

# **Faculty of Arts**

# Programme- B.A.

## Programme Outcomes

- PO1 To enable the students to understand fundamental concepts I History, Geography, Economics, English, Political Science, Hindi and Marathi subjects respectively
- PO2 To acquaint the learners with various genres of Marathi, Hindi and English literature
- PO3 To understand the relationship between literature and society and reflection of Universal truths
- PO4 To appreciate world classics in the realm of British, American and Indian Literature
- PO5 To develop communication skills amongst the students for better employability
- PO6 To make learners sensitive about environment issues and sustainable development
- PO7 To understand importance of social, political, economic ethical and human values in life
- PO8 To enable the learners to think logically and bridge the gap between local and global environment
- PO9 To make the students to have better personality traits

# Department of English

## Programme Specific Outcomes

- PSO1 To appreciate world classics in the realm of English Literature.
- PSO2 To recognize importance of historical perspectives while studying literature.
- PSO3 To understand salient traits of different schools of poetry.
- PSO4 To develop interpretative and critical skills of the learners.
- PSO5 To explore the reflection of human values in literature

## Course Outcomes

**Class: F.Y.B.A. (English)**

**Semester I and II**

### **Course (Paper) Name and No.: Introduction to Literature I**

- CO1 To write clearly, coherently and effectively about various genres of literature.
- CO2 To recognize the culture and context of the work of literature.
- CO3 To develop sensitivity to nature and fellow human beings.
- CO4 To make the students at ease while learning English literature.
- CO5 To understand the relationship between literature and society

### **Course (Paper) Name and No.: Communication Skills of English I**

- CO1 To understand the importance of communication skills of English.
- CO2 To build up language competency in English.
- CO3 To make students to comprehend the functionality of English Language.
- CO4 To make students better at reading, writing in English.
- CO5 To construct the positive approach about English language

## **Class: S.Y.B.A. (English)**

### **Semester III and IV**

#### **Course (Paper) Name and No.: Indian Literature in English II**

- CO1 To strengthen their listening speaking reading and writing skills
- CO2 To make students confident in recognizing the culture and context of the work of literature.
- CO3 To develop humanitarian values through literary masterpieces
- CO4 To enlarge the students understanding level through Indian classics

#### **Course (Paper) Name and No.: American Literature III**

- CO1 To understand various characteristics of Twentieth century American literature.
- CO2 To familiarize the learners with salient tents of African American literature.
- CO3 To develop the sense of gender equality amongst the students.
- CO4 To understand features of Jewish American masterpieces.
- CO5 To recognize importance of culture and heritage in our identity

## **Class: T.Y.B.A. (English)**

### **Semester V and VI**

#### **Course (Paper) Name and No.: 16<sup>th</sup> to 18<sup>th</sup> Century English Literature IV**

- CO1 To understand the distinctive features of English literature of the 16th, 17th and 18th centuries
- CO2 To comprehend how background influences shaped the writer's thinking.
- CO3 To recognize and appreciate the literary masters who dominated the scene.
- CO4 To grasp the different writing styles that each age adopted.
- CO5 To understand the relationship between literature and society

#### **Course (Paper) Name and No.: Literary Criticism V**

- CO1 To use important critical terms in the analysis of literary works.
- CO2 To create an awareness about the nature and function of literature and criticism
- CO3 To impart the technique of close reading of literary texts
- CO4 To understand the various literary theories and critical approaches
- CO5 To make the students familiar with the tenets of practical criticism

#### **Course (Paper) Name and No.: Grammar and Art of Writing VI**

- CO1 To gain a basic understanding of phonetics, morphology and word transformation
- CO2 To have improved speaking skills
- CO3 To enhance adequate knowledge of the rules of grammar, grammatical analysis and sentence transformation
- CO4 To Write effectively in various domains

### **Course (Paper) Name and No.: 19<sup>th</sup> Century English Literature (VII)**

- CO1 To view literary works in their dynamic interface with the background
- CO2 To understand the literature of the 19th century as a complex outcome of artistic, intellectual and socio-political cross-currents
- CO3 To appreciate poetry as mirroring private personality, protest and subsequently, public concerns
- CO4 To view the development of the Victorian Novel as informed by Victorian morality as well as by larger democratic processes
- CO5 To contextualize the impulses behind the significant emergence of women writing in the 19th century

### **Course (Paper) Name and No.: 20<sup>th</sup> Century British Literature (VIII)**

- CO1 Students will be equipped with comprehensive understanding of literary genres, trends and movements in 20th Century British Literature; thereby, enabling them to understand the valuable co –relation between the socio-cultural, economical and historical contexts; behind the literary production.
- CO2 Students will acquire the discipline to become reflective and imaginative thinkers through a close, critical and analytical reading of the prescribed texts

### **Course (Paper) Name and No.: Literature of Protest (IX)**

- CO1 Read and interpret cross cultural texts.
- CO2 Understand protest literature.
- CO3 Get sensitized towards global issues.
- CO4 Learn to look into past, correlate it to present and future.
- CO5 Understand the historicity of protest literature

# **Department of Economics**

## **Programme Specific Outcomes**

PSO1 Students will be able to understand the basic concepts of economics.

PSO2 Students will learn the application of statistics in economics and attain the skills.

## Course Outcomes

### Class: F.Y.B.A. (Economics)

#### Semester I

##### Course (Paper) Name and No.: Micro Economics

- CO1 Learners studied the concepts of micro economics.
- CO2 Learners will able to understand the ten principles of economics.
- CO3 Learners will understand what the market demand and supply.
- CO4 Learners will understand the consumer's notary to analyze how to spend his income

#### Semester II

##### Course (Paper) Name and No.: Macro Economics- Paper no. I

- CO1 Learners understand the basic concepts of PCI, GDP, GNP, NNP and difference between GNP and NNP.
- CO2 Learners now are able to understand the consumption, saving and investment.
- CO3 Learners studied the structure of balance of payment and disequilibrium in balance of payment.

## **Class: S.Y.B.A. (Economics)**

### **Semester III**

#### **Course (Paper) Name and No.: Micro Economics - Paper No. :- II**

- CO1 Learners understand the consumer's behavior.
- CO2 Learners studied the theories related to production function.
- CO3 Learners are now in a position to understand various concepts of cost and revenue.
- CO4 Learners will understand actual market competition

#### **Course (Paper) Name and No.: Indian Economy-Contemporary Issues**

- CO1 Learners will understand the prospects and consequences of demonetization.
- CO2 Learners will get with the fiscal framework.
- CO3 Learners will know the details of UBI.
- CO4 Learners will know the status of Income, Health and Fertility

#### **Course (Paper) Name and No.: Demography**

- CO1 Learners will know the basics of demography.
- CO2 Learners will learn sources of data.
- CO3 Learners will get ideas of analysis techniques

### **Semester IV**

#### **Course (Paper) Name and No.: Macro Economics - Paper No. :- II**

- CO1 Learners understand the value of money.
- CO2 Learners understand why peoples are demanding money.
- CO3 Learners understand saving the money to purchase commodities.
- CO4 Learners understand the government's monetary & fiscal policy's role in the economy

### **Course (Paper) Name and No.: Development issues of Maharashtra's Economy**

- CO1 Learners will know the state of economy of Maharashtra.
- CO2 Learners will know the important aspects of Tribal areas.
- CO3 Learners will get the information about water resources.
- CO4 Learners will be able to get the information about health and connectivity

### **Course (Paper) Name and No.: Demography**

- CO1 Learners will get information about changing trends of fertility, Nuptiality, life Table and Mortality.
- CO2 Learners will aware about migration and urbanization.
- CO3 Learners will get idea how policy frames and work.

