the country. The highlights of this course include discussions and debates on the genesis of the Indian Constitution; the major constitutional offices of India; the theory and practice of federalism; the powers and functions of the Union and state legislature, executive and judiciary; preliminary issues of planning and economic

development and discussions on the party system. The course also broadly initiates discussion on various contemporary issues in Indian politics and governance with respect to the institutions. Ultimately, the goal of this course is to help each member of the class arrive at a deeper, more comprehensive understanding of the forces that shape Indian government and politics, so that he or she may be both a more discerning student and critic of the system and a more informed and reflective participant in it.

**Learning Outcomes:** Students will learn the structure and dynamics of Indian national government, providing a broad-based introduction to the ideas and institutions that shape politics in the contemporary India. Students will have a sound foundation on three major areas: the Indian Constitution and the debates of the founding era and the institutions of modern Indian government. At the completion of the course, students will be familiar with the strategies, roles, and limitations of both governmental elites and ordinary citizens, with particular emphasis on how they communicate and interact within the constitutional "rules of the game" to promote (or inhibit?) the achievement of public goods. Students will be able to critically examine important political phenomena and governmental processes from a variety of perspectives. On successful completion of this course students should be able to show strong knowledge of the Indian political institutions and the way in which they interact in the process of policy making; familiarize themselves with the history of the Indian political system; become aware of the main contentious policy debates that have dominated contemporary Indian political discourse; demonstrate strong understanding of the Indian electoral process as well as critically assess the electoral process.

**CC 04: WESTERN POLITICAL THOUGHT**

**Course Objectives:** One of the most enduring controversies in Western political thought is how to conceptualize the relationship among concepts such as justice, freedom, politics, and citizenship. Aristotle sharply distinguished the economic and political realms, and held that humans experienced freedom—which consisted in civic activity—only in the latter. The English philosopher, John Locke, however, saw freedom, economics, and citizenship as integrally interrelated: government exists to protect not only persons but also property, and freedom largely consists in the ability to accumulate and enjoy property without the threat of either anarchy or tyranny. Marx and Engels agreed with Locke that freedom, economics, and citizenship were integrally interrelated, but Marx and Engels thought private property was antithetical to freedom, and reconceived citizenship as revolution against capitalism. This course introduces the students to Western political thought by tracing the classical history of

the philosophical debate over the proper relation among justice, freedom, economics, and citizenship. Though Plato, Aristotle, J.S Mill, Bentham figure most centrally in the storyline, we will also consider works by Thomas Hobbes, Rousseau, John Locke and others. Heavy emphasis will be placed on enhancing the skills in writing and argument. In this regard, certain key texts (extracts) shall be circulated that will help the students in developing the skill of content analysis.

**Learning Outcomes:** Students will understand the origin and nature of political theory and the ways political theoretical thinking can enhance our capacities for critical reflection and democratic citizenship. They will also understand how the concepts of freedom and citizenship have had multiple and sometimes conflicting meanings in the history of Western political thought and meanings of freedom and citizenship have varied in response to changing understanding. After completing this course, students will be familiar with the main features of the two most important and influential political theories of all time – those of Plato and Aristotle. They will also understand the historical origins of political theory as a field of study and the ultimate roots of contemporary political thought. They will be trained in Socratic, deductive and empirical approaches to studying social life; Students will be able to describe and apply the main classical concepts of political theory, including justice, liberty and community and know the classical forms of government and their comparative strengths and weaknesses. Broadly, they will comprehend some key points of similarity and difference between classical and modern political thought.

## SEMESTER III

### COURSE CC 05/DSC 301 COMPARATIVE POLITICS

**Course Objectives:**

This course studies the political systems of a number of different countries, providing the opportunity to examine the features of individual political systems and to investigate the similarities and differences among political systems in two or more countries. Comparative politics attempts to analyze and explain its findings through comparative study. As such, the goal of comparative study is to develop “law-like” generalizations and thereby facilitate both explanation and prediction, thus warranting the status of a “science.”The course includes case studies of countries such as United Kingdom, United States, China and France. U.S.A. ,China

and Russia. The course is aimed at generating a wealth of information that allows us to construct the key features for each of the individual cases, examine similarities and differences among various political systems, and appreciate the diversity of the political world. The case studies also permit interesting conclusions and allow for the generation of useful questions. Most importantly, though, the case studies examined allow you to begin to engage in comparative political analysis. The course takes that the task of comparative analysis is not simply to describe what is going on in one, two, or more countries, but it is to dig for credible reasons for why these things are going on and offer clear evidence for the ideas that students may unearth. Identify the components of system theory and explain its use in political science. The objectives of the course are to identify the key theoretical approaches and methods used in comparative politics in the hope that students apply these comparative approaches to one, two, or more countries (i.e., undertake comparative analysis). The students will also be expected to distinguish between and analyze the politics of three types of political systems: industrialized democracies, former and current Communist regimes, and the Third World.

**Learning Outcomes:**

Students will be able to compare states according to their historical evolution, political culture and political participation, state institutions, form of government, and public policy. They will also be able to describe, the important details of the political systems addressed in the course. They will be enabled to analyze the impact of globalization on the states covered in the course and assess the level of democratization in the regimes studied in the course. In this course, will explore and understand major questions and issues in contemporary comparative politics.

Students will be able to answer questions that have long been central to research in comparative politics, including the challenges for democratization and democratic stability in certain social and economic contexts, how countries vary in their political institutions (constitutional, electoral, administrative, and party systems) and why these variations matter, and what explains the persistence of ethnicity and causes of civil conflict.

At the successful completion of the course, students will be able to:

- Define the key terms in Comparative Politics

- Discuss the political history, institutions, political cultures, political parties, interest groups, political issues, cleavages, and the major political conflicts of various contemporary political systems
- Compare and contrast major aspects of democratic and non-democratic political systems
- Compare and contrast economic challenges facing developed and developing states
- Debate the role of a state in economic development
- Participate in group discussions about contested concepts with confidence and with tolerance for other points of view
- Navigate the large amounts of research material available in this subject through both traditional academic sources and through the use of information technology
- Demonstrate career readiness and leadership skills appropriate for beginning professional practice, including lifelong learning skills characterised by academic rigour, self-direction and intellectual independence

## COURSE CC: 06 PUBLIC POLICY AND ADMINISTRATION IN INDIA

**Course Objectives:** Public Policy and Administration in India covers a wide range of topics, from the norms and values informing democratic policymaking to the basics of cost-benefit and other tools of policy analysis. Though emphases will differ based on instructor strengths, all sections will address the institutional arrangements for making public policy decisions, the role of various actors-including nonprofit and private-sector professionals-in shaping policy outcomes, and the fundamentals (and limits) of analytic approaches to public policy. This course introduces students to a broad range of research strategies, methods and techniques used in policy analysis. It explores recent developments in analytical techniques, with particular reference to their underlying assumptions and their relevance to problems facing policy analysts and decision makers.

This course introduces basic policy concepts, the policy process and elements of the machinery of government showing the links between the foundations of policy analysis and contemporary public issues in the context of India. In this regard the course will discuss in detail the concept of Public Policy, its characteristics, definition and models; introduce them to the meaning of Decentralization – its significance, approaches and types; learn about the

Local Self Governance: Rural and Urban; introduce them to the concept and significance of Budget as well as inform them about budget cycles in India and various types of Budgeting. Putting the idea of Citizen and Administration Interface and Public Service Delivery the course will attempt to make them familiar with the Redressal of Public Grievances, RTI, Lokpal, Citizen's Charter and E-Governance. Finally, the course will also introduce them to the concept and approaches of Social Welfare including the Right to Education, National Health Mission, Right to Food Security and MNREGA.

**Learning Outcomes:**

At the completion of the course, the student will be able to competently assume foundational positions in policy development organisations, implementation and evaluation, and manage these functions in government, non-profit organisations, international organisations and the private sector Implement skills in all aspects of management, including general management, leadership, organisation management, strategic planning, - financial management, human resource management, and IT management. They will be able to utilise training grounded in theory and practical application of theory to work in organisations in developed countries and countries with emerging economies such as India. They will also understand how to analyse data and make effective management decisions given the diversity and complexity of the Indian social reality. The students will be able to look beyond traditional paradigms, looking instead to non-traditional path-breaking solutions for problems that are specific to India.

The students will also be able to effectively recognize, communicate, and contrast foundational concepts and issues in public policy and administration in India. In particular, they will be enabled to practice public administration constitutionally and legally by understanding the Constitution of India, due process, and equal protection rights. They will understand Union budget processes and assess financial implications of public decisions to the people of India.

**COURSE CC 07: NATIONALISM IN INDIA**

**Course Objectives:**

This course is primarily a survey of Indian history from colonial period to the present, focusing on the ideas, encounters, and exchanges that have formed this dynamic region. For the first two-thirds of the course, we will focus on the history of India from British colonial advent to 1947, privileging the two-and-a-half centuries of British colonial rule in India and the political, social, and cultural contestations that culminated in its independence. In the course's final third, we will focus on the history of the region since India's Partition. In particular, the course will focus on the concept of nationalism and its development in India. This course addresses the conflict and oppression that can be engendered through nationalism, and the global changes that can be brought about by national identities, ideologies and interests. Students will gain a comprehensive knowledge of the central concepts and major theories of nationalism, and identify key issues and problems through comparative and case study approaches.

**Learning Outcomes:**

The course will impart an appreciation of the multidisciplinary nature of nationalism studies, in the context of Indian nationalism and provide a thorough grounding the central concepts and major theories of nationalism give students a comprehensive view of the ideas of key figures in the field convey the need to understand nationalism in the context of long-term, historical social change identify key issues and problems in comparative and case study approaches to the study of nationalism provide explorations of a variety of substantive cases of nationalism, helping students to think concretely about the phenomenon enable students to carry out substantial independent research or write a dissertation on a topic of their interest within the field at a later and higher stage. The course will familiarizes students with major concepts, theories and academic approaches which have influenced scholarly and popular understandings of ethnicity, nationhood, nationalism and notions of individual and group identities in diverse political and territorial contexts. After the completion of the course the students will be enabled to cultivate a theoretical framework for analyzing the various manifestations of identities that are commonly labelled as 'ethnic' and 'national'; engage in a critical inquiry into these processes in diverse cultural and political contexts; develop a comparative perspective to identify underlying similarities as well as distinctive elements of ethnic and nationalist politics across different political, regional and cultural contexts, and finally, gain a broader understanding of the rise and growth of Indian nationalism.

**SEC 301: PUBLIC OPINION AND SURVEY RESEARCH**

**Course Objectives:** Opinion surveys are nearly ubiquitous in public life today. What are surveys, how do we conduct them, what can they tell us (and fail to tell us), and what is their relevance to legal and social research? This course is a skills-based workshop geared to train students to critically consume, generate and interpret survey data including polls. Key topics we will cover include: the history of the concept of public opinion; historical approaches to survey research methods; the role of public opinion in a democracy; understanding sampling theory and questionnaire design; learning about different modes of interviewing and alternatives to opinion surveys; reading texts that discuss public opinion and use survey data; primary analysis of survey data including core concepts of qualitative and quantitative data. This course seeks to provide basic and necessary experience with the use of statistics and probability theory. Students are expected to work on a group project and a research paper for the class which will be used for internal evaluation.

**Learning Outcomes:** Students will develop a large number of cross-disciplinary skills such as: discernment, analytical and summarising skills, research experience, and so on. This range of skills, combined with specialist knowledge acquired during their studies, prepares students for professional careers in very varied sectors of activity, such as: private and public companies in the sector of polling, data collection and analysis (social and market research), careers in public administration, statistical offices, Masters and doctoral training, research and teaching at University or college, Non-governmental and international organizations, Journalism, media, public relations, communication, Business and marketing analytics. Students would have gained advanced training in the theory and hands-on design of survey and public opinion polling instruments, learn how to administer and analyze the results of survey instruments and polls, identify how to make data accessible and meaningful across various stakeholder communities and the general public, as well as integrate polling and survey research so that it can be effective for a range of professional settings and workplace environments.

**COURSE GE 301: READING GANDHI**

**Course Objectives:**

This course will take us back to where it all started, and explore the ideas of the man who, more than any other, was responsible for inventing Civil Disobedience. This will not, primarily, be a class on Gandhi's life. Instead, we will examine the both original writings of both Gandhi and some of his major interpretations to better understand what satyagraha and civil disobedience is, what it is not, in what historical contexts it has been effective, and how it is still relevant today. The course will seek and answer to the question: What is Gandhian philosophy? Is it the religious and social ideas adopted and developed by Gandhi, first during his period in South Africa from 1893 to 1914, and later of course in India or are there other sources? Students will learn that these ideas have been further developed by later "Gandhians", most notably, in India by, Vinoba Bhave and Jayaprakash Narayan. Outside of India some of the work of, for example, Martin Luther King Jr. can also be viewed in this light. Students will delve into the manner in which Gandhi understood human nature by critically looking at his ideas of the universe as an organic whole, where the philosophy exists on several planes - the spiritual or religious, moral, political, economic, social, individual and collective. Students will discuss in detail the twin cardinal principles of Gandhi's thought which are truth and nonviolence. In short, the course will discuss the contribution of Gandhian thought in the making of modern India through his own works, as well as through the interpretations of selected scholars, so that students can evaluate the relevance of Gandhi to the modern times.

**Learning Outcomes:**

The course will give students a good knowledge about Human values and Gandhian Principles. This helps students to improve their attitude to Gandhi and his philosophy. It inculcates the right moral values in students. It teaches students to understand that doing Social service and field work is essential for self-development. The course focuses on Gandhi's influence on Indian and Western thinkers, on the historical developments of Gandhi's philosophy, on ethical issues, Gandhi's moral, religious and social philosophy. The course also gives an over-all picture of Gandhi, as a writer, as a humorist, as a philosopher, as the maker of Modern India and his relevance to contemporary India.

**MASS COMMUNICATION AND JOURNALISM**

**COURSE OBJECTIVES AND OUTCOMES**

**SEMESTER – 1**

**C1 INTRODUCTION TO JOURNALISM**

## COURSE OBJECTIVES

The objectives of the course are to enable the student

1. To understand the meaning, definition and nature of News.
2. To understand how News is carried from the event to the readers.
3. To be aware about the elements of News.
4. To develop understanding how News are written for Press, Electronic and Online medium.
5. To learn about how Press works in the largest democratic nation.

## COURSE OUTCOMES

After the completion of the course student are expected to -

1. Learn meaning, definition and nature of News the students learn about the different types of News.
2. Understand the format of how News is written in an inverted pyramid style by using the 5W's and 1H.
3. Learn to format of how News is written; understand the Ethics of News and the principles that are to be kept in mind while reporting/writing News.
4. Realize how democracy in India helps nurture the upliftment of society and nation as a whole.

**C2 INTRODUCTION TO MEDIA AND COMMUNICATION**

## COURSE OBJECTIVES

The objectives of the course are to enable the student

1. To understand the importance of media in our daily life.
2. To gain knowledge on the different types of media available today and their uses.
3. To study the process, forms and levels of mass communication.
4. To understand the different theories (Bullet Theory, Individual Difference Theory, Personal Influence Theory, Cognitive Dissonance Theory, Agenda Setting Theory)

and models of communication (Aristotle Model, Berlo‘s Model, Laswell‘s Model Shanon & Weaver‘s Model)
5. To understand the importance of folk media in Indian society and its effect on culture.

**COURSE OUTCOMES**

After the completion of the course student are expected to -

1. Distinguish the different mediums available today and appreciate the evolution of media.
2. Acquire basic knowledge on the process, forms and levels of mass communication.
3. Gain knowledge on the basic models of communication and to analyse the process of communication.
4. Appreciate the contributions of different stalwarts in media with theories and to practically analyse and identify the theory effects in today’s media.
5. Appreciate and learn about the traditional folk medium in India and in every culture.

**DSC1 INTRODUCTION TO JOURNALISM**

**COURSE OBJECTIVES**

The objectives of the course are to enable the student

1. To understand the meaning, definition and nature of News.
2. To understand how News is carried from the event to the readers.
3. To make aware about the elements of News.
4. To develop understanding about how News are written for Press, Electronic and Online medium.
5. To learn about how Press works in the largest democratic nation.