## **Class: T.Y.B.A. (Economics)**

### **Semester V**

#### **Course (Paper) Name and No.: Micro Economics**

- CO1 Learners understand the monopoly situation.
- CO2 Learners are able to discriminate how the monopoly and oligopoly.
- CO3 Learners are studied the equilibrium concept and social welfare of the people.
- CO4 Learners are studied the Nash equilibrium

#### **Course (Paper) Name and No.: Growth and Development**

- CO1 Learners will get familiar with concepts of growth and development.
- CO2 Learners will able to understand the role of factors of development.
- CO3 Learners will study effects of poverty, inequality on development.
- CO4 Learners will think about sustainable development

#### **Course (Paper) Name and No.: Industrial & Labour Economics**

- CO1 Learners will get with the nature of industries in India.
- CO2 Learners will know factors affecting location of industries and regional imbalance.
- CO3 Learners will aware about factors affecting of industrial productivity and sickness.
- CO4 Learners will get with history of developmental of industries in India.

#### **Course (Paper) Name and No.: Economics of Agriculture and cooperation**

- CO1 To get the role of agriculture in economic development.
- CO2 To know the institutional and non-institutional sources of credit and micro finance.
- CO3 To recognize the importance of marketing in agriculture.
- CO4 To understand various agriculture price and policy

### **Course (Paper) Name and No.: Research Methodology**

- CO1 Learners will study the concepts of research.
- CO2 Learners will study the elements of research methodology.
- CO3 Learners will study the different sources of data for research.
- CO4 Learners will study the process and analysis of data

### **Course (Paper) Name and No.: Environmental Economics**

- CO1 Learners will study the environment and its importance in development.
- CO2 Learners will study the various environmental policies for sustainable development.
- CO3 Learners will study about environmental improvement.
- CO4 Learners will study the environmental problems.

### **Course (Paper) Name and No.: History of Economic Thought**

- CO1 Learners are studied the classical thought of economist.
- CO2 Learners are understand the Marshall and Schumpeter's historical thought
- CO3 Learners are studied the Keynesian views.
- CO4 Learners are able to discriminate the Keynesian and post Keynesian views.

## **Semester VI**

### **Course (Paper) Name and No.: Macro Economics**

- CO1 To study the goods market and the open economy.
- CO2 To study the financial market.
- CO3 To study the exchange rate crisis.
- CO4 To study the international monetary situation

### **Course (Paper) Name and No.: International Economics**

- CO1 Learners are studied the importance of international economics.
- CO2 Learners are studied the various modern theories of international trade.
- CO3 Learners are learned how trade is an engine of economic growth.
- CO4 Learners understand the trade policy and regionalism

### **Course (Paper) Name and No.: Industrial & Labour Economics**

- CO1 Learners will study the nature of labour market.
- CO2 Learners will get with past, present and future of trade unions.
- CO3 Learners will be aware about industrial relations and its measures.
- CO4 Learners will get ways of labour welfare and social security

### **Course (Paper) Name and No.: Economics of Agriculture and cooperation**

- CO1 To understand the important feature of co-operation.
- CO2 To get need, structure and progress of co-operative finance.
- CO3 To know the role and types of co-operative agro Industries.
- CO4 To know the role of co-operative organization in India

### **Course (Paper) Name and No.: Research Methodology**

- CO1 Learners will study statistical applications in research.
- CO2 Learners will study index numbers.
- CO3 Learners will study hypothesis formulation and testing.
- CO4 Learners will study research report writing

### **Course (Paper) Name and No.: Development Theory and Experience**

- CO1 Learners will study the relation between demography and development.
- CO2 Learners will get information structural transformation.
- CO3 Learners will get knowledge about land, labour and credit market.
- CO4 Learners will know the importance of environment and development.

### **Course (Paper) Name and No.: International trade policy and practice**

- CO1 Learners will understand the difference between interregional and international trade.
- CO2 Learners will understand the GATT, WTO and Doha round.
- CO3 Learners will understand the international financial institutions and debt problem.
- CO4 Learners will study the foreign capital flow in economy

# Department of Hindi

## Programme Specific Outcomes

- PSO1 पाठ्यक्रम की समाप्ति पर विद्यार्थियों में अग्रलिखित योग्यता विकसित हो जानी चाहिए।
- PSO2 हिंदी की विभिन्न विधाओं के बारे में सुसंगत और प्रभावी समझ निर्माण होनी आवश्यक है।
- PSO3 हिंदी के क्षेत्र में विद्यार्थियों की समझ और रुचि विकसित होनी चाहिए।
- PSO4 व्यावहारिक हिंदी और इसके व्यावसायिक अनुप्रयोग में बुनियादी कौशल विकसित करना।
- PSO5 पाठ्यक्रम के माध्यम से विद्यार्थियों में सामाजिक, राजनीतिक, धार्मिक, सांस्कृतिक विश्वदृष्टि का विकास होगा।
- PSO6 विद्यार्थियों में रसास्वाद के कौशल का विकास होगा।
- PSO7 हिंदी हेतु उपलब्ध रोजगारों के लिए आवश्यक गुणों का विकास होगा तथा ज्ञानात्मक आधार पुष्ट होगा।

## **Course Outcomes**

**Class: F.Y.B.A. (Hindi)**

**Semester I and II**

### **Course (Paper) Name and No.: Hindi Compulsory**

- CO1 To be able to understand and explain the distinct social consciousness as expressed by eminent writers like Premchand, Usha Priyamwada, Manu Bhandari, Om Prakash Walmiki etc. through their short stories
- CO2 Clear understanding of the spirit of Nationalism, Human Values and social commitment by way of various poems and stories
- CO3 Enhanced sensitiveness and humility among students
- CO4 Students are in position to compare and contrast paragraph using vocabulary

**Class: S.Y.B.A. (Hindi)**

**Semester III and IV**

**Course (Paper) Name and No.: Medieval and Modern poetry, Paper-II**

- CO1 To be able to clearly describe the prevailing philosophy of life and writing skills of the authors with reference to the socio cultural scenario of their period.
- CO2 To be able to understand and establish the linkage between nationalism and mythological aspects of “Dinkar” in his book “Parshuram Ki Pratiksha”
- CO3 To be able to recognize and describe the context along with style of modern poetry expressed by various modern poets.
- CO4 To be able to understand various prevalent social issues by way of poetry

## **Class: T.Y.B.A. (Hindi)**

### **Semester V and VI**

#### **Course (Paper) Name and No.: Post-Independence Hindi Literature, Paper-V**

- CO1 To be able to identify and understand the various forms of post-independence Hindi Literature
- CO2 To understand and appreciate the various unique writing styles of writers of post-independence time
- CO3 To be able to identify and distinguish various forms of poetry and prose
- CO4 To be able to understand the prevailing topics of that era which were influencing the thought process of writers and poets

#### **Course (Paper) Name and No.:Linguistics Hindi, Language & Hindi Grammar-VIII**

- CO1 To describe the various concepts and importance of Linguistics
- CO2 To recognize and appreciate different flows of Hindi Language (Raj bhasha, Boli bhasha etc.)
- CO3 Students are able to comprehend the introductory concepts of Hindi grammar and linguistics
- CO4 Students are able to identify and distinguish various ancient and medieval period languages i.e Pali, Prakrut, Apbhransh.
- CO5 Students are able to understand and use the different forms of Khadiboli (Hindi, Urdu etc.)

**Course (Paper) Name and No.: Mass Media, Paper-IX**

- CO1 To understand the journey of Mass Media and application of modern options
- CO2 Clear understanding of all relevant theories supporting the operational aspects of reputed Institutes
- CO3 To be able to join the Media Houses with help of acquired knowledge
- CO4 To be able to distinguish various traditional and modern platforms and their relevance, evolution, features and applications along with impact.
- CO5 To be able to understand the use of Hindi in the field of Media

# **Department of Geography**

## **Programme Specific Outcomes**

- PSO1 Understand, coherently and effectively about various genres of Geography.
- PSO2 Understanding the diverse concepts in the field of Geography.
- PSO3 Uunderstand global and regional patterns of cultural, political and economic institutions, and their effects on exploitation of natural resources and landscapes.
- PSO4 Understand need for protection and conservation of natural recourses.
- PSO5 Develop basic skills in practical Geography and its industrial applications.

## Course Outcomes

### Class: F.Y.B.A. (Geography)

#### Semester I

##### Course (Paper) Name and No.: Paper No. I – Geomorphology

- CO1 Understand comprehensibly the nature and scope of Geomorphology
- CO2 Understanding the composition and structure of the interior of the earth and the types Rocks.
- CO3 Understand the Diastrophic and catastrophic movements of the earth's surface
- CO4 Understand the concept and types of weathering and erosion.
- CO5 Understand the erosional and depositional landforms by the erosional agents.
- CO6 Identification of contours, slopes and drawing of sections to depict contour landforms.

#### Semester II

##### Course (Paper) Name and No.: Paper No. I – Human Geography

- CO1 Understand comprehensibly the nature, scope, approaches, branches and concepts in Human Geography
- CO2 Understanding the concept, types and patterns of rural and urban settlements.
- CO3 Understand the determinants on growth, distribution and problems of population.
- CO4 Understand the concept, causes, types, trends and consequences of migration.
- CO5 Able to construct and interpret of line graphs and flow diagrams and other techniques.

## **Class: S.Y.B.A. (Geography)**

### **Semester III**

#### **Course (Paper) Name and No.: Paper No. II - An Introduction to Climatology**

- CO1 Understand the introduction to Climatology considering weather & climate, role of climate in human life, aims, nature, scope, and some other sub division of the course.
- CO2 Understand weather phenomena winds, humidity, precipitation and winds.
- CO3 Understand the process, methods of weather forecasting and climatic changes
- CO4 Able to read and interpret the weather map and to construct the various graphs related to climatology.

#### **Course (Paper) Name and No.: Paper No. III – Physical Geography of India**

- CO1 Understand importance of the location and the geographical personality of India.
- CO2 Understand the variability of drainage pattern and climate in India.
- CO3 Study of problems related to soil and forest depletion and their conservation methods.
- CO4 Study of problems related to minerals and power resources and their conservation methods
- CO5 Show the geographical features in the map of India.
- CO6 Read, convert and prepare the map scale.

### **Semester IV**

#### **Course (Paper) Name and No.: Paper No. II - An Introduction to Oceanography**

- CO1 Understand importance and physical structure of ocean.
- CO2 Knowledge about effect of ocean Currents.
- CO3 Understand the relationship between man and ocean.
- CO4 Study about movements of ocean water

## **Course (Paper) Name and No.: Paper No. III – Agriculture Geography of India**

- CO1 Understand the introduction to agriculture, nature, scope, significance and approaches of agriculture geography.
- CO2 Understand features, determinants, major crops and problems of Indian agriculture
- CO3 Understand the history, components and impacts of green revolution in India.
- CO4 Understand the development of recent trends in agriculture in India.
- CO5 Interpret the thematic maps and draw the statistical diagrams and graphs

## **Class: T.Y.B.A. (Geography)**

### **Semester V**

#### **Course (Paper) Name and No.: Geography of Settlements**

- CO1 Understand the nature and scope of Settlement Geography and the characteristics of rural and urban settlements.
- CO2 Understand the structure of house and building materials, regional variations of rural settlement in India.
- CO3 Understand the history of world settlements and factors responsible for world settlements.
- CO4 Understand the classification and morphology, pattern and nature and process of rural and urban settlements
- CO5 Understand the process of urbanization, urban problems and smart cities in India.

#### **Course (Paper) Name and No.: Geography of Maharashtra**

- CO1 Understand the location, administrative setup and geographical personality of Maharashtra
- CO2 Understand the drainage and climate in Maharashtra
- CO3 Understand the natural and human resources of Maharashtra
- CO4 Understand the agriculture, fishing and livestock resources in Maharashtra.
- CO5 Understand the growth and development of industries, trade and transport in Maharashtra

### **Course (Paper) Name and No.: Population Geography**

- CO1 Understand the nature, scope, importance and relation with other social sciences of Population Geography
- CO2 Understand the structure, growth, density & distribution of population in India and World.
- CO3 Get knowledge about population theories.
- CO4 Understand the causes, consequences and recent trends of migration in India
- CO5 Understand the contemporary issues of population in India.

### **Course (Paper) Name and No.: Tools and Techniques In Geography For Spatial Analysis-I (Practical)**

- CO1 Understand the basic concept and types map projections.
- CO2 Understand the Basic elements of map and able to area calculation.
- CO3 Able to read and interpret of topographical maps.
- CO4 Able to use the computer with basic Microsoft and SPSS software's.
- CO5 Able to prepare the thematic maps by using different techniques

### **Course (Paper) Name and No.: Regional Planning and Development**

- CO1 Understand the concept, nature and problems of Regional Planning
- CO2 Gain knowledge about definition of region, evolution and types of regional planning.
- CO3 Understand the concept, strategies and measurements of regional disparities and different models of regional development.
- CO4 Understand the regional planning of India.

### **Course (Paper) Name and No.: Geography of Resources**

- CO1 Understand the concept, factors, importance and classification of resources.
- CO2 Know the over exploitation and conservation measures of natural resources.
- CO3 Learn the importance, consumption, problems and Conservation methods of water, forest, soil and mineral resources.
- CO4 Understand the concept and distribution of human resources.