**COURSE OUTCOMES**

After the completion of the course student are expected to -

1. Learn about the meaning, definition and nature of News the students learn about the different types of News.
2. Format of how News is written in an inverted pyramid style by using the 5W's and 1H.
3. Understand the Ethics of News and the principles that are to be kept in mind while reporting/writing News. The unit will help them realize how democracy in India helps nurture the upliftment of society and nation as a whole.

**GE1 INTRODUCTION TO JOURNALISM**

**COURSE OBJECTIVES**

The objectives of the course are to enable the student

1. To understand the meaning, definition and nature of News.
2. To understand how News is carried from the event to the readers.
3. To make aware about the elements of News.
4. To develop understanding about how News are written for Press, Electronic and Online medium.
5. To learn about how Press works in the largest democratic nation.

## COURSE OUTCOMES

After the completion of the course student are expected to -

1. Learn about the different types of News.
2. Understand the format of how News is written in an inverted pyramid style by using the 5W's and 1H.
3. Understand the Ethics of News and the principles that are to be kept in mind while reporting/writing News.
4. Realize how democracy in India helps nurture the upliftment of society and nation as a whole.

## SEMESTER – 2
## C3 HISTORY OF THE MEDIA

## COURSE OBJECTIVES

The objectives of the course are to enable the student

1. To understand and learn about the History of Media with special preference to the print revolution and special focus on the history in India. Colonial period and the national freedom movement.
2. To learn about National Freedom Movement, Baptist Missionary, Bucknhgham, Metcalfe, Tilak, Hickey, Raja Rammohun Roy, Aurobindo Ghosh.
3. To understand how the freedom fighters not only fought for independence with determination but also has journalist skills.
4. To the importance of electronic, print and social media in the development and evolution of Media

## COURSE OUTCOMES

After the completion of the course student are expected to -

1. Understand the history of print media in India and how is it became a very important tool for communication. The topic made the students aware about the various restrictions imposed by the Colonial rulers and freedom leaders like Gandhi ,Ambedkar using their journalistic skills through the print medium could become inspirational communicators.
2. Learn how it was not only the Freedom fighters but also English men and organisations that provided literacy to the common people and provided them with knowledge and education.

3. Understand the importance of print media and how it has worked as a tool of making and breaking public opinion. How the first lady Prime Minister Indira Gandhi curbed print media in accordance to her wishes which eventually lead to her dismissal and fall.
4. Understand how electronic, print and social media emerged. The rules and regulations associated with the three media's and their importance form the days of there emergence to present day.

## C4 MEDIA ETHICS AND LAW

### COURSE OBJECTIVES

The objectives of the course are to enable the student

1. To provide fundamental knowledge about ethical framework and media practices including a detailed study on the various laws pertaining to media in India
2. To develop the understanding of media technology and ethical parameters regarding use of media in India.
3. To Examine the Legality and Ethicality of Sting Operations, Phone Tapping and Ethical issues in Social media.
4. To explain the issue of representation and ethics, Advertisement and Women Pornography and study about Related Laws and case studies
5. To learn Media and Regulation Regulatory bodies, Codes and Ethical – ASCI, TRAI, RNI
6. To critique the role of Media and its Social Responsibility, Economic Pressures

### COURSE OUTCOMES

After the completion of the course student are expected to -

1. Have fundamental knowledge of Media Laws and Ethics in India.
2. Exhibit knowledge of legal and ethical issues of media technology.
3. Be equipped with essential knowledge with the issue of presentation and ethics.
4. Acquire adequate information regarding media and social responsibility with special focus on the economic pressure on media and case study on ethical issues of media.

## SEMESTER – 3

## C5 INTRODUCTION TO BROADCAST MEDIA

### COURSE OBJECTIVES

The objectives of the course are to enable the student

1. To understand the basic concepts of sound.
2. To gain knowledge on different types of sound (sound-Sync, Non-Sync, Natural sound, Ambience) and its recording.
3. To understand the basic concepts of images (electronic image, television image digital image, edited Image)
4. To analyse the Characteristics of Radio and television as medium.
5. To gain knowledge on the working style and production (writing and editing) of Radio and Television news.
6. To gain knowledge on Public Service Broadcasters (DD and AIR) and their relevance today.
7. To understand the changing concept of 24 hours news channels and their impact.

### COURSE OUTCOMES

After the completion of the course student are expected to -

1. Gain practical knowledge of identifying and recording (of and) in different sound. sound-Sync, Non-Sync, Natural sound, Ambience)
2. Gain practical knowledge and able to write scripts and production of Radio and Television news.
3. Acquire skill to produce different camera movements and shots.
4. analyse critically the existence and use of Public Service Broadcasters (DD and AIR)
5. Critique the 24 hours news channels and their impact.

**C6 - REPORTING AND EDITING FOR PRINT**

**COURSE OBJECTIVES**

The objectives of the course are to enable the student

1. To provide fundamental knowledge about reporting and editing.
2. To enhance skills in reporting and editing in newspaper for students
3. To develop necessary skills and competency to be employable in the field of print journalism
4. To read newspapers daily and to understand the effect of news in your society and also briefly study the factor affecting news treatment.

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**COURSE OUTCOMES**

After the completion of the course student are expected to -

1. Have fundamental knowledge of Reporting and editing in a newspaper.
2. Exhibit knowledge of print media.
3. Be equipped with essential communication skills for gathering information for news writing.
4. Be adequately motivated to contribute to the development of society after reading daily newspapers and writing stories based on incidents from the society

**C7 ADVERTISING AND PUBLIC RELATIONS**

**COURSE OBJECTIVES**

The objectives of the course are to enable the student

1. To understand the basic concepts of advertising.
2. To learn different areas of advertising.
3. To create new advertising concepts.
4. To expose in the field of public relations.
5. To acquire a working knowledge of a wide range of PR tools and techniques.
6. To use social marketing for social awareness.

**COURSE OUTCOMESS**

After the completion of the course student are expected to -

1. Have an overview of advertising and understanding the basic concept of advertising
2. Be familiar with the hierarchy in the structure of an ad agency and respective roles played by each designation.
3. Analyse and critique the forms of advertisement with different measures and tools.
4. Understand the nuances in brand building.
5. Know advertising in depth.
6. Analyse yesteryear's campaigns for break it down into modules.
7. Understand the notion behind carrying out a campaign.
8. Recognise the public relation materials and how to use it .
9. Launch a campaign on their own and apply the tools and techniques of PR.
10. Acquire the nuances in being a good PRO

## GE 1: FILM STUDIES

## COURSE OBJECTIVES

The objectives of the course are to enable the student

1. To understand the language of cinema focusing on visual language, colour and sound.
2. To learn about the history of film production and its evolution from the age of still photography to present day technical advancements.
3. To understand the difference between different movements in films mainly formalism, realism, French new-wave, Italian neo-realism and its influence on Indian filmmakers and parallel films.
4. To learn the auteur theory and in its light the contributions of well-known directors Satyajit Ray, Akira Kurusowa Cinema and the Nation, Guru Dutt, Raj Kapoor, Mehboob, Mrinal Sen, Ritwik Ghatak, Adoor Gopalakrishnan, Syam Benegal, Govind Nihalini, and Gautam Ghosh
5. To learn about the history and evolution of Indian cinema both main stream and New wave.
6. To understand the effect of cinema on a culture.
7. To understand the contribution of film bodies like CBFC and NFDC.

## COURSE OUTCOMES

After the completion of the course student are expected to -

1. To acquire basic skills in film making with its visual language, colur and sound.
2. To acquire basic knowledge in the film history from its beginning to present day both Western and India.
3. To appreciate the great contributions of well-known auteurs.
4. To analyse the need and importance of Censorship in films in films and have a critical approach towards it.
5. To view and appreciate the screenings and clippings of few famous films and have a liking for classical and parallel films.

# CHEMISTRY

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## Semester I

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**CHEMISTRY-C I: INORGANIC CHEMISTRY-I**
**UNIT I:**
**Atomic Structure:**

**Objectives:**

- Describe the structure of an atom according to Bohr's theory.
- Describe how the atomic model has changed over time and why those changes were necessitated by experimental evidences
- Understand the experimental design and conclusions used in the development of modern atomic theory.
- Development of modern atomic theory.
- Development of quantum-mechanical model of the atom.
- Development of wave-mechanical model of the atom(Schrodinger's wave equation).
- Introduction of mathematical concept of wave-particle duality into the behaviour of electron.
- Explanation of spectral feature of single electronic system
- Quantum Numbers.
- Electronic configuration and orbital diagram of atom
- Term, symbol of polyelectronic system.

**Outcomes:**

Enables one student to

- Describe the structure of atom.
- State the location, relative charges and atomic mass of the subatomic particles.
- Draw the Bohr's structure of atom.
- Know Heisenberg's Uncertainity Principle and De Broglie's Hypothesis.
- Understand Quantum mechanical model of atomic structure.
- know the need of wave mechanical model of atomic structure.
- Understand the mathematical concept of Schrodinger.
- Be familiar with the shapes of different orbitals
- Write the electronic configuration of atom.
- Describe the sequence of energy levels of single electronic system.
- Describe the orbital diagram of atom
- Explain the spectral feature of single as well as polyelectronic system.
- Enables to new areas of research.

**UNIT IV:**
**Objectives:**

Students will be able to know

- Electronic concept of oxidation and reduction.
- Basic principles of Redox reaction.
- Mechanism of electron transfer involve in redox reactions.
- Construct the cell reaction of redox reactions.
- Understand the key mechanism of Volumetric estimation of metal ions.
- Electrochemistry of redox reaction as a tool of future knowledge.

**Outcomes:**

Enables one student to

- Gather knowledge about electronic concept of oxidation and reduction.
- Understand the mechanism of Redox reactions.
- Write down the half Cell Reaction.
- Construct Cell reaction
- Understand the key mechanism of Volumetric Estimation method.
- Apply this knowledge for the estimation of individual and mixture of metal ions.

**CHEMISTRY LAB- C I LAB:**

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**Objectives:**

Students will be able to know

- Thorough concept of Normality and Molality, Primary standard, Secondary standard, Equivalent weight of oxidising and reducing agent.
- Preparation of Standard solution of oxidising and reducing agent
- Details of Volumetric method
- Estimation Carbonate and and hydroxide in a mixture.
- Estimation of Carbonate and Bicarbonate in a mixture.
- Redox Titration
- Redox Indicator both Internal and External
- Estimation of metal ions by titrating with Standard solution of$KMnO_4$ and $K_2Cr_2O_7$.

**Outcomes:**

Enables one student to

- Prepare Standard solution of oxidising and reducing agent
- Estimate Carbonate and and hydroxide in a mixture.
- Estimate Carbonate and Bicarbonate in a mixture.
- Perform Redox Titration
- Estimate metal ions by titrating with Standard solution of$KMnO_4$ and $K_2Cr_2O_7$.
- Utilise this knowledge as future research tools.

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**Semester III**

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**CHEMISTRY-C V: INORGANIC CHEMISTRY-II**

**Objectives**

Students will be able to know

- Understand the general trends in chemistry of s and p block elements.
- Explain Inert pair effect, Anomalous behaviour of the first member of each group(p-block elements).
- Describe the allotropy, catenation of different p-block elements.
- Gather knowledge about rich chemistry of carbon, boron and silicon.
- Describe some haogen compounds(Interhalogen, polyhalides, pseudohalogen e.t.c.).
- Understand new concept of covalent bonding.
- Be familiar with structure and chemistry of some important complex compounds of s and p-block compounds(Chlorophyll, Ca and Mg EDTA complexes).

**Outcomes:**

Enables one student to

- Co- relate the general trends in chemistry of s and p block elements.
- Explain Inert pair effect, Anomalous behaviour of the first member of each group(p-block elements).
- Describe the allotropy, catenation of different p-block elements.
- Gather knowledge about rich chemistry of carbon, boron and silicon.
- Describe some haogen compounds(Interhalogen, polyhalides, pseudohalogen e.t.c.).
- Explain new concept of covalent bonding.
- Be familiar with structure and chemistry of some important complex compounds of s and p-block compounds(Chlorophyll, Ca and Mg EDTA complexes).
- Utilise this knowledge to explain the Chemistry of many other s and p-block elements.

**Objectives**

Students will be able to know

- The structural features of Inorganic polymer, Hybrid Polymer.
- Compare Inorganic Polymer with Organic polymer in physical and chemical properties.
- understand the structures of common inorganic polymers, their preparation and
- applications.
- Know the preparation, properties, structure and application in different fields of some very important polymers like Silicones and Siloxanes, Borazines, Silicates and phosphazenes and polysulphides.

**Outcomes:**

Enables one student to

- Understand the structural features of Inorganic polymer, Hybrid Polymer.
- Compare Inorganic Polymer with Organic polymer in physical and chemical properties.
- understand the structures of common inorganic polymers, their preparation and

- applications.
- Be familiar with the preparation, properties, structure and application in different fields of some very important polymers like Silicones and Siloxanes, Borazines, Silicates and phosphazenes and polysulphides.
- Use this knowledge for further study.

**CHEMISTRY LAB-C V LAB**

**Objectives**

Students will be able to know

- Iodomeric and Iodimetric methods.
- Quantitative estimation of Cu(II) using sodium thiosulphate iodimetrically.
- Estimation of (i) arsenite and (ii) antimony Iodimetrically
- Quantitative estimation of available chlorine in bleaching powder iodometrically.
- Quantitative estimation of mixture of metal ions like $Fe^{3+}$ and $Cu^{2+}$, $Fe^{3+}$ and $Cr^{3+}$, $Fe^{3+}$ and $Ca^{2+}$

**Outcomes:**

Enables one student to

- Know Iodomeric and Iodimetric methods.
- Quantitatively estimate Cu(II) using sodium thiosulphate iodimetrically.
- Estimate (i) arsenite and (ii) antimony Iodimetrically
- Quantitatively estimate available chlorine in bleaching powder iodometrically.
- Quantitatively estimate mixture of metal ions like $Fe^{3+}$ and $Cu^{2+}$, $Fe^{3+}$ and $Cr^{3+}$, $Fe^{3+}$ and $Ca^{2+}$.

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**Semester IV**

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**CHEMISTRY-VIII: INORGANIC CHEMISTRY-III**

**Objectives**

Students will be able to know

- To understand the key features of coordination compounds, including:
  - the variety of structures
  - oxidation numbers and electronic configurations
  - coordination numbers
  - ligands, chelates, Innermetallic complexes
  - bonding, stability of complexes
- Valence bond theory and application
- To be able to use Crystal Field Theory to understand the magnetic properties (and in simple terms the colour) of coordination compounds.

- To be able to describe the shapes and structures of coordination complexes with coordination numbers ranging from 4 to 12.
- To be able to describe the stability of metal complexes by the use of formation constants and to calculate thermodynamic parameters from them.
- Crystal Field Stabilisation Energy and its application
- To be able to recognize the types of isomers in coordination compounds.
- To be able to name coordination compounds and to be able to draw the structure based on it's name.
- Jahn Teller Distortion in Coordination complexes.
- To become familiar with some applications of coordination compounds.

**Outcomes:**

Enables one student to

- understand the key features of coordination compounds, including:
  - the variety of structures
  - oxidation numbers and electronic configurations
  - coordination numbers
  - ligands, chelates, Innermetallic complexes
  - bonding, stability of complexes
- Describe Valence bond theory and application
- Be able to use Crystal Field Theory to understand the magnetic properties (and in simple terms the colour) and spectral properties of coordination compounds.
- Be able to describe the shapes and structures of coordination complexes with coordination numbers ranging from 4 to 12.
- Be able to describe the stability of metal complexes by the use of formation constants and to calculate thermodynamic parameters from them.
- Understand Crystal Field Stabilisation Energy and its application
- Be able to recognize the types of isomers in coordination compounds.
- Be able to name coordination compounds and to be able to draw the structure based on it's name.
- Describe Jahn Teller Distortion in Coordination complexes.
- Become familiar with some applications of coordination compounds.

**UNIT IV:**

**Objectives**

Students will be able to know

- Understand typical roles and chemistry of the elements, in particular the metal ions, essential for living systems, e.g. structural, recognition, sensor roles and redox and non-redox catalytic roles.
- Gather knowledge about the classification of elements as Essential, trace, ultra trace elements.
- Geochemical effect on the distribution of metals.
- About Sodium/Potassium- pump, carbonic anhydrase and carboxy peptidases and their specific roles.
- Dose responce of some trace metals to human body.
- Toxicity of metals like Hg, Pb, Cd and As and reasons for toxicity.