### **Course (Paper) Name and No.: Geography of Health**

- CO1 Understand the nature, scope, approaches and evolution geography of Health Geography.
- CO2 Understand the Causes, effects and remedial measures of air, water, radioactive and plastic pollution.
- CO3 Learn the geographical background of diseases, types and case studies of communicable and non-communicable diseases
- CO4 Understand the linkages of health with environment and health related issues.
- CO5 Understand the Health care facilities, distribution, policies and health organisations in India.

### **Course (Paper) Name and No.: Geography Of Disaster Mitigation And Management**

- CO1 Understand the definition, classification and impacts of disasters and hazards.
- CO2 Understand the concept and role of national and international organisations for disaster management.
- CO3 Understand the causes, effects and distribution of natural disasters and its management in India
- CO4 Understand the anthropogenic disasters and its management in India.

### **Course (Paper) Name and No.: Geospatial Technology**

- CO1 Understand the Concept, Components Importance and history of Geospatial Technology
- CO2 Able to analyze and interpret the aerial photographs and satellite imageries.
- CO3 Able to understand the concept and Applications GPS and capable to survey through GPS.
- CO4 Understand the concept, Components and applications of GIS and capable to data analysis by using the GIS software

## **Semester VI**

### **Course (Paper) Name and No.: Environmental Geography**

- CO1 Understand the nature, scope, importance and man-environment relationship in Environmental Geography
- CO2 Understand the Structure, functions and types of ecosystem.
- CO3 Acquire knowledge about biodiversity and its importance and Management.
- CO4 Understand the concept, types, distribution and hotspots of biodiversity
- CO5 Understand environmental problems there Cause, Effect and Remedies.
- CO6 Understand the Sustainable Development and Environmental Management methods in India.

### **Course (Paper) Name and No.: Geography of Tourism and Recreation**

- CO1 Understand about nature, scope, development and factors of tourism development
- CO2 Understand about infrastructure and ancillary services for tourism
- CO3 They understand about types and impacts of tourism.
- CO4 Understand Planning and organization about tourism
- CO5 Understand the potential of tourism sectors in Maharashtra and India
- CO6 Know about national tourism policy.

### **Course (Paper) Name and No.: Political Geography**

- CO1 Understand the nature, scope and historical development of Political Geography
- CO2 Get knowledge about Evolution of states & nations.
- CO3 Understand the frontiers and boundaries
- CO4 Get knowledge of Geopolitical theories.
- CO5 Investigate the problems and disputes in India
- CO6 Understand about the Electoral Geography.

### **Course (Paper) Name and No.: Tools and Techniques in Geography for Spatial Analysis-II (Practical)**

- CO1 Understand the Meaning and types of data and its presentation.
- CO2 Understand and able to solve the examples of measures of central tendency, dispersion and deviation and correlation, regression and hypothesis testing.
- CO3 Able to collect and analysis of data sampling.
- CO4 Able to collect the field data, its processing and writing of research report.

### **Course (Paper) Name and No.: Economic Geography**

- CO1 Understand the nature, scope branches and approaches of Economic Geography
- CO2 Know the human economic activities
- CO3 Understand the mineral resources and industrial development
- CO4 Understand the Weber's industrial location theory
- CO5 Understand the importance and pattern of transport and international trade
- CO6 Understand the levels of economic development, Special Economic Zones and related issues in India.

### **Course (Paper) Name and No.: Biogeography**

- CO1 Understand the nature, scope, branches and approaches of Biogeography.
- CO2 Understand the ecosystem and biosphere.
- CO3 Understand the community and classification of plants.
- CO4 Understand the marine biogeography
- CO5 Understand the types, importance, loss and conservation of biodiversity.

### **Course (Paper) Name and No.: Social Geography**

- CO1 Understand the nature, scope, and concept, relationship between culture and social environment.
- CO2 Understand the race, religion, language and tribes in India and the world.
- CO3 Understand the social groups and its segregation.
- CO4 Understand the contemporary social issues in India.

### **Course (Paper) Name and No.: Geography of Transport**

- CO1 Understand the concept, nature, scope and significance of Transport Geography.
- CO2 Understand the transport network system.
- CO3 Understand the evolution and pattern of modes of transport.
- CO4 Understand the models about the transport.
- CO5 Understand the issues of transportation in India.

## **Course (Paper) Name and No.: Research Methodology in Geography**

- CO1 Students will be able to understand the concept, types and stages in the research methodology, formulation of research and research design.
- CO2 Students will know methods of data collection and its processing and role of internet in research.
- CO3 Students will be able to prepare the hypothesis and also be able to do the hypothesis testing by using computer and statistical techniques.
- CO4 Students will be able to spatial and non-spatial data analysis in GIS software's and competent for research writing.
- CO5 Students will be able to prepare the research report on any one theme in Physical

# Department of History

## Programme Specific Outcomes

- PO1 To understand the background of social, economic, religious, cultural and political life of people and compare it with present to achieve overall development of society.
- PO2 The study of history impart the knowledge of the significant historical events and past mistakes and create awareness for avoid the mistakes in present for better future with peace, progress in diverse and global community.
- PO3 History instil the idea of national integration and harmony as well as generates the feeling of nationalism and patriotism.
- PO4 History develop curious approach and interest for historical facts, art and architecture, archaeological sites, museums and archives as the sources for research in history

## **Course Outcomes**

**Class: F.Y.B.A. (History)**

**Semester I and II**

**Course (Paper) Name and No.: History of Modern India (1857 C.E- 1947 C.E)**

- CO1 The Learners will be able to understand the Modern History with regards to the struggles that their forefathers had undertaken to break the fetters of British Slavery.
- CO2 The Learners will get well acquainted with the significant events, Freedom fighters, personas, political movements in the History of Modern India.
- CO3 The Learners can envisage the whole process of Freedom struggle and learn from the mistakes in the past.

## **Class: S.Y.B.A. (History)**

### **Semester III**

#### **Course (Paper) Name and No.: Ancient India from Earliest Times to 1000 AD**

- CO1 Students will have better understanding of ancient period of Indian history.
- CO2 They will be able to trace the continuity and change in historical perspective.
- CO3 It will induce students to history of India In chronological framework.

#### **Course (Paper) Name and No.: Landmarks in World History**

- CO1 The Learners will be able to understand the significant historical events of the world which world come out from the darkest period which grappled the dungeon of ignorance and ill human activities

### **Semester IV**

#### **Course (Paper) Name and No.: History of Ancient India**

- CO1 The course will enable the students to study the history of ancient India from an analytical perspective
- CO2 It will acquaint the student with various approaches and interpretation of ancient history of India

#### **Course (Paper) Name and No.: Landmarks in World History**

- CO1 The syllabus will enable the students to critically analysis of totalitarian rules and it's threats to world peace and progress

## **Class: T.Y.B.A. (History)**

### **Semester V**

#### **Course (Paper) Name and No.: History of Medieval India**

CO1 The students will learn the Sultanate rule and the history of Vijayanagar and Bahamani Kingdom and their contribution in social economic cultural and political history of medieval India

#### **Course (Paper) Name and No.: Introduction of Archaeology**

CO1 The students will get knowledge of Archaeology, Epigraphy and Numismatics and its contribution in the research of art, architecture, script, coins history and opportunities in this field

#### **Course (Paper) Name and No.: History of Contemporary World**

CO1 The students will comprehend the important events took place after Second World War period in the world and its influenced in the present world politics

#### **Course (Paper) Name and No.: History of the Marathas (1630 CE-1707 CE)**

CO1 Students will learn significance of regional history.

CO2 It will enhance their perception of 17th century India in context of Maratha history

#### **Course (Paper) Name and No.: History of Modern Maharashtra**

CO1 Learners will acquaint a deeper and more inclusive understanding of landmarks events, personality

### **Course (Paper) Name and No.: Research Methodology and Sources of History IX**

CO1 Students will be able to learn methods in research writing and understand the new trends in historical research

## **Semester VI**

### **Course (Paper) Name and No.: History of Medieval India**

CO1 The students will get knowledge about the political power of Mughal and Maratha as well as socio, Eco, Cultural, religious and administrative system and it's impact on present Indian society and polity

### **Course (Paper) Name and No.: Introduction of Museology and Archival Science**

CO1 The students will get encourage to pursue careers in the field of Museology, Archaeology as well as understand the glorious cultural development and scope and value

### **Course (Paper) Name and No.: History of Asia**

CO1 The students will get knowledge of transformation of china under Mao Zedong and deng Xiaoping. The reconstruction the of Japan and major trends that emerge in Asia

### **Course (Paper) Name and No.: History of the Maratha - Peshwa Period (1707CE to 1818 CE)**

CO1 Students will be able to analyse the Marathas polices of expansion and its consequences .They will understand the role played by the Marathas in the 18th century India

**Course (Paper) Name and No.: History & contemporary India (1947-2000)**

CO1 Students will acquire a deeper and more preclusive understanding of changes ,  
Personality and themes in modern Indian history

**Course (Paper) Name and No.: Research Methodology and Sources of History**

CO1 Students will understanding and aware of historical research

# **Department of Rural Development**

## **Course Outcomes**

### **Class: F.Y.B.A. (Rural Development)**

#### **Semester I**

##### **Course (Paper) Name and No.: Introduction to Rural Development**

- CO1 Learners will get different aspects of Rural Development.
- CO2 Learners will understand the nature, features and problems of Rural Society in India.
- CO3 Learners will know the concept of Rural Social Institution.
- CO4 To understand the concept and obstacles in Social Change

#### **Semester II**

##### **Course (Paper) Name and No.: Issues related to Rural Development**

- CO1 Learners will acquire deeper and more inclusive understanding about functions of Rural Governance in Maharashtra.
- CO2 Learners will occur to Rural Economy.
- CO3 Learners will know the role of Rural Infrastructure in Rural Development.
- CO4 Learners will be aware about the Key Issues of Rural Communities.

## **Class: S.Y.B.A. (Rural Development)**

### **Semester III**

#### **Course (Paper) Name and No.: Rural Society III**

- CO1 Learners will know the components of Indian Rural Society and problems of weaker section.
- CO2 Learners will understand the Rural Institutional System.
- CO3 Learners will be familiar with the process of social change.
- CO4 Learners will be acquaint to the concept of Modernization, Westernization and Sanskritization

#### **Course (Paper) Name and No.: Rural Administration IV**

- CO1 Learners will get the role and basic concept of District Administration.
- CO2 Learners will know the components of Revenue Administration.
- CO3 Learners will be familiar with Law and Order Administration and Judicial Machinery.
- CO4 Learners will understand the concept of Planning.

### **Semester IV**

#### **Course (Paper) Name and No.: Development Strategies V**

- CO1 Learners will get to know the schemes implemented by Agricultural Department, Panchayat Raj and Tribal Development Department.
- CO2 Learners will understand the Agricultural Policy, Water Management and Agricultural Universities.
- CO3 Learners will occur to various sources of Rural Empowerment.
- CO4 Learners will get exposure about Tourism Development for rural area.

## **Course (Paper) Name and No.: Laws related to Rural Development VI**

- CO1 Learners will get to know the difficult laws related to Panchayat Raj in Maharashtra.
- CO2 Learners will understand the Land Reform Legislation.
- CO3 Learners will acquaint to the laws related to rural area.
- CO4 Learners will know the role of Right to Information Act 2005

# Department of Political Science

## Course Outcomes

### Class: F.Y.B.A. (Political Science)

#### Semester I

##### Course (Paper) Name and No.: Indian Political System

- CO1 Students will find about the important role played by the constitution in making of today's modern India.
- CO2 Identify and explain the central and state institutions, procedures and decision-making processes of the Indian political system.
- CO3 will help to develop deeper understanding of the institutions, processes and services of state and local self govt.
- CO4 Analysing the influence of media on political institutions and the public.

#### Semester II

##### Course (Paper) Name and No.: Indian Political Process

- CO1 To evaluate the evolution, functioning and consequences of political parties in India.  
To identify how electoral rules and procedure in India effect election outcomes.
- CO2 Identify the central and state institutions, procedures and decision-making processes of the Indian political system.
- CO3 Help to develop deeper understanding of the institutions, processes and services of state and central government.
- CO4 Analysing the influence of caste and reservation, media, social movement on political institutions and the public.

## **Class: S.Y.B.A. (Political Science)**

### **Semester III**

#### **Course (Paper) Name and No.: Political Theory**

- CO1 Analysing what is Political Theory meaning and scope and explaining the approaches to the Study of Political Theory – Traditional and Contemporary Approaches.
- CO2 Assessing the concept and theories of State, (Origin, Nature, Functions): Contract, Idealist, Liberal and Neo-Liberal Theories, Concept of nation, Factors of Nation, Civil society, Market.
- CO3 Understanding basic concepts of Power and Authority and Legitimacy.
- CO4 Understanding basic concepts of Liberty, Equality, Rights, Law and Justice.
- CO5 Understanding basic concepts of Political Obligation and Right to Resist.

#### **Course (Paper) Name and No.: Public Administration**

- CO1 Explaining the meaning, nature, scope and evolution of Public Administration; Private and Public Administration.
- CO2 Analysing the major Theories in Public Administration.
- CO3 The Challenges in the discipline of Public Administration like New Public Administration (NPA), New Public Management (NPM)
- CO4 Discussing Webern theories of bureaucracy, Human Relation Theory (Elton Mayo), Scientific management Theory (F.W.Taylor)
- CO5 Understanding the concept of District Administration in India and Examining the Institutions of Local Self Government in India.
- CO6 Analysing the Civil Service in India. Explaining the planning and Planned Administration in India. Continuity and Change in Indian Administration

## **Semester IV**

### **Course (Paper) Name and No.: Political Values and Ideologies**

- CO1 To demonstrate knowledge of key Ideology and concepts.
- CO2 To understand the nature, methods and significance of political values and Ideology

### **Course (Paper) Name and No.: Indian Administration**

- CO1 Explaining the meaning, nature, scope and evolution of Indian Administration
- CO2 Analysing the Personnel Administration.
- CO3 Analysing the Civil Service in India. Explaining the Planning and Planned Administration in India. Continuity and Change in Indian Administration

# Programme- M.A.

## Programme Outcomes

- PO1 To understand the relationship between literature and society and reflection of universal truths
- PO2 To appreciate world classics in the realm of English Literature.
- PO3 To understand various consequences of gender discrimination
- PO4 Students will be able to understand the basic concepts of economics and can enter in the variety competitive services.
- PO5 Students will learn the application of statistics and econometrics in economics and able to estimate the performance of the economy and various sectors

# **Department of English**

## **Programme Specific Outcomes**

- PSO1 To appreciate world classics in the realm of English Literature.
- PSO2 To empower the students with research aptitude and creative writing.
- PSO3 To understand various consequences of gender discrimination.
- PSO4 To enhance analytical and evaluative skills of the learners.
- PSO5 To examine reflection of universal truths in the realm of literature.