- Uses of chelates in medicine.
- Chemistry of metalloprotein like Haemoglobin and its application in bio-system.

**Outcomes:**

Enables one student to

- Understand typical roles and chemistry of the elements, in particular the metal ions, essential for living systems, e.g. structural, recognition, sensor roles and redox and non-redox catalytic roles.
- Be familiar about the classification of elements as Essential, trace, ultra trace elements.
- Know Geochemical effect on the distribution of metals.
- Gather knowledge about Sodium/Potassium- pump, carbonic anhydrase and carboxy peptidases and their specific roles.
- Understand Dose responce of some trace metals to human body.
- Be familiar with Toxicity of metals like Hg, Pb, Cd and As and reasons for toxicity.
- Know about uses of chelates in medicine.
- Understand the chemistry of metalloprotein like Haemoglobin and its application in bio-system.
- Apply this knowledge for future study.

# COMPUTER SCIENCE

**Program Outcomes (PO):**

1) To provide through understanding application of Computer and computer languages.

2) To develop interdisciplinary approach among the students.

**Program Specific Outcome (PSO):**

After the completion of the course a student is able to

1) To pursue further studies to get specialization in computer Science and Application,MCA,M.Sc.

2) To pursue the career in corporate sector can opt for MBA.

3) To work in public sector undertakings and government organization

4) For teaching in school.

5) To work in the IT sector as programmer, system engineer, software tester, junior programmer, web developer, system administrator, software developer etc.

**Course outcomes (CO):**

## Computer Science SEM 1

AEC11 : Environmental Science

Objectives

1) To Help the social groups and individuals to acquire knowledge of pollution and environmental degradation.

2) To help social groups and individuals to acquire knowledge of the environment beyond the immediate environment including distant environment.

3) To help social groups and individuals to acquire a set of values for environmental protection

4)To help social groups and individuals to develop skills required for making discriminations in form,shape,sound,touch,habits and habitats. Further,to develop ability to draw unbiased inferences and conclusions.

Outcomes

1) The types of Environmenatal issues on which decisions might be made.

2) The physical setting of the prospective environmental decision,including its spatial scale.

3) The types of social groups and individuals who might interact in a process leading up to an environmental decision

4) The time frame within which the decision must be made.

5) To provide social groups and individuals with an opoortunity to be actively involved at all levels in environmental decision making

C12 + CC12L : Programming Fundamental using C (Theory and Lab)

Objectives

8. The course is designed to provide complete knowledge of C language.
9. To help students understand the medium of communication between users and the machine.
10. To develop logic in students which will help them to create programs and applications in C.
11. To make students understand the concept of compilation and execution of a program.
12. To help students understand the basic concept of the various branching and looping constructs for efficient programming

Outcomes

6. By learning the concept of C language, students will be able to develop real life applications in C
7. After learning the basic programming constructs, they can easily switch over to any other programming language in future.
8. After learning the language they will have a clearer understanding of the working of system software like compilers, loaders and linkers.
9. To provide confidence in students to switch to new object oriented languages after understanding the drawbacks of procedural language.
10. To get hands on practice on developing small working applications.
11. To develop understanding of arrays, strings, pointers and memory allocation for real life applications.
12. To help students differentiate between a procedural and object oriented language.

## CC13 + CC13L Computer System Architechture (Theory and Lab)

### Objectives

7. To understand the concept of fundamentals of computers, like : software/hardware/firmware, etc, and the generations of computers and computer languages.
8. To provide the concept of number system and their conversions from one system to the other.
9. To give a clear idea of the working principle of the Arithmetic and Logic unit of the computer processor.
10. To help students identify the difference in evaluation of arithmetic operations by a human and a computer.
11. To understand the basic building blocks of a computer system (logic gate)

### Outcomes

6. Students will be able to design small digital circuits in the Lab and will be able to clearly understand their working principle.
7. Students can assemble and disassemble a computer after learning about its various components.
8. Students can make a small digital project using the various ICs.
9. Students will be able to identify the different hardware parts and they can also resolve minor technical issues.
10. Students will have knowledge on the different software related issues, so they will be able to fix it.
11. To give the realization of the different circuits operating in the computer system.

## GE14 + GE14T : Mathematics (Theory and Tutorial)

Maths Dept.

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## Computer Science Sem 2

## AEC21 : MIL Communication

### Objectives:

6. To introduce students to the theory, fundamentals and tools of communication and to develop in them vital communication skills which should be integral to personal, social and professional interactions.
7. To make students understand that one of the important links between human beings and an important thread that binds society together is the ability to share thoughts, emotions and ideas, which can be done through verbal communication.
8. Recognition of social and cultural pluralities to assist in rapid globalization

9. Nurturing growth of various speaking skills, such as personal communication, social interactions and professional communication (like: personal interviews, group discussions)
10. Develop writing skills like report writing, note taking, etc

Outcomes :

6. Students will be able to overcome the different communication barriers and will be more confident in dealing with people.
7. After studying this course students will find a difference in their personal and professional interaction.
8. They will be able to learn the art of creative writing after development of their writing skills.
9. Better communication skills will help in the personality development of students
10. Students will regular practice on group discussions will be benefited when facing competitive exams.

## CC22 + CC22L : Programming in Java (Theory and Lab)

Objectives

9. The course is designed to provide complete knowledge of Object oriented languages, like, Java.
10. To help students understand the concept of a virtual machine.
11. To develop logic in students which will help them to create programs and applications in Java.
12. To make students understand the concept of compilation, interpretation and execution of a program.
13. To help students understand the basic concept of the various branching and looping constructs for efficient programming.

Outcomes

6. Students will be able to develop real life applications in Java.
7. After learning the language they will have a clearer understanding of the working of system software like compilers, interpreters, loaders and linkers.
8. To get hands on practice on developing working applications.
9. Students will be able to design live software which would be counted in their professional experience.
10. After getting the fundamental knowledge on a powerful language like java, students can further explore its functionalities.
11. To develop understanding of the concept of inheritance, polymorphism, packages, metadata and interfaces.
12. To help students develop network and database related programs.
13. To design graphics based programs.

CC23 + CC23T : Discrete Structures (Theory and Tutorial)

Objectives

7. To understand the internal architecture of a computer.
8. To give a clear idea of the working principle of the Control unit and the Arithmetic and Logic unit of the computer.
9. To help students understand the operations carried out by a computer system and the circuits involved in performing those operations.

Outcomes

5. Students will be able to identify all the hardware components present in a computer and will be able to assemble and disassemble a computer.
6. Students will be able to design small digital circuits in the Lab and will be able to clearly understand their working principle.
7. Students will be able to identify the different hardware parts and they can also resolve minor technical issues.
8. Students will be able to perform arithmetic operations in binary system and understand the exact evaluation procedure that takes place in a computer.
9. To understand the basic building blocks of a computer system and their interconnections.
10. To understand to the process of input and output operations that takes place in a computer.
11. To have a clear understanding of the memory units of a computer and their categorization

GE24 : General Elective 2 (Maths)

Maths Dept

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**Computer Science-IIIsem**

CC31 + CC31L: Data Structures (Theory and Practical)

Objectives

9. To understand the concept of how data is stored in Computers and how they are retrieved.
10. To understand the categorization of data structures into linear and non linear.
11. To understand the use of recursion and recursive functions.
12. To help design algorithms that can search and sort data in a list.

Outcomes:

1.Ability to analyze algorithms and algorithm correctness.

2. Ability to summarize searching and sorting technique.

3. Ability to describe stack,queue and linked list operation

4. Ability to have knowledge of tree and graphs concept.

5. To help design algorithms which are presented in a form, which is machine and language independent.

6. Use of appropriate data structure enables a computer system to perform its task more efficiently by influencing the ability of computer to store and retrieve data from any location in its memory.

7. To understand basic concept about stacks,queues,lists,trees and graphs

8. To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.

## CC32 + CC32L: Operating System (Theory and Practical)

Objectives:

6. To understand the fundamental concepts and techniques of operating systems.
7. To study the concepts in process management and concurrency control mechanisms.
8. To understand the concept of efficient memory managements and related problems.
9. To understand the concept of Synchronization among processes.
10. To help study file management and storage structures used by the operating system.

Outcomes:

6. An ability to understand basic concepts about operating system.
7. An ability to describe process management, scheduling and concurrency control mechanism.
8. An ability to analyze memory management and deadlocks.
9. An ability to compare various file systems and its operating systems example.
10. Ability to implement shell scripting on UNIX Operating System.

## CC33 + CC33T : Computer Networks (Theory and Tutorial)

Objectives:

6. To help students learn the basic terminologies related to Computer Networking and enumerate the layers of OSI and TCP/IP model.
7. To acquire knowledge of application layer and presentation layer paradigms and protocols.

8. To gain core knowledge of network layer, routing protocols, IP addressing and different switching techniques.
9. To help students understand data link layer concepts, design issues and protocols.
10. To help students read the fundamentals and basics of physical layer and will apply them in real time applications.

Outcomes

6. Students will be able to describe the function of each layer in OSI and TCP/IP model.
7. Students will be able to classify the routing protocols and analyze how to assign the IP addresses for the given network.
8. Students will be able to explain the types of transmission media with real time applications.
9. Students will be able to explain the function of application layer and presentation layer paradigms and protocols.
10. Students will be able to apply network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols.

GE34+GE34TL:General elective-3(Physics)

Physics Dept

SEC 35 TL(E3:Python programming)

**Objective:**

1. To learn how to use lists, tuples and dictionaries in Python Programs.
2. To understand useful of scripting language for developers.
3. To learn to use indexing and slicing to access data in Python Programs.
4. To define the structure and components of a Python Programs.
5. To build and package Python modules to reusability.

**Outcomes:**

1) Students will be able to describe the numbers, math function, strings,list,tuples and dictionaries in python
2) students will be able to express different decision making statements and functions
3) students will be able to interpret object oriented programming in python
4) Student can understand and summarize different file handling operations.
5) Students will be able to design and develop client server network applications using python.
6) To use exception handling in Python application for error handling.

## CC41+CC41L:(Design and Analysis of Algorithm)

### Objectives:

1) To teach techniques for effective problems solving in computing

2) The use of different paradigms of problem solving will be used to illustrate clever and efficient ways to solve a given problem

3) In each case emphasis will be placed on rigorously proving correctness of the algorithm

4) it is used to show the efficiency of the algorithm over the native techniques.

5) synthesize efficient algorithms in common engineering design situations.

6)Demonstrate a familiarity with major algorithms and data structures.

### Outcomes:

1) Students can argue the correctness of algorithm using inductive proofs and invariants.

2) Students can analyze worst-case running times of algorithm using asymptotic analysis

3) Students can explain the major graph algorithms and their analyses.

4) Students can describe the greedy paradigm and explain when an algorithmic design situation class for it.

5) Students can compare between different data structures.

6) Students can explain what competitive analysis is and to which situations is applied.

## CC42+CC42L:Software Engineering(Theory +Lab)

### Objectives

7. To help students learn the nature of software development and software lifecycle process models.
8. To have a clear understanding of the concepts and principles of software design and user centric approach and principles of effective user interfaces.
9. To know the basics of testing and understanding the concepts of software quality assurance and software configuration management process.
10. To understand the needs of project management and project management life cycle.
11. To understand project scheduling concepts and risk management associated to various types of projects.
12. To explain methods of capturing, specifying, visualizing and analyzing software requirements.

### Outcomes

7. Students will be able to define various software application domains and remember different process models used in software development.
8. Students will be able to explain needs for software specification and also to classify different types of software requirements and their gathering techniques.
9. Students will be able to classify different testing strategies and tactics and compare them.
10. Students will be able to convert the requirements model into the design model and demonstrate use of software and user interface design principles.
11. Students will be able to generate project schedule and can construct, design and develop network diagrams for different types of projects.
12. Students will be able to investigate the results of bugs and analyze the principles in software testing to prevent and remove bugs

## CC43 + CC43L : Database Management System (Theory and Practical)

### Objectives

7. To enable students to learn to describe a sound introduction to the discipline of database management system.
8. To give a good formal foundation on the relational model of data and usage of relational algebra.
9. To introduce the concept of basic SQL as a universal database language.
10. To enhance knowledge to advanced SQL topics like embedded SQL,procedures connectivity through JDBC.
11. Two demonstrate the principals behind systematic Database design approaches by covering conceptual design, logical design through normalization.
12. To provide an overview of physical design of a database system by discussing Database Indexing Techniques and storage techniques.

### Outcomes:

1. Students will be able to explain the features of Database Management System and Relational Database.
2. Students will be able to design conceptual models of a database using ER Modeling for real life applications and also construct queries in Relational Algebra.
3. Students will be able to create and populate a Relational Database Management System for a real life application with constrants and keys using SQL.
4. Students will be able to analyze the existing design of a database schema and apply concepts of normalization to design an Optimal Database.
5. Students will be able to build indexing mechanisms for efficient retrival of information from a database.

## GE 44: Generic Elective-4(Maths)

Objectives:

1. Students will learn the concept of Set Theory and Relations.
2. The concept of functions and define the recursive functions.
3. To give the concept of Laplace and inverse Laplace transform.
4. To give the concept of Permutation and Combinations.
5. To give the concept of variable and also identify the mapping.

Outcome:

1. Student will be able to apply the Set theory and Relation concepts.
2. Student will be able to apply the functions and define the recursive functions.
3. Student will be able to apply Laplace and inverse Laplace transform to different applications.
4. Student will be able to identify the permutations and combinations.
5. Student will be able to define variable and also identify the mappings.

SEC 45 TL :Android Programming(Theory+Lab)

**Objective:**

1. Students will learn to introduce anroid platform and its architecture.
2. To learn activity creation and anroid User Interface (UI) designing.
3. To be familiarized with intent, broadcast receivers and internet services.
4. To integrate multimedia, camera and location based services in anroid applications.
5. To explore Mobile Security issues.

**Outcomes:**

1. Students will be able to describe anroid platforms, architecture and features.
2. .Students will be able to design user interface and develop activity for anroid application.
3. Students will be able to design and implement Database application and content providers.
4. Students will be able to use multimedia, camera and location based service in anroid application.
5. Students will be able to discuss various security issues in anroid platform.
6. To work with SQLite database and content providers.

# MATHEMATICS

## Math11 HCC-I: Calculus, Geometry and Differential Equation

### Course Objective

1. Introduction of differentiation and its applications in in different curves, in business and in Economics.
2. Introduction of integration and its application through reduction formula in finding length of a curve, area of different geometric shapes and volumes of conics.
3. Finding the equation of conics in coordinate axes and its polar equations. Introductions of more complicated geometric objects, like spheres, cylinders, ellipsoid etc.
4. Introduction to differentia equation and its mathematical models.

### Course Outcome

The students are expected to learn…..

1. Differentiation and its applications in different curves, in business and in Economics.
2. Integration and its application through reduction formula in finding length of a curve, area of different geometric shapes and volumes of conics.
3. To find the equation of conics in coordinate axes and its polar equations. Introductions of more complicated geometric objects, like spheres, cylinders, ellipsoid etc.
4. Differentia equation and its mathematical models.

## Math11 HCC-II: Algebra

### Course Objective

1. Introduction of complex numbers in polar form, theory of equations and certain inequalities.
2. Introduction of basic relations, functions and some mathematical principles in algebra.
3. Introduction to linear equation, matrix equation and its applications.
4. Introduction to linear transformation and its application in matrices.

## Course Outcome

The students are expected to learn…..

1. Complex numbers in polar form, theory of equations and certain inequalities.
2. Basic relations, functions and some mathematical principles in algebra.
3. Linear equation, matrix equation and its applications.
4. Linear transformation and its application in matrices.

## Math21 HCC-III: Real Analysis

## Course Objective

1. Introduction to Real number and its properties.
2. Introduction to sequences with its properties and convergence of sequences.
3. Introduction to series its convergence and divergence through different tests.

## Course Outcome

The students are expected to learn…..

1. Real number and its properties.
2. Sequences with its properties and convergence of sequences.
3. Series its convergence and divergence through different tests.

## Math21 HCC-IV: Differential Equations and Vector Calculus

## Course Objective

1. Finding solutions to homogeneous equations of second order, its properties and applications.
2. Introduction to power series solutions of differential equations.
3. Introduction to systems of linear differential equations, differential operators.

## Course Outcome

The students are expected to learn…..

1. To Find solutions to homogeneous equations of second order, its properties and applications.
2. To find power series solutions of differential equations.
3. Systems of linear differential equations, differential operators.
4. Vector functions and applications of limits to vector functions, differentiation and integration of vector functions.

**Math31 HCC-V**: THEORY OF REAL FUNCTIONS AND INTRODUCTION TO METRIC SPACE

## Course Objective

1. Introduce the main mathematical concept of calculus through critical analysis.
2. To provide a logical progression from fundamental to more advanced concepts, connections between theory and applications in the field of calculus.
3. Introduce the concept of a limit or limiting process, essential to the understanding of calculus.
4. To apply calculus in calculating velocity and changes in velocity and acceleration etc.
5. To introduce the Mean Value Theorems and their implications.
6. To introduce the concept of Metric Space.

## Course Outcome

1. The students are expected to learn the basic concept of calculus its development.
2. They were expected to understand the advanced concepts of calculus and its applications.
3. They are expected to learn and understand limit and its uses in calculus
4. They are expected to learn the use of calculus to calculate velocity and related topics.
5. To make them familiar with the Mean value theorems and its applications in different areas of mathematics.
6. They are expected to be familiar with the concept of metric space and related results.

**Math31 HCC-VI**: **Group Theory 1**

## Course Objective

1. Introduction to Group theory and its basic properties.
2. Deeper studies on the properties of Group.
3. Introduction to cyclic groups and their properties.
4. Introduction to operations on groups.
5. Introduction to Group Homomorphism and their properties.

## Course Outcome

The students are expected to learn…..

1. Group theory and its basic properties.
2. Rudimentary properties of Group.
3. Cyclic groups and their properties.
4. How to do operations on Groups.
5. Group Homomorphism and their properties

**Math31 HCC-VII**: Riemann Integration and Series of Functions

## Course Objective

1. Introduction to Improper Integrals.
2. Introduction to sequence of functions, series of functions and continuity and derivability of the same.
3. Introduction to Fourier Series and their properties.
4. Introduction to power series and their convergences.

## Course Outcome

The students are expected to learn…..

1. Basics of Improper Integrals.
2. Sequence of functions, series of functions and continuity and derivability of the same.
3. Fourier Series and their properties.
4. Power series and their convergences

**MATP11 DSC, Paper-1:** Calculus and Geometry

## Course Objective

1. Introduction to Higher order Derivatives and its applications using Leibnitz rule.
2. Introduction to Reduction formulae and its applications
3. Study of Conics and their properties.

## Course Outcome

The students are expected to learn…..

1. Higher order Derivatives and its applications using Leibnitz rule.
2. Reduction formulae and its applications
3. Conics and their properties.

**MATP24 DSC, Paper-2:** Algebra

## Course Objective

1. Introduction to Polar representation of Complex numbers, Theory of Equations.
2. Introduction to Different types of relations in sets and their applications.
3. Introduction to Linear transformation and its applications in matrices.

## Course Outcome

The students are expected to learn…..

1. Polar representation of Complex numbers, Theory of Equations.
2. Different types of relations in sets and their applications.
3. Linear transformation and its applications in matrices.

**MATP31 DSC, Paper-3:** Real Analysis

## Course Objective

1. Introduction to Real number system and rudimentary studies on its properties.
2. Introduction to Sequences and their convergences by different tests.
3. Introduction to Series and their convergences by different tests.

## Course Outcome

The students are expected to learn…..

1. Real number system and rudimentary studies on its properties.
2. Sequences and their convergences by different tests.
3. Series and their convergences by different tests.

# MICROBIOLOGY

**Course Objective:**

The aim of this course is to familiarize the students with the elementary history of the subject Microbiology and the various theories proposed for Microbial existences which are used in understanding the basics of Microbiology in general. The core course will also help to describe the world-changing scientific contributions of pioneering scientist of the $17^{th}$ to $18^{th}$ century. The core course will help the students to understand the importance of morphological distinctness with respect to species diversity of Algae, Fungi and Protozoa and their Evolutionary relationship that exist in between them. They will try to critically think why algae, fungi and protozoa are studied in Microbiology. Moreover, core course will also provide a comprehensive understanding of the origin of various techniques used in Microbiology and development of ideas to exhibit the techniques origin and development of ideas to exhibit the techniques for isolation of pure culture.

**Learning Outcome:**

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

- Demonstrate an understanding of the principles of scientific inquiry.
- Demonstrate the ability to think critically and employ critical thinking skills.
- Demonstrate the ability to make connections between concepts across Microbiology.
- Describe the contributions of eminent pioneer microbiologist, Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming, Martinus W. Beijerinck, Sergei N. Winogradsky and Selman A. Waksman in the establishment of the field of Microbiology.
- Describe the evidence that support the Germ theory of disease.
- Define microbes in the words of Leeuwenhoek and as we know them today.
- Explain why protozoa, algae, and non-microbial parasitic worms are studied in microbiology.
- List and answer four questions that propelled research in what is called the "Golden Age of Microbiology."
- Identify the scientists who argued in favour of spontaneous generation.
- Compare and contrast the investigations of Redi, Needham, Spallanzani, and Pasteur concerning spontaneous generation.
- List four steps in the scientific method of investigation.
- Discuss the significance of Pasteur's fermentation experiments to our world today.
- Explain why Pasteur may be considered the Father of Microbiology.
- Identify the scientist whose experiments led to the field of biochemistry and the study of metabolism.
- List at least seven contributions made by Koch to the field of microbiology
- List four groups of algae, and describe the distinguishing characteristics of each

- List the four steps that must be taken to prove the cause of an infectious disease.
- Describe the contribution of Gram to the field of microbiology.
- Identify six health care practitioners who did pioneering research in the areas of public health microbiology and epidemiology.
- Name two scientists whose work with vaccines began the field of immunology.
- List four major questions that drive microbiological investigations today.
- Identify the field of microbiology that studies the role of microorganisms in the environment.
- Name the fastest-growing scientific disciplines in microbiology today.
- List the economically important group of Algae, Fungi and Protozoa
- Describe the ultrastructure of viruses
- List several economic benefits derived from algae.
- List four ways in which water moulds differ from true fungi
- Describe the five kingdom system of classification

**BSc. MICROBIOLOGY (CBCS)**

**Course Objective:**

The objective of the Bacteriology paper is to acquaint the student with the basic concepts of bacteriology for the development of the right attitudes by the Microbiology students to better understand the theoretical aspects of Bacteriology. The course is also intended to provide a thorough background on the anatomical and cellular organisation of the basic fundamental unit of all living organisms called cell. The course will also help the student to understand the basic microbial structure and function and study the comparative characteristics of prokaryotes and eukaryotes and also understand the structural similarities and differences among various physiological groups of bacteria/archaea. The student will be able to understand various physical and chemical means of sterilization, historical background of culture growth media and their applications. Know more about various microbial techniques for the isolation of pure cultures in an artificial growth media along with the safe laboratory practices. Moreover, the topics also provide an opportunity to understand the importance of three distinct Domain system of life (Eubacteria, Archaebacteria and Eukaryotes). The coverage of important archaeal and eubacterial groups has been expanded and updated for coherent understanding.

**Learning Outcome:**

**Learning Outcome:**

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

- Demonstrate an understanding of the principles of scientific inquiry.
- Demonstrate the ability to think critically and employ critical thinking skills.
- Demonstrate the ability to make connections between concepts across Microbiology.
- Describe the cellular organisation of prokaryotic and eukaryotic cells
- Differentiate the cell wall characteristics of Gram Positive and Gram Negative Bacteria

- Describe the importance of differential staining procedure: Gram and Acid fast staining
- Describe the importance of differential staining procedure in medical microbiology
- Describe the importance of Archaebacteria
- List two structures that are unique to Gram-negative and to Gram-positive cells, and provide the function of each.
- List two structures that both Gram-negative and Gram-positive cells have in common, and provide the function of each.
-
- Comment on the cell wall characteristics of Archaebacteria
- Describe the effect of antibiotic on the growth of prokaryotic organisms with respect to cell wall architecture
- Differentiate the plasma membrane structure of archaea and prokaryotic organism
- Comment on the Ribosome of Prokaryote and Eukarya
- Describe the process of sporulation in Gram positive bacteria
- State two unique structures present in Eukaryotes, but not in Bacteria and Achaea.
- Describe the structure of endospore
- List the various stages of endospore formation
- List the methods of pure culture isolation
- Describe the various methods of pure culture isolation
- List the important technique available for maintaining the pure culture for short term and long term preservations
- How can anaerobic bacteria be brought into culture growth
- State the difficulties faced by microbiologist in isolating pure culture
- Describe the various methods available in determining non-cultural bacteria.
- List the various types of Microscope used in the field of Microbiology
- Describe the mechanical part and functioning of Bright Field Microscope, Dark Field Microscope, Phase Contrast Microscope, Fluorescence Microscope, Confocal microscopy, Scanning and Transmission Electron Microscope
- Explain why microscope is used in Microbiology
- Describe the nutritional requirements in bacteria
- List the various type of media used in microbiology
- What is a culture and culture media
- Classify various types of media based on function and composition
- How can bacterial growth be enriched
- Describe the physical and chemical methods of sterilization
- Explain the mode of action biocides for controlling microorganisms
- Describe the general process of asexual reproduction
- Explain the logarithmic increase in growth
- Describe the various phases of growth
- Calculate the mean generation time and specific growth rate constant
- List the three Domains of the phylogenetic tree of life. State a unique characteristic of each Domain
- List two features of a useful molecular/evolutionary clock.
- Explain what features of 16S rRNA make it useful to compare the evolutionary relationship between organisms.
- Determine the two most related and two least related organisms from a short list of 16S rRNA sequences.
- Draw inferences about evolutionary relatedness of organisms based on phylogenetic trees.

- Describe the general characteristics of the different members of Archaebacteria
- Describe the overall features related to alpha, beta and gamma proteobacteria
- Describe extensively the features of low G+C Firmicutes
- Describe extensively the features of high G+C Actinobacteria
- Briefly describe the important cellular features associated with cyanobacteria
- Explain the role of heterocyst in nitrogen fixation

**BSc. MICROBIOLOGY (CBCS)**

**SYLLABUS: SEMESTER-II**

**Objective:**

Biochemistry is an evolving science where researchers are making new discoveries every day. The purpose of this course is to teach students the fundamentals concepts in biochemical chemistry and thermodynamics. Enable student to understanding the laws of thermodynamics, concepts of entropy, enthalpy and free energy changes and their application to biological systems and various biochemical studies and reactions. The student will be able to incorporate these concepts into their basic learning of chemical structures needed for understanding of chapter in other courses where basic chemical are used as a precursor for the generation of biological macromolecules i.e., integration of metabolism with biochemistry. The biochemistry course has been designed to meet up the fundamentals required for understanding the chemical biology of microbes and human health. Finally to give an overview of major biomolecules –carbohydrates, lipids, proteins, amino acids, nucleic acids, vitamins, enzymes, their classification, structure, and function will be dealt in details. The fundamental and conceptual knowledge of properties, structure, and function of enzymes, enzyme kinetics and their regulation will be covered using models.

**Learning Outcome:**

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

- Demonstrate an understanding of the principles of scientific inquiry.
- Demonstrate the ability to think critically and employ critical thinking skills.
- Demonstrate the ability to make connections between concepts across Microbiology.
- Explain the two laws of Thermodynamics
- Define Gibb's Free Energy, enthalpy, and Entropy and establish mathematical relationship among them.
- Describe standard free energy change and equilibrium constant and Coupled reactions and additive nature of standard free energy change
- Describe the structure and importance of energy rich compounds: Phosphoenolpyruvate, 1,3- Bisphosphoglycerate, Thioesters andATP
- Give a concise account on the classification of carbohydrates
- Describe the various types of isomerism exhibited by the carbohydrates
- Describe mutarotation with respect to monosaccharides
- Contrast reducing and non-reducing sugars
- Explain Haworth projection formulae for glucose

- Describe the chair and boat forms of glucose
- List the different types of monosaccharides
- Describe the structure of sugar derivatives
- Explain the concept of reducing and non-reducing sugars
- Describe the structural and storage polysaccharides citing biological examples
- Define major classes of lipids
- Classify lipids on the basis carbon chain
- Explain saponification with respect to hydrolysis of triglycerides
- Comment on structural lipids
- Give few examples of saturated and unsaturated fatty acids
- Describe the functions of lipids
- Define amino acids and proteins
- Explain the concept of Zwitterions
- Describe the titration curve of amino acids and its significance
- Classify amino acids on the basis of side groups
- Classify the different level of organisation of protein structure
- Describe the structure and functions of naturally occurring glutathione and insulin and synthetic Aspartame
- Describe in details the structure of Human Haemoglobin
- List the different types of forces that hold the protein structure
- Define enzyme
- Classify enzymes according to enzyme commission number
- Explain the following: Structure of enzyme: Apoenzyme and cofactors, prosthetic group-TPP, coenzyme NAD,metal cofactors
- Describe the mechanism of action of enzymes: active site, transition state complex and activation energy.
- Explain the Lock and key hypothesis, and Induced Fit hypothesis
- Describe the significance of hyperbolic, double reciprocal plots of enzyme activity, Km, and allosteric mechanism
- Give a definitions of terms – enzyme unit, specific activity and turnover number,
- Describe multienzyme complex : pyruvate dehydrogenase; isozyme: lactate dehydrogenase
- Explain the effect of pH and temperature on enzyme activity
- Describe enzyme inhibition: through competitive- sulfa drugs; non-competitive- heavy metal salts
- Classify and characterise vitamins with suitable examples, sources and importance

**BSc. MICROBIOLOGY (CBCS)**

**SYLLABUS: SEMESTER-II**

**Objective:**

This course is offered to students to gain basic knowledge on Introduction to Virology and is followed by an exploration of theories of viral origin. The Virology course is designed in a

lucid manner outlining the essential morphological architecture, physiological, and genetic elements of viruses as well as viroids, satellites, and prions. They will also know how viruses are classified. The concept of interferon, proto-oncogenes is presented and their updated discussion of the role of viruses in causing cancer shall be discussed in detail.

**Learning Outcome:**

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

- Demonstrate an understanding of the principles of scientific inquiry.
- Demonstrate the ability to think critically and employ critical thinking skills.
- Demonstrate the ability to make connections between concepts across Microbiology.
- Define viruses and label its different parts
- Describe the importance of viruses
- Give a general characteristics of viruses
- Give an examples of double stranded single stranded DNA/RNA virus
- Explain the importance of different theories of viral origin
- Describe the various methods available for isolation, purification and cultivation of viruses
- Contrast non-enveloped and enveloped viruses
- What are the possible ways available for the classifications of viruses
- Describe the structure of lambda phage virus
- Compare and contrast DNA and RNA viruses
- Compare and Contrast Plant and animal Viruses
- Explain in details the one step growth curve
- Describe the life cycle patterns of lambda phage
- Describe the role of molecular switches in regulating lytic and lysogenic cycles
- Compare and contrast the differences between lysogenic and latent viral infections
- Explain the various modes of Persistent, non-persistent, vertical and horizontal viral transmissions
- List the salient features of viral nucleic acids with respect to Unusual bases (TMV,T4 phage), overlapping genes (ϕX174, Hepatitis B virus), alternate splicing (HIV), terminal redundancy (T4 phage), terminal cohesive ends (lambda phage), partial double stranded genomes (Hepatitis B), long terminal repeats (retrovirus), segmented (Influenza virus), and non-segmented genomes (picornavirus), capping and tailing (TMV)
- Know how viruses are classified
- Understand the architecture of viruses
- Know the methods used in studying viruses
- Classify the virus on the basis of replication strategies of representative viruses from the seven Baltimore classes
- Understand the interactions between viruses and the host immune system
- Describe the terms Oncogenes and tumor suppressor genes, and how tumor viruses interact with these products and their intersecting pathways and cause oncogenesis.
- Explain the term oncogenic with respect to viruses
- Differentiate between oncogenes and protooncogenes
- Give a concise account of oncogenic DNA and RNA viruses
- Describe the importance of antiviral compounds and their mode of action
- Explain vaccine strategies and mechanisms of antiviral drugs and Interferons
- What are interferon and comment on their mode of action
- Know how viruses can be used as tools to study biological processes , as cloning vectors and for gene transfer.