## **Course Outcomes**

### **Class: M.A. I (English)**

#### **Semester I and II**

##### **Course (Paper) Name and No.: Literary Theory and Criticism**

- CO1 To understand importance of classical critical theories and its application.
- CO2 To recognize the relationship between literary theories and literature.
- CO3 To develop interpretative and evaluative skills amongst the students.
- CO4 To make the students at ease while learning critical theories

##### **Course (Paper) Name and No.: Linguistics and Stylistics Analysis of the Text**

- CO1 To write clearly, coherently and effectively about various genres of literature.
- CO2 To identify different styles used in literature.
- CO3 To develop sound knowledge about phonetics and its applications.
- CO4 To strengthen communication skills of the students.
- CO5 To recognize the relationship between language and literature.

##### **Course (Paper) Name and No.: Fiction I**

- CO1 To understand different types of fiction and its themes.
- CO2 To recognize the culture and context of the work of literature.
- CO3 To appreciate narrative techniques used in the novels.
- CO4 To explore various elements of novel reflected in literature

## **Course (Paper) Name and No.: Drama**

- CO1 To identify different types of dramas.
- CO2 To recognize theatrical devices employed in the play.
- CO3 To appreciate themes and characterization reflected in the drama.
- CO4 To understand nuances of dramatic performances.
- CO5 To understand the relationship between literature and society

## **Class: M.A. II (English)**

### **Semester III**

#### **Course (Paper) Name and No.: Poetry**

- CO1 To identify different conventions of poetry.
- CO2 To recognize importance of studying poetry.
- CO3 To appreciate major poets from Chaucer till modern times.
- CO4 To understand nuances of poetry in literature.

#### **Course (Paper) Name and No.: Gendered Perspectives on Literature**

- CO1 To identify different types of gender issues present in the literary text.
- CO2 To recognize consequences of gender discrimination present in the society.
- CO3 To appreciate themes and characterization reflected in specific literary texts.
- CO4 To understand nature of patriarchal society.
- CO5 To understand the relationship between gender problems and real life

#### **Course (Paper) Name and No.: Twentieth Century American Literature**

- CO1 To identify salient characteristics of twentieth century American literature.
- CO2 To appreciate major poets, dramatists and novelists.
- CO3 To analyze themes and characterization reflected in twentieth century American literature.
- CO4 To recognize the importance of history and literature.
- CO5 To understand the relationship between literature and society.

### **Course (Paper) Name and No.: Shakespeare**

- CO1 To identify universal truths reflected in the masterpieces of Shakespeare.
- CO2 To recognize theatrical devices used during Elizabethan era.
- CO3 To appreciate themes and characterization reflected in tragedy, comedy and historical plays.
- CO4 To understand beauty of Shakespearian sonnets.
- CO5 To examine importance of soliloquy in Shakespearean tragedies.

### **Course (Paper) Name and No.: Indian Writing in Translation**

- CO1 To learn various trends in translation in Indian literature.
- CO2 To analyze major contributors in the development of Indian writing.
- CO3 To examine themes and characterization reflected in the context of Indian milieu.
- CO4 To understand salient features of Indian literature in translation.
- CO5 To recognize Indianess reflected in literature.

## **Semester IV**

### **Course (Paper) Name and No.: Research Methodology**

- CO1 To develop interest about academic research in the mind of learners.
- CO2 To study the mechanisms of the process of research and its application.
- CO3 To enable learners to write research papers confidently.
- CO4 To understand the process of writing research project.
- CO5 To learn the skill of creative writing amongst the learners

**Course (Paper) Name and No.: Political Reading of Literature.**

- CO1 To examine political ideology present in the literary works.
- CO2 To study the patriarchal ideology its impact on the people in the society.
- CO3 To enable learners to understand nature of gender discrimination.
- CO4 To recognize the consequences of thirst for power in literary works.
- CO5 To understand the nature of monarchy present during Elizabethan era

# **Department of Economics**

## **Programme Specific Outcomes**

- PSO1 Students will be able to understand the basic concepts of economics and can enter in the variety competitive services.
- PSO2 Students will learn the application of statistics and econometrics in economics and able to estimate the performance of the economy and various sectors

## Course Outcomes

### Class: M.A. I (Economics)

#### Semester I

##### Course (Paper) Name and No.: Micro Economics

- CO1 Learners will understand how consumer will manage behavior in the market.
- CO2 Learners will able to understand the Consumer Behavior and Rational choices.
- CO3 Learners will know how price and output determines in perfect competition.
- CO4 Learners will be able to understand concepts of Production, Cost and Supply

##### Course (Paper) Name and No.: Macroeconomics

- CO1 Learners will get with concepts of Macroeconomic Accounting.
- CO2 Learners will able to understand the Advance concepts of National Income.
- CO3 Learners will get knowledge of advanced open economy with applications.
- CO4 Learners will know the Micro foundations of Macroeconomics

##### Course (Paper) Name and No.: Economics of Development

- CO1 Learners will understand Growth and Development concepts and structural changes.
- CO2 Learners will get with various modern growth and development models.
- CO3 Learners will know the concepts of micro economic development (credit, land, labor, capital, microfinance etc.).
- CO4 Learners will study Concepts of macro-economic development (Environment, natural resources, financial institutions, trade, foreign exchange etc.).

### **Course (Paper) Name and No.: Statistical Methods in Economics**

- CO1 Learner will know the basic concepts of statistics.
- CO2 Learner will get ideas of how to test the hypothesis in the research work.
- CO3 Learner will understand the Concept of simple linear regression analysis.
- CO4 Learner will understand the use of linear regression analysis and its problems

## **Semester II**

### **Course (Paper) Name and No.: Micro Economics**

- CO1 Learners will understand how to behave in symmetric and asymmetric information.
- CO2 Learners will learn oligopoly market and various models.
- CO3 Learners will know how competitors behave in various situations in oligopoly market.
- CO4 Learners will know about alternative managerial decision and theories

### **Course (Paper) Name and No.: Macroeconomics**

- CO1 Learners will understand the Price Mechanism with practical examples.
- CO2 Learners will be able to know the Neo-classical economics contribution and its impact on various Economies.
- CO3 Learners will get with importance and requirement of Keynesian economics in recent time.
- CO4 Learners will understand the Macroeconomics policies and understand its real implementation in India.