**BSc. MICROBIOLOGY (CBCS)**

**SYLLABUS: SEMESTER-III**

**Course Objective:**

This course is offered to students to understand the basic of bacterial metabolism and nutrient translocation. The chapter included in the course will be helpful for the student to know the nutritional requirements needed for the biosynthesis and energy yielding and energy-conserving process of each nutritional type. The concept of microbial metabolism is presented by discussing the chemical reaction mainly the redox reaction for understanding the interconnected biochemical pathways used by the cells. Moreover, the coverage of nitrogen metabolism is expanded and updated for better physico-chemical understanding of nitrogen fixation by Nitrogen fixing organisms.

**Learning Outcome:**

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

- Demonstrate an understanding of the principles of scientific inquiry.
- Demonstrate the ability to think critically and employ critical thinking skills.
- Demonstrate the ability to make connections between concepts across Microbiology.
- Describe binary fission as a means of reproduction.
- Explain what is meant by the generation time of bacteria.
- Describe logarithmic growth.
- Draw and label a bacterial growth curve.
- Describe what occurs at each phase of a population's growth.
- Explain how a chemostat can maintain a microbial culture in a continuous phase.
- Contrast direct and indirect methods of measuring bacterial reproduction
- Name the five phases of bacterial batch culture growth, and describe what the cells are doing during each phase.
- Describe the mathematical expression of growth
- Describe the viable and non-viable growth attributes
- Explain the importance of batch and continuous culture
- Compare and contrast synchronous growth, diauxic growth
- Explain the concept of diauxic growth.
- Describe the various physical factors that influence growth
- Define thermophilic, psychrophilic, psychrotolerant, mesophilic, halophilic, acidophilic, alkalophilic, etc., organisms.
- Classify organism on the basis of temperature requirements

- Classify organism on the basis of pH requirements
- Classify organism on the basis of salt requirements
- Classify organism on the basis of oxygen requirements
- Classify organism on the basis of pressure requirements
- Differentiate autotroph with heterotroph
- Classify the organism on the basis of carbon requirements
- Compare and contrast Passive and facilitated diffusion
- Explain the mechanism of group translocation
- Define uniport, symport and antiport
- Describe the microbial growth and effect of environment on microbial growth
- Describe the concept of nutrient uptake and transport.
- Explain the concepts of aerobic respiration, anaerobic respiration and fermentation and various intermediary mechanism involved.
- Explain the pentose phosphate pathway with molecular structure and enzymes involved
- Comment on the various sugar degradation pathways
- Describe with flow diagram , EMP,ED, TCA cycle and electron transport phosphorylation
- What are uncouplers and inhibitors
- Describe anaerobic respiration with special reference to dissimilatory nitrate reduction
- Give a flow diagram of lactate fermentations
- Explain the importance of metabolic pathways in case living organism
- Give the importance of linear and branched fermentation pathways
- Describe the pathway related to alcohol production
- List two differences between substrate-level phosphorylation and oxidative phosphorylation.
- Explain the importance of chemolithotrophic group of organisms
- Explain the role of hydrogen and methane producing bacteria
- Describe the process of methanogenesis in terms of electron transport and energy generation
- What are the various mode of photosynthesis available in case of bacteria
- List the important bacteria capable of carrying out bacterial photosynthesis
- Give a redox diagram to explain the anoxygenic photosynthesis in case of Purple and Green Bacteria
- Give a redox diagram related to oxygenic photosynthesis
- Describe the concept of photosynthesis with relation to light harvesting molecules
- Explain the importance of cyclic photophosphorylation
- Compare and contrast photosynthesis in cyanobacteria and purple or green bacteria
- Describe the process of biological nitrogen fixation with respect to nitrogen fixing group of organisms
- Explain the importance of assimilatory and dissimilatory nitrate reduction

**BSc. MICROBIOLOGY (CBCS)**

**SYLLABUS: SEMESTER-III**

**Course Objective:**

This course introduces the concept of cell biology. The course deals with the discovery of cells and its historical perspectives. The chapters included in different unit deals with the morphology, types, ultrastructure and function of cells. It also discusses the mechanics of cell signalling with respect to second messenger and cell sorting to various cellular compartments. The course also throws light on the mechanism of cell division and its regulatory mechanism through CDK phosphorylation. Moreover, a very significant topic of cancer biology and apoptosis has been covered to a greater extent.

**Learning Outcome:**

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

- Demonstrate an understanding of the principles of scientific inquiry.
- Demonstrate the ability to think critically and employ critical thinking skills.
- Demonstrate the ability to make connections between concepts across Microbiology.
- Describe the cell organisation in relation to plant, animals and bacterial cells
- Describe the Garth-Nicholson fluid mosaic model for explaining the plasma membrane of the prokaryotes
- What are the various mode available for the transport of small molecules across the biological membrane
- Describe the general cell wall structure of Eukaryotes
- Explain the importance of cell organelles in the survival of living organisms
- Describe the ultra structure of various cell organelles present in eukaryotic microorganisms
- Comment on the importance of cytoskeleton for performing various cellular role
- Describe role of actin filaments, intermediate filaments and microtubules
- Describe the overall structure of nuclear envelope nuclear pore complex and nuclear lamina
- Describe the molecular organisation of nucleolus
- Give the importance of Golgi and endoplasmic reticulum in protein sorting mechanism
- What benefits does cell possess after phosphorylation
- Comment on the importance of lysosomes in protein sorting
- Explain various types of signalling molecules and their receptors
- Describe the functions of cell surface receptors
- Describe in general the second messenger pathways for cellular functions
- Comment on cAMP pathway
- Describe the various phases of cell cycle
- How cell cycles is regulated at various phases
- Explain mitosis with respect to animal and plant cell
- How does cytokinesis different in plant and animal cells
- Why does a cell undergo mitotic division? Explain
- Describe the various stages of cancer development
- Sort out the various reasons for cancer progression

- Explain the importance of Programmed cell death and various pathways used during apoptosis.

**BSc. MICROBIOLOGY (CBCS)**

**SYLLABUS: SEMESTER-III**

**Course Objective:**

Eubacteria and Eukaryotes genome replication and expression are considered together in this course. In both cases, the topics has been updated and expanded, and reflects the comparative information flow as carried out by members of Eubacteria and Eukaryote. It will enable the students to know the terms and terminologies related to molecular biology. It will help student to understand the properties, structure and function of genes at the molecular level. To discuss the molecular mechanisms underlying mutations, detection of mutations and DNA damage and repair mechanisms along with the molecular mechanism involved in Replication, Transcription and Translation and the enzymes, accessory proteins involved in it.

**Learning Outcome:**

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

- Demonstrate an understanding of the principles of scientific inquiry.
- Demonstrate the ability to think critically and employ critical thinking skills.
- Demonstrate the ability to make connections between concepts across Microbiology.
- Know the terms and terminologies related to molecular biology and microbial genetics
- Explain Griffith's classic experiment with rough and smooth cells. Describe the relationship between capsule genes and virulence.
- Understand the properties, structure and function of genes in living organisms at the molecular level
- Explain the significance of central dogma of gene action
- Have a conceptual knowledge about DNA as a genetic material, enzymology, and replication strategies
- Compare and contrast prokaryotic and eukaryotic chromosomes.
- Describe the replication of DNA as a semiconservative process.
- Compare and contrast the synthesis of leading and lagging strands in DNA replication.
- Contrast bacterial DNA replication with that of eukaryotes.
- State the central dogma of genetics, and explain the roles of DNA and RNA in polypeptide synthesis.
- Describe the structure of DNA, and its importance as genetic material.
- Describe three steps in RNA transcription, mentioning the following: DNA, RNA polymerase, and promoter, 5' to 3' direction, terminator, and Rho.
- Contrast bacterial transcription with that of eukaryotes.

- Describe the genetic code in general, and identify the relationship between codons and amino acids.
- Describe the synthesis of polypeptides, identifying the roles of three types of RNA.
- Contrast translation in bacteria from that in eukaryotes.
- Explain the operon model of transcriptional control in prokaryotes.
- Contrast the regulation of an inducible operon with that of a repressible operon, and give an example of each.
- Understand the molecular mechanisms involved in transcription and translation
- Describe the importance of genetic code and wobble hypothesis
- Explain the role of post transcriptional mRNA processing in Eukaryotes
- Explain the translation process of eukaryotes and prokaryotes
- Describe the molecular mechanism of sporulation
- Describe the DNA methylations mechanism
- Describe the histone acetylation mechanism

**SKILL ENHANCEMENT ELECTIVE COURSE**
**SEMESTER – III**

**Learning Outcome:**
After successful completion of this course students will be able to:

- Demonstrate an understanding of the principles of scientific inquiry.
- Demonstrate the ability to think critically and employ critical thinking skills.
- Demonstrate the ability to make connections between concepts across Microbiology.
- Understand good laboratory practices
- Understand good microbiological practices
- To know the working of biosafety cabinets
- To know the means of discarding biohazardous materials
- To know the methods of disinfection
- To understand the concept of cultural and microscopic methods
- To enumerate the number by standard plate count and MPN technique
- To know direct microscopic measurements
- Describe the various immunological and biochemical methods for determining food toxins
- Know the use of nucleic acid probes in the assessment of microbe in food sample
- To learn the art of enrichment technique
- To use differential selective media for isolating specific bacteria from water and food samples
- To ascertain the quality of milk sample by MBRT technique
- To learn the rapid detection technique of microbiological quality of milk using, COB, 10 min Resazurin assay
- To appreciate the importance of Hazard analysis of critical control point (HACCP)
- State the BIS standards for common foods and drinking water

**SKILL ENHANCEMENT ELECTIVE COURSE**
**SEMESTER – IV**

**Learning Outcome:**
After successful completion of this course students will be able to:

- Demonstrate an understanding of the principles of scientific inquiry.
- Demonstrate the ability to think critically and employ critical thinking skills.
- Demonstrate the ability to make connections between concepts across Microbiology.
- To list the different types of fermented foods
- State the health benefits advantages of fermented foods
- To learn the various types of milk based fermented foods like Dahi, Yogurt, Buttermilk (Chach) and cheese
- Describe the importance of cereal based fermented foods
- To learn the production methods of Soy sauce, Bread, Idli and Dosa
- To learn the production methods and microorganisms involved in Pickels, Saeurkraut
- To learn the basic of fermented meat and fish products
- To learn the importance of probiotics in promoting health benefits

**BSc. MICROBIOLOGY (CBCS)**

**SYLLABUS: SEMESTER-IV**

**Course Objective:**
Microbial genetics have revolutionized the field of microbiology and the present course covers genome organization, mutations and mechanism in the context of genetic variation into populations. Content also focuses on the mechanism of viral multiplications and stresses on phage genetics and molecular switch.

**Learning Outcome:**
After successful completion of this course students will be able to:

- Demonstrate an understanding of the principles of scientific inquiry.
- Demonstrate the ability to think critically and employ critical thinking skills.
- Demonstrate the ability to make connections between concepts across Microbiology.
- Compare and contrast the genomes of prokaryotes and eukaryotes.
- Describe the structure and function of plasmids.
- Contrast vertical gene transfer with horizontal gene transfer.
- Explain the roles of an F factor, F+ cells, and Hfr cells in bacterial conjugation.
- Compare and contrast crossing over, transformation, transduction, and conjugation.
- Describe a lac operon.

- Define molecular basis of mutation.
- Define point mutation, and describe three types.
- List three effects of point mutations.
- Discuss how different types of radiation cause mutations in a genome.
- Describe three kinds of chemical mutagens and their effects.
- Describe light and dark repair of pyrimidine dimers, base excision repair, mismatch repair, and the SOS response.
- Contrast the positive and negative selection techniques for isolating mutants.
- Describe the Ames test, and discuss its use in discovering carcinogens.
- Discuss the molecular mechanisms underlying mutations, detection of mutations and DNA damage and repair mechanisms
- Describe the genetic basis of lytic and lysogenic switches
- Describe the mechanism of vector mediated horizontal gene transfer
- Explain the HFT and LFT
- Describe the importance of transposable element
- What are insertion sequences
- What are P elements in drosophila
- What are Ac/Dc in maize
- Explain the use of transposition and transposons in genetics

**BSc. MICROBIOLOGY (CBCS)**

**SYLLABUS: SEMESTER-IV**

**Course Title:**

**Course Objective:**

This course has been designed as student-friendly by incorporating pressing issues related to global environmental context. The content in this course also reflect the importance of microorganisms in providing many essential services through its interaction with the biotic and abiotic components of the ecosystem. The importance of essential gaseous and non-gaseous elements required for survival of diverse group of organisms on earth and its cyclic transformation through dynamic biogeochemical cycling and the microbes involved shall be dealt extensively. It also provides an opportunity to appreciate the diversity of

microorganism, abundance and microbial communities inhabiting a multitude of habitats and occupying a wide range of ecological habitats. The content of the course also stresses the urgent need of understanding the water as indispensable resource for the survival of human on this planet. The student will learn the various methods available for the determination of sanitary quality of water and sewage treatment methods employed in waste water treatment.

**Learning Outcome:**

- Demonstrate an understanding of the principles of scientific inquiry.
- Demonstrate the ability to think critically and employ critical thinking skills.
- Demonstrate the ability to make connections between concepts across Microbiology.
- Describe how microbial metabolism can be manipulated for food production.
- Describe how food characteristics and the presence of microorganisms in food can lead to food spoilage.
- List several methods for preventing food spoilage.
- Discuss the basic types of illnesses caused by food spoilage or food contamination, and describe how they can be avoided.
- Describe the role of genetically manipulated microorganisms in industrial and agricultural processes and the basics of industrial- scale fermentation.
- List some of the various commercial products produced by microorganisms.
- Describe two waterborne illnesses.
- Explain how water for drinking and wastewater are treated to make them safe and usable.
- Define the terms used to describe microbial relationships within the environment.
- Explain the influences of competition, antagonism, and cooperation on microbial survival.
- Describe the process of bioremediation.
- Contrast the processes by which microorganisms cycle carbon, nitrogen, sulfur and phosphorus.
- Explain the work of microorganisms in the carbon cycle.
- Elucidate the phosphorous pathway
- Contrast the actions of microbes involved in nitrogen fixation, nitrification, ammonification, denitrification, and anammox reactions.
- How microbes are used for degradation of pesticides
- Describe the importance of hydrocarbon degrading bacteria
- Describe the reduction and oxidation of sulfur by microbes.
- Identify five factors affecting microbial abundance in soils.
- Describe the various methods for solid waste management
- List the various methods available for waste water treatment
- Compare the characteristics and microbial populations of freshwater and marine ecosystems.

- Describe the MPN, P/A tests and membrane filter technique for assessing water quality
- State the strength of sewage with respect to BOD and COD parameters
- Compare and contrast symbiotic and non-symbiotic interactions
- Comment on the microflora of ruminant animals
- Explain the importance of nematophagous fungi

## BSc. MICROBIOLOGY (CBCS)

## SYLLABUS: SEMESTER-IV

**Course Objective:**
The course will help the student to appreciate the importance of microbes in feeding the billions of population on earth. Additionally, preservation of food material from spoilage microorganisms with respect to food borne pathogens and its safety regulation shall be dealt extensively. The course will also focus on the traditional methods of food processing mainly the fermented food and how a microbe enhances the palatability of food by enhancing the nutrient quality and health benefits through development of antioxidant molecules in the finished products. Moreover, the economic importance of food from the microbiological perspective shall be studied in detail.

**Learning Outcome:**
After successful completion of this course students will be able to:

- Demonstrate an understanding of the principles of scientific inquiry.
- Demonstrate the ability to think critically and employ critical thinking skills.
- Demonstrate the ability to make connections between concepts across Microbiology.
- Describe the extrinsic and intrinsic factors that affect growth and survival of microorganism
- Describe various methods available for control of spoilage microorganisms
- Explain the importance of physical method for the control of microorganism in food
- State the importance of chemical methods of food preservations
- List the different starter cultures used in food production
- List the different types of fermented foods
- Describe the health promoting effect of probiotics
- Describe how microbial metabolism can be manipulated for food production.
- Describe how food characteristics and the presence of microorganisms in food can lead to food spoilage.
- List several methods for preventing food spoilage.
- Discuss the basic types of illnesses caused by food spoilage or food contamination, and describe how they can be avoided.

- Describe the role of genetically manipulated microorganisms in industrial and agricultural processes and the basics of industrial- scale fermentation.
- List some of the various commercial products produced by microorganisms.
- Describe the characteristics of food borne pathogens and how is it related to disease formation
- Explain the importance of HACCP
- Describe the various indices of food sanitary quality and sanitizers
- Describe the involvement of bacteria in Food intoxications
- Describe the involvement of bacterial infections in food with respect to both Gram positive and negative bacteria

**PRACTICAL PAPERS**

**BSc. MICROBIOLOGY (CBCS)**

**SYLLABUS: SEMESTER-I**

**Course Objective:**
The students will be attending a laboratory session of 6 hours weekly and they have to perform the practical related to the course list. The Purpose of the lab course is to introduce students to the various types of instruments used in microbiology laboratory. They will learn to take weight measurements using electronics balance for preparing microbial media and reagents required in laboratory along with the art of sterilisation using autoclaves, membrane filter, and hot air oven. The main objective of this subject is to help students identify the different latest measurement and sterilisation techniques available for specific microbiological applications. Lastly, the course is so designed to provide greater safety awareness and to alert students to potential hazards in performing certain experiments in working laboratory.

**Learning Outcomes:**
This course will lead the students to
- Understand the various measurement techniques available.
- Understand the basic working of instruments used for measurement.
- Understand the errors in measurements and their rectification.
- Understand the importance of aseptic practises in Microbiology laboratory.
- Demonstrate practical skills in microscopy and their handling techniques along with staining procedures

1. Microbiology Good Laboratory Practices and Biosafety.
2. To study the principle and applications of important instruments (biological safety cabinets,
Autoclave, incubator, BOD incubator, hot air oven, light microscope, pH meter) used in the

Microbiology laboratory.
3. Preparation of culture media for bacterial cultivation.
4. Sterilization of medium using Autoclave and assessment for sterility
5. Sterilization of glassware using Hot Air Oven and assessment for sterility
6. Sterilization of heat sensitive material by membrane filtration and assessment for sterility
7. Demonstration of the presence of microflora in the environment by exposing nutrient agar Plates to air.
8. Study of *Rhizopus*, *Aspergillus* using temporary mounts
9. Study of the following protozoans using permanent mounts/photographs: *Amoeba*, *Plasmodium*

**BSc. MICROBIOLOGY (CBCS)**

**SYLLABUS: SEMESTER-I**

**Course Objective:** The course aims at developing an appreciation about the principles, functions of culture media used in microbiology laboratory and functioning of various instruments. Know various types of culture media and their applications and also understand various physical and chemical means of sterilization

**Learning Outcomes:** After completion of course students will be able to:

- Work independent in microbiological laboratory.
- To apply the principles and theories learned in the theory in the practical work context.
- Develop mastery of aseptic techniques.
- To perform routine culture handling task safe and effectively.

1. Preparation of different media: synthetic media BG-11, Complex media-Nutrient agar, McConkey agar, EMB agar.
2. Simple staining
3. Negative staining
4. Gram's staining
5. Acid fast staining-permanent slide only.
6. Capsule staining
7. Endospore staining.
8. Isolation of pure cultures of bacteria by streaking method.
9. Preservation of bacterial cultures by various techniques.
10. Estimation of CFU count by spread plate method/pour plate method.
11. Motility by hanging drop method.

**BSc. MICROBIOLOGY (CBCS)**

**SYLLABUS: SEMESTER-II**

**Course Objective:**
The purpose of this practical course is to provide a basis for understanding the basic working design and use of spectrophotometer for determination of linear quantitative curve for the estimation of biological macromolecules, with basic operation and limitations of

spectrophotometer. The course is intended to equip students with a basic understanding of the underlying principles of quantitative and qualitative research methods. This course also helps the students to understand the preparation of reagents and serial dilutions for preparation of standard curve. They will also learn the effect of physical factors and inorganic components mainly the heavy metals on the activity of functional molecules like enzymes.

**Learning Outcomes:** After completion of course students will be able:

- To use spectrophotometer independently for carrying biochemistry experiments.
- To master hands on experience with electronic instruments.

1. Properties of water, Concept of pH and buffers, preparation of buffers and Numerical problems to explain the concepts
2. Numerical problems on calculations of Standard Free Energy Change and Equilibrium constant
3. Qualitative/Quantitative tests for carbohydrates, reducing sugars, non-reducing sugars
4. Qualitative/Quantitative tests for lipids and proteins
5. Study of protein secondary and tertiary structures with the help of models
6. Study of enzyme kinetics – calculation of *V*max , Km, Kcat values
7. Study effect of temperature, pH and Heavy metals on enzyme activity
8. Estimation of any one vitamin

**BSc. MICROBIOLOGY (CBCS)**

**SYLLABUS: SEMESTER-II**

**Course Objective:**

To reinforce learning in the virology course through hands-on experience with plaque assay determination using agar double layer technique and plant assay using focal lesion technique. This course is intended to understand the students to critically analyze the operation of various electron microscopes for ultra-structure determination and morphological characterization of viruses.

**Learning Outcomes:**

After completion of this course, the students will be:

- Capable of working with sewage sample for water quality analysis using plaque assay.
- To understand the importance of various method used in studying viruses.
- Describe electron micrographs of both the animal and plant viruses.
- Know viral diversity using electron micrograph.

1. Study of the structure of important animal viruses (influenza, hepatitis B and retroviruses) using electron micrographs
2. Study of the structure of important plant viruses (Gemini, tobacco ring spot and alpha-alpha mosaic viruses) using electron micrographs
3. Study of the structure of important bacterial viruses (T4, λ) using electron micrograph.
4. Isolation and enumeration of bacteriophages (PFU) from water/sewage sample using double agar layer technique
5. Study of cytopathic effects of viruses using photographs
6. Perform local lesion technique for assaying plant viruses.

**BSc. MICROBIOLOGY (CBCS)**

**SYLLABUS: SEMESTER-III**

**Course Objective:**
To reinforce learning in the microbial physiology course through hands-on experience with growth kinetics experiments using spectrophotometer. This course is intended to understand the students to critically analyze the physical factors which influence the growth dynamics of the organism. Moreover, knowledge acquired through practical doing will help the students to relate better with theoretical paper.

**Learning Outcomes:**
After completion of this course, the students will be;

- Capable of working with bacterial culture for determining the generation time and growth rate constant.
- Describe the roles of carbon, nitrogen, sodium chloride, pH and temperature in microbial growth and reproduction.
- Know the various Physical and Chemical growth requirements of microbes and get equipped with various methods of bacterial growth measurement.

1. Study and plot the growth curve of *E. coli* by turbidometric and standard plate count methods.
2. Calculations of generation time and specific growth rate of bacteria from the graph plotted with the given data
3. Effect of temperature on growth of *E. coli*
4. Effect of pH on growth of *E. coli*
5. Effect of carbon and nitrogen sources on growth of *E.coli*
6. Effect of salt on growth of *E. coli*
7. Demonstration of alcoholic fermentation
8. Demonstration of the thermal death time and decimal reduction time of *E. coli.*

**BSc. MICROBIOLOGY (CBCS)**

**SEMESTER-III**

**Course Objective:**
The purpose of this course is to introduce the students the basics of cell biology. The course provides the opportunity to observe cell undergoing mitotic and meiotic division in a real time basis using compound microscope. Moreover, the experiments in this laboratory course enable the students to gather basic knowledge on chromosomal material through cytochemical staining. Different experiments are also performed which forms the fundamental blocks for understanding the ploidy level in an organisms.

**Learning Outcomes:**
After completion of this course, the students will be:

- Capable of counting chromosome under the microscope.
- Describe the size and shape of chromosome at various stages of mitotic phase.
- On a long term basis they will develop skill which will be helpful for those student who wants to pursue higher learning in the field of cytogenetics.

1. Study a representative plant and animal cell by microscopy.
2. Study of the structure of cell organelles through electron micrographs
3. Cytochemical staining of DNA – Feulgen
4. Study of polyploidy in Onion root tip by colchicine treatment.
5. Identification and study of cancer cells by photomicrographs.
6. Study of different stages of Mitosis.
7. Study of different stages of Meiosis.

**BSc. MICROBIOLOGY (CBCS)**

**SEMESTER-III**

**Course Objective:**
The purpose of this course is to teach students the fundamentals of molecular biology through means of hands-on experiment. The student will be able to isolate DNA, estimate nucleic acid (RNA/DNA) and will characterize it using vertical gel electrophoresis. The main objective of this course is to help student's physical understanding of the genetic material present in all living organisms.

**Learning Outcomes:**
After completion of this course, the students will be;

- Capable of using electrophoretic unit for resolving the size of biomolecules. It will also enable them to take biotechnology as a discipline for pursuing MSc and higher research.

1. Study of different types of DNA and RNA using micrographs and model / schematic representations
2. Study of semi-conservative replication of DNA through micrographs / schematic representations
3. Isolation of genomic DNA from *E. coli*
4. Estimation of salmon sperm / calf thymus DNA using colorimeter (diphenylamine reagent) or UV spectrophotometer (A260 measurement)
5. Estimation of RNA using colorimeter (orcinol reagent) or UV spectrophotometer (A260 measurement)
6. Resolution and visualization of DNA by Agarose Gel Electrophoresis.
7. Resolution and visualization of proteins by Polyacrylamide Gel Electrophoresis (SDS-PAGE).

**BSc. MICROBIOLOGY (CBCS)**

**SEMESTER-IV**

**Course Objective:**
The purpose of this course is to teach students the fundamentals of microbial genetics through means of hands-on experiment. The students will also study the effects of chemical and physical mutagens on bacterial cells and carry out Ames test for the same. The course also provides them with the opportunity to learn various available techniques for assessment of vertical gene transfer. They will try to explain the concept of recombination and elucidate the gene transfer mechanisms in Prokaryotes.

**Learning Outcomes:**
After completion of this course, the students will be able:

- Master technique for isolation of mutants and its characterization.
- Master the skill to handle and work independently on lab protocols involving molecular techniques.
- To use spectrophotometer, bench top centrifuge during isolation of plasmid.

1. Preparation of Master and Replica Plates
2. Study the effect of chemical ($HNO_2$) and physical (UV) mutagens on bacterial cells
3. Study survival curve of bacteria after exposure to ultraviolet (UV) light
4. Isolation of Plasmid DNA from *E.coli*
5. Study different conformations of plasmid DNA through Agaraose gel electrophoresis.
6. Demonstration of Bacterial Conjugation
7. Demonstration of bacterial transformation and transduction
8. Demonstration of AMES test

**BSc. MICROBIOLOGY (CBCS)**

**SEMESTER-IV**

**Course Objective:**
The purpose of this course is to teach students the fundamentals of environmental microbiology through means of hands-on experiment. They will be given on field hands-on exposure on experiments of microbial ecology through assessment of rhizosphere soil and rhizoplane habitat. This course will also help them to carry out water analysis on the physico-chemical basis.

**Learning Outcomes:**
The students will carry out field exclusion for sampling of water and soil sample. The course also provides them with the opportunity to learn various available techniques for assessment of ecological curriculum on class outside the classroom basis. It will be helpful to develop skilled human resource to study the effect of green house gases on climate change and management of natural and anthropogenic wastes.

1. Analysis of soil - pH, moisture content, water holding capacity, percolation, capillary action.
2. Isolation of microbes (bacteria & fungi) from soil (28ºC & 45ºC ).
3. Isolation of microbes (bacteria & fungi) from rhizosphere and rhizoplane.
4. Assessment of microbiological quality of water.
5. Determination of BOD of waste water sample.
6. Study the presence of microbial activity by detecting (qualitatively) enzymes ( amylase) in soil.
7. Isolation of *Rhizobium* from root nodules.

**BSc. MICROBIOLOGY (CBCS)**

**SEMESTER-IV**

**Course Objective:**

This lab course will help the students to understand the basic principles of food and dairy microbiology through practical module systems. The experiments are designed in student friendly way that the theoretical concepts introduced in lectures are re- discussed and implemented practically. The characterization of the microbes isolated from spoiled food stuffs will be done extensively until the basic skill is developed among the student.

**Learning Outcomes:**

- To provide hands-on experience to the students so that they are able to put theoretical concepts to practice.
- To use MBRT and alkaline phosphatase test for the assessment of milk quality.
- To isolate food borne pathogens from the spoiled food/vegetables.
- On the long term basis the course will be fruitful to generate professionals with both theoretical and practical knowledge for food and dairy industry.

1. MBRT of milk samples and their standard plate count.
2. Alkaline phosphatase test to check the efficiency of pasteurization of milk.
3. Isolation of any food borne bacteria from food products.
4. Isolation of spoilage microorganisms from spoiled vegetables/fruits.
5. Isolation of spoilage microorganisms from bread.
6. Preparation of Yogurt.

# Department of Physics

**B. Sc. Physics Honours**

**Semester I**

Paper Core T1:

**Course Objective:**

The Mathematical physics includes basic methodologies in Calculus, vector algebra and calculus, Orthogonal curvilinear coordinates, Introduction to probability and few special functions. The applications of these mathematical tools are to comprehend different physical theories and solving practical physical problems related to Physics. The objective of the course is to enable the students to:

1. Develop the foundational knowledge on the basic calculus, including the idea of limits, continuity, differentiability etc.
2. Formulate and solve different types of first order and second order differential equations.
3. Have a thorough knowledge of partial derivatives, exact and inexact differentials, constrained Maximization using Lagrange Multipliers.
4. Be familiar with the properties of vector, its properties under rotation, scalar and vector product and scalar and vector field.
5. Understand the notion of vector differential operators and their physical significances.
6. Develop the idea about line, surface and volume vector integrations and the relations between them.
7. Comprehend the idea of different types of orthogonal curvilinear coordinates, the transformation between them and the form of vector differential operators in different orthogonal curvilinear coordinates.
8. Learn fundamental idea on probability and different types of probability distribution functions.

**Outcome of the course:**

After the completion the course the students will

1. Acquire comprehensive knowledge on basic ideas of calculus, vector analysis, orthogonal curvilinear coordinates, Dirac delta function and introductory knowledge on theory of probability.
2. Have problem solving ability in the fields, covered in the syllabus.
3. Interlink between these mathematical theories and their applications in different physical systems.
4. Understand the foundation of differential equations and its solutions to enhance problem solving skills.
5. Obtain idea about the physical significances of line, surface and volume vector integrations and their uses in different types of problems.
6. Acquire knowledge on probability and its application in day to day problems.

7. Become familiar with the method of Lagranges undetermined multiplier to solve inter-related functions.
8. Acquire skills in using the Mathematical tolls covered by the syllabus.

Paper Core T2:

**Course Objective:**

Mechanics is one of the fundamental theories in Physics which helps to comprehend the interaction and properties of massive particles within classical limits. This course intends the students to familiar with the introductory ideas of basic and fundamental laws of classical mechanics and also to expose them with the different properties of materials. The course also offers introductory ideas on special theory of relativity, which may help students to realize the evaluation of this canonical theory of modern physics by compare and contrast with the classical idea of mechanics. After going through this course the students are expected to:

1. Have a thorough knowledge on about frames of reference, Newton's laws of motion, Galilean transformation, conservation of momentum, dynamics of systems of particles.
2. Comprehend the relations between force, work and energy, idea of conservative and non-conservative force.
3. Have detail knowledge on laws of Gravitation, potential fields for rigid bodies of different shapes.
4. Be introduced with the motion of particle under central force.
5. Become familiar with simple harmonic oscillator.
6. Have introductory ideas on elasticity of materials and fluid motions,
7. Have knowledge about special theory of relativity which includes ideas about Lorentz Transformations, simultaneity and order of events, Lorentz contraction, time dilation, relativistic transformation of velocity, frequency and wave number, relativistic addition of velocities, variation of mass with velocity, massless particles, mass-energy equivalence, relativistic Doppler effect, relativistic kinematics, transformation of energy and momentum.

**Outcome of the course:**

After the completion the course the students will

1. Acquire the introductory knowledge on Newtonian mechanics.
2. Develop skills to solve problems related to mechanical systems.
3. Acquire knowledge on properties of dynamical systems.
4. Become familiar with the properties of systems under simple harmonic oscillation.
5. Acquire knowledge on elastic properties of materials and fluid motion.
6. Gain an appreciation on the special theory of relativity.
7. Be motivated to extend the knowledge gained from the syllabus to understand modern Physics problems.