### **Course (Paper) Name and No.: Public Economics**

- CO1 Learners will understand Welfare Economy and its various concepts.
- CO2 Learners will get with Governments rationale public expenditure.
- CO3 Learners will study tax regulation, distribution, implication and tax evasion.
- CO4 Learners will study India's federal structure, Decentralization and Government reforms

### **Course (Paper) Name and No.: Mathematical Techniques for Economists**

- CO1 Learner will able to understand the set theory and types of function.
- CO2 Learner will understand the concept of derivatives and its application in economics.
- CO3 Learner will understand the application of constrained optimization in economics.
- CO4 Learner will understand the use of matrices in economics subject.

## **Class: M.A. II (Economics)**

### **Semester III**

#### **Course (Paper) Name and No.: Agricultural Development and policy**

- CO1 Learners will get with various theories of agricultural development in developing and developed economy.
- CO2 Learners will able to understand food security and sustainable agricultural development.
- CO3 Learners will get aware about Indian commodity market and international agricultural products.
- CO4 Learners will know trends in India's agricultural product and its export and import

#### **Course (Paper) Name and No.: Economics of Agricultural production and Rural Markets**

- CO1 Learners will understand production relationships and input uses.
- CO2 Learners will get with rural credit markets and its segmentation.
- CO3 Learners will understand concepts of work, skill and productivity in labour market.
- CO4 Learners will learn various types of farming and formal and informal leases

#### **Course (Paper) Name and No.: Economics of Labour Markets**

- CO1 Learners will understand the nature of labour market.
- CO2 Learners will learn approaches in labour markets.
- CO3 Learners will know wage issues in labour markets.
- CO4 Learners will get with the labour market in India.

### **Course (Paper) Name and No.: Trade Unions and Industrial relations in India**

- CO1 Learners will understand economics of trade unions.
- CO2 Learners will learn industrial relations.
- CO3 Learners will know industrial relations in India.
- CO4 Learners will get with the role of state in industrial relations in India

### **Course (Paper) Name and No.: Environmental Economics**

- CO1 Learners will study the Environmental problems and policy.
- CO2 Learners will get with micro foundations of environmental economics.
- CO3 Learners get with supplementary analytical tools and environmental issues.
- CO4 Learners will get knowledge of Environmental policy and practices

## **Semester IV**

### **Course (Paper) Name and No.: Industrial Economics**

- CO1 Learners will understand the various theories of the firms.
- CO2 Learners will get understand Technical change.
- CO3 Learners will understand financial analysis.
- CO4 Learners will get the history of development of Indian Industries

### **Course (Paper) Name and No.: Economics of Human Development**

- CO1 Learners will study basic need approaches in human development.
- CO2 Learners will understand various concepts like Empowerment, Equity, Sustainability, Security, Productivity etc.
- CO3 Learners will understand concepts of indices (GDP, PQLI, DALY, SCI, HDI, HPI etc).
- CO4 Learners will study various aspects of Human Development

## **Course (Paper) Name and No.: Project**

- CO1 Learners will get with nature and scope of research in economics.
- CO2 Learners will understand various types of research design.
- CO3 Learners will understand methods of data collection and presentation and elementary analysis data.
- CO4 Learners will study index numbers.
- CO5 Learners will study different methods of testing hypothesis.
- CO6 Learners will study how to write a report

# Department of Hindi

## Programme Specific Outcomes

- PSO1 पाठ्यक्रम के माध्यम से विद्यार्थियों में सामाजिक, राजनीतिक धार्मिक एव सांस्कृतिक विश्वदृष्टि का विकास होगा ।
- PSO2 विद्यार्थियों में रसास्वादन के कौशल्य का विकास होगा ।
- PSO3 हिन्दी हेतु उपलब्ध रोजगारों के लिए आवश्यक गुणों का विकास होगा तथा ज्ञानात्मक आधार पुष्ट होगा ।

## **Course Outcomes**

**Class: M.A. I (Hindi)**

**Semester I and II**

**Course (Paper) Name and No.: Bhasha Vigyan avam Hindi Bhasha, Paper-V**

- CO1 Learners will be able to understand and list down various aspects of Linguistics and Hindi language
- CO2 To be able to understand nuances of Phonetics, Morphology, Syntax and semantics
- CO3 To be able to trace and list down the entire journey of Hindi language period wise with unique aspects of all stages.
- CO4 To be able to comprehend all aspects of Devanagri lipi including origin, evolution and unique features.
- CO5 To be able to apply the knowledge of advanced level of grammar

**Class: M.A. II (Hindi)**

**Semester III and IV**

**Course (Paper) Name and No.: Vishesh Adhyan Chitra Mudgal, Paper-13.4**

- CO1 To understand and appreciate the impact of author life journey on their thought process as well as learning style
- CO2 To be able to understand various kinds of exploitation faced by working women associated with Media and Advertising sector
- CO3 To be able to understand the complexities and taboo related to the life of a transgender in Indian society. It also throws light on their non-acceptance at all stages of life like school, profession including behavior of family as well.
- CO4 From the short stories woven around women centric issues, one can understand the diverse shades of situations faced by working women's on daily basis.

# **Faculty of Commerce**

# Programme- B.Com

## Programme Outcomes

- PO1 After completing three years for Bachelors in Commerce (B.Com) programme, students would gain Knowledge in the fundamentals of Commerce, Accountancy, Management and all allied subjects
- PO2 The commerce focused curriculum offers a number of specializations which would equip the student to face the modern-day challenges in commerce and business and they will be prepared to accept responsibilities in the business world
- PO3 Empowerment of learners through access to commerce education and enabling them to develop as intellectually active, socially responsible citizens always ready for continuous personal and professional growth to fit into the challenging business environment
- PO4 Inculcate the element of research amongst the learners, to develop their overall personality

# Department of Commerce

## Course Outcomes

Class: F.Y.B. Com.

### Semester I

#### Course (Paper) Name and No.: Commerce I

- CO1 Better understanding of Business concepts
- CO2 Understanding impact of Environment on Business
- CO3 Understanding concept of Project planning
- CO4 Awareness of Entrepreneurship as Career option

#### Course (Paper) Name and No: Accountancy and Financial Management - I

- CO1 Learner understand the practical applications of Indian Accounting Standards no-1,2 and 9
- CO2 Learners understand the differences between Capital and Revenue expenditure and Receipts.
- CO3 Learners learn to keep books in departmental accounting system.
- CO4 Learners become aware about the practical application of Pass Book and cash book transactions

#### Course (Paper) Name and No: Business Economics- Paper no. I

- CO1 Learners understand the basic tools to analyze the business economics.
- CO2 Learners are able to understand the elasticity of demand forecasting.
- CO3 Learners studied the theories related to production function.
- CO4 Learners are now in a position to understand different concepts of costs

### **Course (Paper) Name and No.: Paper No. I - Environmental Studies**

- CO1 Understand comprehensibly the concept of environment and ecosystem.
- CO2 Understanding the natural resources and need and measures for sustainable development.
- CO3 Understand the population and emerging issues of development
- CO4 Understand the urbanization and environment.
- CO5 Read the thematic maps and fill the world map.