Paper Core P1:

**Course Objective:**

Apart from the traditional means like experimental or theoretical approaches, computation has emerged as a third independent method to practice Physics. Simulation of different

physical problems serves as a bridge between the experimental and theoretical physics. Even in hard core experimental or theoretical physics, computation has become indispensable for either interfacing the scientific instruments or analysing the data or to have numerical solutions of equations.

The objective of this course is to make the students

1. Aware of basic structure of computers.
2. Learn the different programming languages like python, mote carlo
3. familiar with data analysing software like GNUplot
4. Develop the skill of numerical analysis.

**Outcome of the course:**

After the completion the course the students will

1. Develop skills of error analysis using computation
2. Acquire skills to draw 2D, 3D graph and fitting data with fit functions using GNUplot
3. Write programmes in Phython
4. Use skills in solving linear and quadratic equations by Newton Raphson and Secant method using programming
5. Solve differentiations and integrations using Monte Carlo method.
6. Understand the importance of Computational methods to interlink Theoretical and Experimental results.

Paper Core P2:

**Course Objective:**

Hand on experiments traditionally has been an inseparable part for practicing Physics. It provides the evidence that grounds the theoretical knowledge. The objective of this course is to introduce students with the first hand experience of experimental physics. The experiments selected in this course have direct relevance with the theoretical knowledge that they gathered in the Core T1 paper so that they can appreciate the empiricism of the said course.

After completing this course the students are expected to:

1. Be familiar with basic measuring instruments in Physics
2. Have an idea about different types of error involved in measurements.
3. Be able to measure different elastic and viscous properties of certain matters using standard experimental procedures.
4. Be able to measure gravitational acceleration using different standard experimental procedures.

**Outcome of the course:**

After successfully completing the course the students were observed to:

1. Have expertise in using instruments like slide calliper, screw gauge, travelling microscope etc.
2. Have been able to calculate different types of errors involved in data acquiring.
3. Acquire skills with standard experimental methods in elasticity and mechanics.
4. Measure acceleration due to gravity using different standard experimental techniques.
5. Relate the theoretical knowledge with the empirical outcomes.

**Semester II**

Paper Core T3:

**Course Objective:**

This course aims to introduce the basic ideas of electric and magnetic fields and electric and magnetic properties of material.

After completing this course the students are expected to:

1. Have knowledge about electric field, potential, energy and relation between them.
2. Know about dielectric properties of materials.
3. Be introduced with the idea of magnetic field magnetic potentials and relations between them.
4. Have knowledge about magnetic properties of materials.
5. Have skill on network analysis

**Outcome of the course:**

After successfully completing the course the students were observed to:

1. Acquire knowledge about electric field, potential, energy and relation between them.
2. Acquire knowledge about dielectric properties of materials.
3. Acquire the idea of magnetic field magnetic potentials and relations between them.
4. Acquire knowledge about magnetic properties of materials.
5. Grown skill on network analysis.
6. Understand the interlink age between electric and magnetic fields and their importance in development of modern Physics.

Paper Core T4:

**Course Objective:**

This course is designed to give students knowledge about waves and optics.

After completing this course the students are expected to:

1. Have knowledge on harmonic oscillations and their super positions.
2. Have idea about longitudinal, transverse plane progressive wave and their wave equations.
3. Have introduced with the electromagnetic nature of light, interference and diffraction.

**Outcome of the course:**

After successfully completing the course the students were observed to:

1. Acquire knowledge on harmonic oscillations and their super positions.
2. Understand the difference in propagation of longitudinal and transverse waves and their inter-linkage with electromagnetic waves.
3. Acquire idea about longitudinal, transverse plane progressive wave and their wave equations.
4. Acquire knowledge on the electromagnetic nature of light, interference and diffraction.
5. Understand the wave characteristic nature of light and to be curious about its wave–particle characteristic.

Paper Core P3:

**Course Objective:**

This course is designed to give students the experience of some traditional hand on experiments on electricity and magnetism. These experiments are related with the theoretical knowledge that they gather from paper T3. After completing the course the students are expected to

1. be familiar with the basic measuring instruments related to electricity and magnetism experiments.

2. Experimentally verify the theoretical knowledge with which they were introduced in course T3.

**Outcome of the course:**

After successfully completing the course the students were observed to:

1. Have acquired the skill to carryout practical experiments related to electricity and magnetism.
2. Comprehend the empiricism of the theoretical inputs of course T3.
3. Gain insight in the digital electronics field.

Paper Core P4:

**Course Objective:**

This course is designed to give students the experience of some traditional hand on experiments on waves and optics. These experiments are related with the theoretical knowledge that they gather from paper T4. After completing the course the students are expected to

1. Be familiar with the basic measuring instruments related to waves and optics experiments.
2. Experimentally verify the theoretical knowledge with which they were introduced in course T4.

**Outcome of the course:**

After successfully completing the course the students were observed to:

1. Have the skill to carryout practical experiments related to waves and optics.
2. Experimentally verify the wave nature of light
3. Comprehend the empiricism of the theoretical inputs of course T4.

**Semester III**

Paper Core T5:

**Course Objective:**

The course aims to familiarise the students with basic concepts of differential equations, Laplace's equation, Boundary Value Problems, Orthogonal Functions and Fourier series and Fourier Integrals, which are widely used in classical as well as in modern physics to derive different physical properties of the system. Application of these mathematical tools will help students have a strong grip on the basic concepts and will be helpful in solving practical physics problems. After completing this course the students are expected to:

1. Acquire knowledge about different types of differential equations and their singular points.
2. Have the skill to convert different physical entities from one coordinate system to another.
3. Have an idea about periodic functions and orthogonality of sine and cosine functions.
4. He introduced to Fourier integrals and their transformation.

**Outcome of the course:**

After successfully completing the course the students are expected to:

1. Solve differential equations and use it to obtain different theories relating to the subject.
2. Have an idea about the solution of Boundary Value Problems belonging to the above class using the method of separation of variables.
3. Acquire skills to solve Legendre and Hermite equations.
4. Have knowledge about periodic functions and the Dirichlet conditions for expanding them in a harmonic series of sines, cosines and complex exponentials.
5. Have acquired skills in solving practical physics problems.

Paper Core P5:

**Course Objective:**
This course is designed to give students knowledge about Numerical computation. Students will be introduced to online graph plotting softwares and scipy modules.
After completing this course the students are expected to:

1. Have basic programming skills on python.
2. Get introduced to python numpy module, arrays, array operations, shaping arrays etc.
3. Have knowledge about curve fitting, least square fit, standard deviation etc.
4. Have idea about plotting Legendre Polynomials and Bessel functions.

**Outcome of the course:**
After successfully completing the course the students are expected to:

1. Acquire basic problem solving skills using python language.
2. Be able to plot graphs using online plotting software like matplotlib.
3. Have knowledge of curve fitting and to determine the goodness of fit.
4. Be able to solve mesh equations of electric circuits.
5. Solve Linear system of equations by Gauss elimination method and Gauss Seidal method.

Paper Core T6:

**Course Objective:**
This course aims to introduce the basic ideas of Kinetic theory of gases and the laws of thermodynamics. Application of these laws is to be applied in understanding the gaseous behaviour. The course briefly covers different topics like velocity distribution in gases, deviation of perfect gas from real behaviour and the different laws of thermodynamics, widely used in understanding gaseous nature.
After completing this course the students are expected to:

1. Understand the application of Maxwell's velocity distribution law and its applications in solving practical problems.
2. Get introduced to the concept of mean velocity, root mean square velocity, most probable velocity and their applications.
3. Have knowledge about molecular collision, free path, mean free path and the idea of relaxation time.
4. Get introduced to different transport phenomenons like viscosity, diffusion and thermal conductivity.
5. Get idea about the behaviour of real gases and its deviation from ideal behaviour.

**Outcome of the course:**
After successfully completing the course the students are expected to:

1. Understand gaseous systems and solve problems based on mean velocity, RMS velocity and most probable velocity.
2. Acquire knowledge on molecular collisions and free paths.
3. Use thermodynamics to further address the different properties of a gaseous systems.
4. Have knowledge on heat engines and their efficiency.
5. Understand the importance of thermodynamics in Physics.
6. Get introduced to the concept of work and heat and to extend the idea to acquire knowledge about adiabatic and isothermal process.
7. Have a brief idea about the laws of thermodynamics and its applications.
8. Get introduced to the idea of reversible and irreversible process.
9. Understand heat engines and acquire knowledge of Carnots engine and its efficiency.
10. Have knowledge about phase transition and basic concept of different thermodynamic potentials.

Paper Core P6:

**Course Objective:**
This course aims to give practical understanding of theoretical methods in thermal physics.
After completing this course the students are expected to:

1. Practically understand thermal conductivity and heat flow.
2. To determine thermal conductivity by different experimental techniques.
3. Get knowledge about thermocouples and thermo-emf.

**Outcome of the course:**
After successfully completing the course the students are expected to:

1. Determine the coefficient of thermal conductivity using various experimental techniques.
2. Acquire practical knowledge about heat flow.
3. Be able to calibrate thermocouples to measure temperature in specified ranges.
4. Practically determine the theoretical knowledge gained from course core T6

Paper Core T7:

**Course Objective:**
This course aims to introduce basic ideas about digital systems and their applications.
After completing this course the students are expected to:

1. Get knowledge about the advantages of integrated circuits and their uses.
2. Differentiate between analog and digital circuits.

**Outcome of the course:**
After successfully completing the course the students are expected to:

1. Differentiate between active and passive components of integrated circuits.
2. Acquire an understanding about advantages and disadvantages of integrated circuits in digital systems.
3. Understand decimal systems in digital circuits and its conversion to binary and vice versa.
4. Understand different types of GATES using diodes and transistors.
5. Get knowledge about Boolean algebra and their uses in circuit realization.
6. Acquire understanding about block diagram and application of timers and counters.

Paper Core P7:

**Course Objective:**
This course is designed to give students the experience of some traditional hand on experiments on digital circuits. These experiments are related with the theoretical knowledge that they gather from paper T7.

After completing the course the students are expected to

1. Experimentally verify the theoretical knowledge with which they were introduced in course T7.

**Outcome of the course:**
After successfully completing the course the students were observed to:

1. Have the skill to carryout practical experiments related to digital circuits and their applications.
2. Be familiar with the basic measuring instruments related to digital circuit experiments.
3. Comprehend the empiricism of the theoretical inputs of course T7.

Paper Core SEC T2:

**Course Objective:**
This course aims to introduce the basics of computational methods in Physics, which will be helpful to the students for solving physics problems.

After completing the course the students are expected to

1. Use linux operating system for computational purpose and as an editor.
2. Be familiar with algorithms and flow chart for plotting different figures arising in physics problems.
3. Use latex for preparing documentation.

**Outcome of the course:**
After successfully completing the course the students were observed to:

1. Understand and develop skills in linux operating system for different computational purposes.
2. Be able to solve basic physics problems using Fortran and C++ computer languages.
3. Use latex with same ease as windows based Microsoft word.
4. Understand linux commands and basics of Fortran and C++ programming skills.

**Semester I (DSC)**

Paper GET1:

**Course Objective:**

The objective of the course is to develop the foundation in mathematical physics, which includes basic methodologies in Calculus, vector algebra, calculus and their applications. The applications of these mathematical tools to comprehend different physical theories and solving practical physical problems related to Physics are to be highlighted.

After going through this course the students are expected to:

1. Develop the foundational knowledge on the basic calculus, including the idea of limits, continuity, differentiability etc.
2. Have a thorough knowledge on about frames of reference, Newton's laws of motion, Galilean transformation, conservation of momentum, dynamics of systems of particles.
3. Comprehend the relations between force, work and energy, idea of conservative and non-conservative force.
4. Have a detail knowledge on laws of Gravitation, potential fields for rigid bodies of different shapes.
5. Be introduced with the motion of particle under central force.

**Outcome of the course:**

After successfully completing the course the students were observed to:

1. Acquire the introductory knowledge on Newtonian mechanics.
2. Develop skills to solve problems related to mechanical systems.
3. Acquire knowledge on properties of dynamical systems.
4. Become familiar with the properties of systems under simple harmonic oscillation.
5. Acquire knowledge on elastic properties of materials and fluid motion.
6. Gain an appreciation on the special theory of relativity.
7. Become familiar with simple harmonic oscillator.
8. Have introductory ideas on elasticity of materials and fluid motions,
9. Have knowledge about special theory of relativity which includes ideas about Lorentz Transformations, simultaneity and order of events, Lorentz contraction, time dilation, relativistic transformation of velocity, frequency and wave number.

Paper GEP1:

**Course Objective:**

This course is designed to give students the experience of some traditional hand on experiments on mechanics. These experiments are related with the theoretical knowledge that they gather from paper T1.

After completing the course the students are expected to

1. Be familiar with the basic measuring instruments related to mechanics experiments.
2. Experimentally verify the theoretical knowledge with which they were introduced in course T1.

**Outcome of the course:**

After successfully completing the course the students were observed to:

1. Have the skill to carryout practical experiments related to mechanics and motion.
2. Comprehend the empiricism of the theoretical inputs of course T1.

**Semester II**

Paper GET2:

**Course Objective:**

The objective of the course is to develop the foundation in mathematical physics, which includes basic methodologies in Electricity and Magnetism. The course is designed to give students knowledge about electrostatics, magnetic properties, electromagnetic induction and basic concepts about electromagnetic nature of light.

After going through this course the students are expected to:

1. Gain knowledge about electricity and magnetism and to understand these phenomenon as a consequence of one another.
2. Be introduced to Faraday's law of electromagnetic induction.

**Outcome of the course:**

After successfully completing the course the students were observed to:

1. Understand the phenomenon of electricity and magnetism and their applications.
2. Understand transverse nature of electromagnetic waves and propagation of light as an electromagnetic wave.
3. Understand light as electromagnetic wave.

Paper GEP2:

**Course Objective:**

This course is designed to give students the experience of some traditional hand on experiments on electricity and magnetism. These experiments are related with the theoretical knowledge that they gather from paper T2.

After completing the course the students are expected to

1. Experimentally verify the theoretical knowledge with which they were introduced in course T2.

**Outcome of the course:**

After successfully completing the course the students were observed to:

1. Be familiar with the basic measuring instruments related to electricity and magnetism experiments.

2. Have the skill to carryout practical experiments related to mechanics and motion.
3. Comprehend the empiricism of the theoretical inputs of course T1.

**Semester III (DSC and GE)**

Paper GET3:

**Course Objective:**

This course aims to introduce the basic ideas of Kinetic theory of gases and the laws of thermodynamics. Application of these laws are to be applied in understanding the gaseous behaviour. The course briefly covers different topics like velocity distribution in gases, deviation of perfect gas from real behaviour and the different laws of thermodynamics, widely used in understanding gaseous nature.

After completing this course the students are expected to:

1. Understand the application of Maxwell's velocity distribution law and its applications in solving practical problems.
2. Get introduced to the concept of mean velocity, root mean square velocity, most probable velocity and their applications.
3. Have knowledge about molecular collision, free path, mean free path and the idea of relaxation time.

**Outcome of the course:**
After successfully completing the course the students are expected to:

1. Understand gaseous systems and solve problems based on mean velocity, RMS velocity and most probable velocity.
2. Acquire knowledge on molecular collisions and free paths.
3. Use thermodynamics to further address the different properties of gaseous systems.
4. Have knowledge on heat engines and their efficiency.
5. Understand the importance of thermodynamics in Physics.
6. Get introduced to different transport phenomenon's like viscosity, diffusion and thermal conductivity.
7. Get introduced to the concept of work and heat and to extend the idea to acquire knowledge about adiabatic and isothermal process.
8. Have a brief idea about the laws of thermodynamics and its applications.
9. Have knowledge about phase transition and basic concept of different thermodynamic potentials.

Paper GEP3:

**Course Objective:**

This course is designed to give students the experience of some traditional hand on experiments on heat and thermodynamics. These experiments are related with the theoretical knowledge that they gather from paper T3.

After completing the course the students are expected to

1. Experimentally verify the theoretical knowledge with which they were introduced in course T3.

**Outcome of the course:**
After successfully completing the course the students were observed to:

1. Have the skill to carryout practical experiments related to heat and thermodynamics.
2. Comprehend the empiricism of the theoretical inputs of course T3.
3. Be familiar with the basic measuring instruments related to heat and thermodynamics.

## DEPARTMENT OF ZOOLOGY

### CORE T1: NON CHORDATES 1

### COURSE OBJECTIVES:

To enable the learners

1. To introduce the basics of Animal classification and concept of classification (Whittakar and Carl Woese)
2. To acquaint students with general characters and classification of different phyla from protozoa to nematodes.
3. To describe the life cycle of protozoan parasite, platyhelminth parasite and nematode parasite.
4. To provide conceptual knowledge on the evolution of symmetry and segmentation of metazoa.
5. To introduce the concept on metagenesis and polymorphism in Cnidaria.
6. To discuss the coral reef diversity and their function and conservation.

### COURSE OUTCOME:

Students are expected

1. To define Systematics and Taxonomy and to describe the codes of zoological nomenclature.
2. To describe the general characters and recall the classification of different phyla.
3. To explain the life cycles of different parasites.
4. To differentiate the different forms of symmetry and understand the importance of segmentation in metazoan
5. To describe metagenesis and different forms of polymorphism.
6. To recognise the different forms of coral reefs and understand their importance in ecosystem.

**CORE T2: ECOLOGY SEM-I**

**COURSE OBJECTIVES :**

The larger objective of the study of ecology is to understand the nature of environmental influences on individual organisms, their populations, and communities, on ecoscapes and ultimately at the level of the biosphere. If students can achieve an understanding of relationships, they will be well placed to contribute to the development of systems by which humans could sustainably use ecological resources.
The purpose of the study is to give an insight to various topics related to ecology which are as follows:

1. Distinguished between species, populations, communities, ecosystems and biomes.
2. Understand the factors that affect population size, density, distribution, and dynamics.
3. Know the exponential growth curve and s-curve.
4. Know what factors control carrying capacity.

a. Density dependent
b. Density independent

5. Distinguish the following terms

a. Habitat
b. Niche
c. Symbiosis
d. Competition
e. Predation
f. Mutualism
g. Commensalism
h. Parasitism

6. Describe species interactions

a. Intraspecific
b. Interspecific

7. Describe succession in a community.
8. Understand how materials and energy are flowing through any ecosystem.
9. Describe various trophic levels and their roles in ecosystem.
10 .Compare and contrast terrestrial, aquatic and marine ecosystems.

OUTCOME:
Students attain the basic knowledge of fundamental and applied ecology, which will enable their further education at the University postgraduate studies and researches in the field of ecology. They will be able to differentiate and distinguish the various types of ecosystems. With a clear understanding of the biotic and biotic factors, they will be able to explain the importance of energy flow and material recycling in nature . They will be able to understand the importance of every species in the ecosystem and value the importance of protecting and preserving them. The relation of the species, population and the community will help them to take positive steps in the areas of global health and preservation of Natural Resources.

**CORE T3: NON CHORDATES II**

**COURSE OBJECTIVES:**

To enable the learners

1. To understand the evolution of coelom and metamerism.
2. To understand the taxonomic portion of Annelids to Hemichordata.
3. To understand the general characters of animals belonging to Annelida uptoHemichordata.
4. To classify the animals belonging to Annelida uptoHemichordata.
5. To acquaint the students with excretion in Annelida through nephridia and locomotion in *Neries*.
6. To discuss vision in insects, respiration in Arthropoda and metamorphosis in insects.
7. To explain the evolutionary significance and affinities of *Peripatus*.
8. To describe the nervous system and torsion and detorsion in Gastropoda.
9. To provide conceptual knowledge on the water vascular system in Echinodermata and various larval forms.

**COURSE OUTCOME:**

**Students are expected**

1. To classify animals on the basis of coelom and describe different types of metamerism and their significance.
2. To recall and write the systematic position of Annelids to Hemichordata.
3. To describe unique characters of annelids, arthropods,molluscs, echinoderms and hemichordates.
4. To recall the classification of different phyla from annelids to hemichordates.
5. To list all the different types of nephridia in annelids and describe locomotion in *Neries*.
10. To describe the different parts of compound eye, respiration in Arthropoda and recognise the different types of metamorphosis in insects.
11. To comprehend the evolutionary significance and affinities of *Peripatus*.
12. To draw the nervous system and explain torsion and detorsion in Gastropoda.
13. To describe the water vascular system in Echinodermata and identify the different larval forms.

**Core T4 - Cell Biology**

**OBJECTIVES:**

**1.**The students will be introduced to the basic structure of Prokaryotic and Eukaryotic cells, Viruses, Viroid, Prion and Mycoplasma.

2. To be familiar with the ultra structure and composition of Plasma membrane: Fluid mosaic model and mechanism of Transport across membrane: Active and Passive transport, Facilitated transport and knowledge of Cell junctions: Tight junctions, Gap junctions and Desmosomes.

3. To familiarise the students with the Structure and Functions: Endoplasmic Reticulum, Golgi Apparatus and Lysosomes.

To understand the Protein sorting and mechanisms of vesicular transport.

4. Mitochondria: Structure, Semi-autonomous nature, Endosymbiotic hypothesis, Mitochondrial

Respiratory Chain, Chemi-osmotic hypothesis Peroxisomes: Structure and Functions Centrosome: Structure and Functions

5. To understasnd the ypes and function of cytoskeleton and have a clear understanding of

structure of microtubules and microfilamentsin terms of molecular makeup related to proteins.

A brief idea about molecular motors will be discussed as well.

6. The Structure of Nucleus, the Nuclear envelope and theNucleolus along with Chromatin:

Euchromatin and Hetrochromatin and packaging (nucleosome) will be explained.

7To discuss the concept of Cell cycle and its regulation and emphasize on the difference between mitosis and meiosis and its significance. Cancer (Concept of oncogenes and tumor suppressor genes) will be explained in brief.

8. They will have a concept of Cell signalling transduction pathways; Types of signaling molecules and receptors along with GPCR and Role of second messenger (cAMP), Protein kinase and $Ca^{+2}$

Apoptosis and Necrosis- (brief idea).

**OUTCOME :**

1. The students are expected to gain knowledge to differentiate Prokaryotic and Eukaryotic cells, Viruses, Viroid, Prion and Mycoplasma.

2. The students will have clear of the different molecules that comprises the structure of plasma membrane and the ways they facilitate the transport mechanism in and out of the cells. They will be able to understand the difference between facilitatedtransport, active and passive transport

3. The students will be able to understand the structure and related function of the organelles in a cell such as Endoplasmic Reticulum, Golgi Apparatus and Lysosomes.

4. The students will be able to understand the structure and function of Mitochondria as the energy producing organelle in a cell. They will be able to explainthe respiratory chain, along with endosymbiotic and chemiosmotic hypothesis.

5 The students should be able to differentiate the molecular structure of microtubules and microfilaments and explain the structure of skeletal framework.

6. The students should be able to explain the ultra structure of nucleus, nuclear encelope and nucleolus in relation to the importance of the organelle as the central coordinating centre of a cell.

7. The students will gain knowledge to understand the different types of cell division and its significance in vegetative and reproductive cells

8. The students should be able to explain and write on the. Cell signalling and transduction pathways.

**Core T5 – CHORDATES**

OBJECTIVES:

Unit 1: To understand the main characteristic features of Phylum Chordata and general characteristic features upto Class level.

Unit 2: To classify Urochordates and Cephalochordates upto Class Level and understand the Retrogressive metamorphosis in ***Ascidia*** and feeding in ***Branchiostoma.***

Unit 3:To understand how the chordates originated and related theory of their origin.

Unit 4: To explore the characteristic features of cyclostomes upto order level. The process of metamorphosis in Lamprey and the zoological importance of ammocoete larva.

Unit 5: To familiarise the students with two major classes of fishes, the Chondrichthyes and Osteichthyes. The students will learn the process of migration and parental care in fishes and the diversity in the structure o swim bladder in fishes.

Unit 6: To understand the classification of Amphibia upto living orders along with parental care, metamorphosis, neoteny and paedogenesis.

Unit 7:To classify Class Reptiliaup to living orders with deeper insight into the biting mechanism of snakes and the poison apparatus.

Unit 8: To learn the characters and classification of Aves . To understand the mechanism of migration in birds, their exoskeletal structures and double respiration. The students will understand the aerodynamics and principles of flight.

Unit 9: the students will learn to classify Mammals up to living orders, the exoskeletal structures, adaptive radiation and echolocation in bats,

Unit 10. The Continental Drift theory, and animal distribution globally with a detailed understanding of Zoogeographical Realms.

## OUTCOME

The students will have the concept of lower chordates (Protochordata) and higher chordates and the importance of the study of ***Ascidia*** and***Branchiostoma***.

The students shall have a detailed understanding about the structure of the pharynx associated with filter and ciliary feeding in lower chordates.

The students will be able to understand that the vertebrates are more advanced in structure and function than the protochordata.

The students will be able to distinguish the vertebrates from invertebrates and should be able to understand the characteristic features of Chordates.

The students shall be able to classify any class of vertebrates and able to corelate the theoretical knowledge with local specimens.

The students will be able to discuss the unique adaptive capabilities of vertebrates such as accessory respiration in fishes, parental care in amphibia, adaptation of birds as a flying machine and echolocation in bats should enrich the students with the evolutionary processes in different classes of vertebrates.

The students will be able to explain the concept of understanding the mechanisms of progressive and retrogressive metamorphosis should be understood by the students.

The students will be able to describe the development of special structures in animals such as the poison apparatus in snakes, feathers in birds and locomotory appendages in mammals as a result of adaptive radiation should be clear to the students.

The student will be able to realise the diversity of ecosystems globally and its relation to animal distribution in the Zoogeographical Realms. It should make the students to relate the diversity of life (higher vertebrates ) in different parts of the globe .

**Core T6 – Animal physiology: Controlling and coordinating systems.**

**OBJECTIVES:**

From this lesson, the students will be able to know:

1. How animals work and the biological processes essential for animal life, at levels of organization from membranes to the whole animal.
2. In its broad sense it includes the scientific disciplines of tissues, bone and cartilage, nervous system, muscular system, reproductive system and endocrine system.
3. The role of the nervous system in coordinating an animal's response to environment and organ system of human body.
4. The nervous system gathers, sorts and stores information and initiates movement
5. The basic structure and function of a neuron, the structure and function of a synapse and neurotransmitter chemicals.
6. The nervous pathway known as a reflex with examples.
7. That the nervous system can be divided into the central and peripheral nervous systems.
8. That the peripheral nervous system and autonomic nervous system
9. How the endocrine system and endocrine glands in animals help in the chemical coordination.
10. Histology and function of pituitary, thyroid, pancreas and adrenal gland.

**OUTCOMES:**

At the end of this unit students should be able to recognize the need for control and coordination in the body of organisms., various hormones and discuss about their functions, understand that nerve cell is the basic structural and functional unit of nervous system, understand significance of nervous system, reproductive system, muscular system, structural integration of tissues, bones and cartilages in human body.

**CC7: GENETICS**

**COURSE OBJECTIVES:**

To enable the learners

1. To understand the basic principles of Mendelian inheritance.
2. To provide conceptual knowledge on linkage and crossing over and chromosome mapping.
3. To introduce the types of gene mutations, types of chromosomal aberrations.
4. To discuss the mechanisms of sex determination in *Drosophila* and mammals.
5. To analyse the criteria for extra chromosomal inheritance, antibiotic resistance in *Chlamydomonas*.
6. To learn recombination in bacteria and viruses, conjugation,transformation and transduction.

**COURSE OUTCOME:**

Students are expected

1. To demonstrate knowledge of the basic principles of Mendelian genetics.
2. To explain the process of linkage and crossing over and apply the principles in measuring recombination frequency.
3. To classify different types of gene mutations and chromosomal aberrations.
4. To differentiate the different mechanisms of sex determination.
5. To recall the criteria for extra chromosomal inheritance and explain the antibiotic resistance in *Chlamydomonas*.
6. To explain recombination in bacteria and viruses, and differentiate between conjugation, transformation and transduction.

**SKILL ENHANCEMENT COURSE**

**SEC T1: APICULTURE**

**COURSE OBJECTIVES:**

To enable the learners

1. To understand the basics of Apiculture, classification, biology and social organization of honey bees.

2. To provide conceptual knowledge on artificial bee rearing and bee hives- Newton and Langstroth.

3. To study about bee diseases and enemies and its control and preventive measures.

4. To discuss the products of apiculture industry and its uses.

5. To provide knowledge regarding entrepreneurship in apiculture by enabling them to understand the modern methods in employing artificial beehives for cross pollination in horticultural gardens.

**COURSE OUTCOME:**

**Students are expected**

1. To name the different classes of honeybees and to have a preliminary knowledge regarding Apiculture.
2. To explain the process of artificial bee rearing and the framework of Newton and Langstroth hive.
3. To classify different types of bee diseases and enemies and to know about its control and preventive measures
4. To recall the different products of apiculture industry and their uses.
5. To differentiate the different mechanisms of sex determination.
6. To apply the knowledge of Apiculture entrepreneurship and utilize it to employ artificial bee hives.

# Program outcomes of Bachelor of Arts

PO1. Demonstrate a detailed knowledge and understanding of selected fields of study in core disciplines in humanities, social sciences and languages.

PO2. Articulate the relationship between diverse forms of knowledge and the social, historical and cultural contents that produced them. Communicate effectively and in the case of those students undertaking a language major, need, write, listen to and speak another language with fluency and appreciate its cultural context.

PO3. Reading, Writing skills and Process:- Students will become accomplished, active readers to appreciate ambiguity and complexity and who can articulate their own interpretations with an awareness and curiosity for other perspectives. Students will be able to write effectively for a variety of professional and social setting. they will develop an awareness and confidence in their own voice as a writer and analyse complex social and natural problems with the help of their degree specialisation.

PO4. Sense of Genre:- Student will develop an appreciation of how the formal elements of language and genre shape meaning and they will develop a facility at writing in appropriate genres for research and other variety of purposes.

PO5. Critical Approaches:- Students will develop the ability to read works of literary, rhetorical, research, cultural criticism and develop idea with the help of their specialisation. They will express their own ideas as informed opinions, small projects, practical, research papers and understand how their own approach compares to variety of critical and theoretical approaches.

PO6. Oral communication skills:- Student will demonstrate the skill needed to participate in conversation that builds knowledge collaboratively. Listening carefully and respectfully to others view points. Articulating their own ideas and questions clearly and situating their own ideas in relation to other voices and ideas. Student will be able to prepare, organise and deliver and engaging oral presentation.

PO7. Ethics:- Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**Program outcomes of Bachelor of Commerce:**

PO1. Demonstrate knowledge of major theories and models in key areas of organizational behaviour.

PO2. Analysis Organisational problems and generate realistic solutions based on current academic research in organisational behaviour.

PO3. Apply basic mathematical and statistical skills necessary for analysis of a range of problems in economics actuarial studies, Accounting, Marketing, Management and Finance.

PO4.Environment Awareness : Understand the issues and problems of environmental context and develop environmental awareness in the mind.

PO5.Consumer Movement : Make people aware about consumer movement, rights & duties, laws relating to consumers.

PO6.Sound knowledge of various laws : Impart the knowledge of basic concepts, terms & provisions of company law, Mercantile law, Income Tax and other laws affecting business, trade and commerce.

**Program outcomes of Bachelor of Science:**

PO1. Articulate the methods of and science and explain why current scientific knowledge is both contestable testable by future inquiry.

PO2. Apply appropriate methods of research, investigation and design, to solve problem in science, mathematics, technology including the planning and conduct of a significant project problem or investigation.

PO3. Articulate the relationship between different science communities of practice, the international scope of science, mathematics, technology and engineering knowledge and methods and the contributions to their development that have been made by people with diverse perspectives, culture and backgrounds.

PO4. Students will develop the ability to read works of literary, rhetorical, research, cultural criticism and develop idea with the help of their specialisation. They will express their own ideas as informed opinions, small projects, practical, research papers and understand how their own approach compares to variety of critical and theoretical approaches.

**Program outcomes of Bachelor of Computer Science:**

PO1.To prepare the students for a career in Software Industry.

PO2.To develop problem solving abilities using computer.

PO3. To build the necessary skill set and analytical abilities for developing computer based solutions for real life problems.

PO4. To imbibe quality software development practices.

PO5. Student can work effectively both individually and as member of team.