### **Course (Paper) Name and No.: Business Communication I**

- CO1 To recognize importance of business communication in corporate world.
- CO2 To differentiate between formal and informal communication.
- CO3 To understand the use of technology in the process of communication.
- CO4 To acquire the skills of drafting various business letters.
- CO5 To understand the importance of presentation and interview skills.

### **Course (Paper) Name and No.: Mathematical & Statistical Techniques-I**

- CO1 Theoretical concept relating Mathematics and Statistics
- CO2 Shares and Mutual Funds,
- CO3 Permutation Combinations,
- CO4 Measures of central tendencies, Dispersion, Correlation and Regression, sources of data, classification of data,
- CO5 Index Number, Probability, Probability Distribution etc. It will further help to apply the statistical tools and techniques for decision making and for research studies.

## Semester II

### Course (Paper) Name and No.: Commerce II

- CO1 Understanding the service sector.
- CO2 Better Knowledge about banking and retailing sector.
- CO3 Understanding various aspects of E-Commerce.

### Course (Paper) Name and No: Accountancy and Financial Management - II

- CO1 Learners are able to know single entry system and conversion method.
- CO2 Learners are able to know concept of consignment, Procedure of consignment, accounting of consignment and stock valuation
- CO3 Learners are able to know the concept of Branch, Dependent Branches, Debtors system and stock debtor system.
- CO4 Learners are be able to know computer system, Components of Computer, Importance of Computer and limitations of computer in Accountancy.

### Course (Paper) Name and No: Business Economics- Paper no. II

- CO1 Learners get the knowledge of perfect competition and monopoly markets
- CO2 Learners are now able to discriminate monopolistic competition and oligopoly markets.
- CO3 Learners studied the different pricing practices adopted by the firm.
- CO4 Students studied the theories capital budgeting.

### **Course (Paper) Name and No.: Paper No. I - Environmental Studies**

- CO1 Understand the solid waste management and role of society in solid waste management.
- CO2 Understanding the environmental problems associated with agriculture and sustainable agricultural practices.
- CO3 Understand the Tourism potentials and challenges before India.
- CO4 Understand the environmental movements and environmental management in India.
- CO5 Able to fill the environmentally significant features in Mumbai and Konkan region map.

### **Course (Paper) Name and No.: Business Communication II**

- CO1 To recognize importance of business communication in corporate world.
- CO2 To differentiate between formal and informal communication.
- CO3 To understand the use of technology in the process of communication.
- CO4 To acquire the skills of drafting various business letters.
- CO5 To understand the importance of presentation and interview skills.

### **Course (Paper) Name and No.: Mathematical & Statistical Techniques-II**

- CO1 Concept of Functions, Derivatives and Their Applications.
- CO2 Concept of Interest and Annuity
- CO3 Understood the tools and techniques like measures of Bivariate Linear Correlation and Regression
- CO4 Critical decision making and in Time series, Index Numbers,
- CO5 Solving the problems of elementary probability distributions

## **Class: S.Y.B. Com.**

### **Semester III**

#### **Course (Paper) Name and No.: Commerce III**

- CO1 Understanding about conceptual knowledge and evolution of management.
- CO2 Awareness about the functions of management.
- CO3 Developing the skills of decision making.
- CO4 Better understanding about aspects of organizing.
- CO5 Developing the skills of controlling.

#### **Course (Paper) Name and No: Accountancy & Financial Management III**

- CO1 Student will able to understand or gain the knowledge of admission or retirement /death of a partnership
- CO2 Student will able to understand analysis how piecemeal distribution of cash after dissolution of partnership firm
- CO3 Student will able to understand how old firm merge with new firm
- CO4 Student will able to understand how partnership firm converted into a ltd co.

#### **Course (Paper) Name and No: Financial Accounting and Auditing – Management Accounting**

- CO1 Student will able to understand analysis and interpretation of financial statement.
- CO2 Student will able to understand Balance sheet ratio, revenue ratio and combined ratio.
- CO3 Student will understand projection of working capital requirement in case of trading and manufacturing organization.
- CO4 Students will understand capital budgeting techniques – payback period, Accounting rate of return, Net present value, profitability index

### **Course (Paper) Name and No: Business Economics- Paper no. III**

- CO1 Learners learn the basic concepts of macroeconomics.
- CO2 Learners are now able to understand basic concepts of Keynesian economics.
- CO3 Learners studied the post Keynesian development in macroeconomics.
- CO4 Learners studied the relationship between inflation and money and prices of the commodity

### **Course (Paper) Name and No.: Advertising- I**

- CO1 Understanding of evaluation and classification of advertising.
- CO2 Developed skills required for carrier in advertising.
- CO3 Understanding economic & social aspects of advertising.
- CO4 Understanding of Brand building & Special purpose & trends in advertisng.

### **Course (Paper) Name and No.: Business law-I**

- CO1 Better understanding of Contract act 1872.
- CO2 To be aware of the legal impact of contracts in business.
- CO3 Understanding the concept of special contract.
- CO4 Better understanding of goods acts Negotiable Instruments for their business.

## **Semester IV**

### **Course (Paper) Name and No.: Commerce IV**

- CO1 Understanding about conceptual knowledge of production and Finance.
- CO2 Awareness about the production management and Inventory management.
- CO3 Better knowledge towards Quality management.
- CO4 Better understanding about various aspect of Financial System.
- CO5 Developing the skills of trading with Financial market.

### **Course (Paper) Name and No.: Accountancy & Financial Management IV**

- CO1 Student will able to understand or gain the knowledge of company A/c , issue of Shares or debenture
- CO2 Student will able to understand the provision of companies Act regarding redemption of preference shares
- CO3 Student will able to understand the provision of companies Act regarding redemption of preference shares
- CO4 Student will able to understand after incorporation and how allocated income & expenses.

### **Course (Paper) Name and No.: Financial Accounting and Auditing – Auditing**

- CO1 Student will able to understand principles of auditing.
- CO2 Student will able to understand audit planning, audit program, audit working papers .
- CO3 Student will understand audit sample, test check, internal control.
- CO4 Students will understand audit income, audit of expenditure, audit of assets book debts and audit of liabilities

### **Course (Paper) Name and No: Business Economics- Paper no. IV**

- CO1 Learners are now able to understand how public finance is helpful in determining the role of government.
- CO2 Learners learn the different theories related to the sources of revenue to government.
- CO3 Learners are now able to understand the theories of public expenditure and public debt.
- CO4 Learners learn the policies of the government and fiscal federalism.

### **Course (Paper) Name and No.: Advertising- II**

- CO1 Better understanding of media in advertising.
- CO2 To be aware of advertising budget & planning in advertising.
- CO3 Understanding the creativity aspect of advertising.
- CO4 To measuring the effectiveness of advertising.

### **Course (Paper) Name and No.: Business law-II**

- CO1 Understanding of company rules and regulations.
- CO2 Better understanding of Company laws & their act.
- CO3 Understanding of Formation, dissolution & working of partnership firm.
- CO4 Awareness about consumer rights.
- CO5 Better understanding of property rights.

## **Class: T.Y.B. Com.**

### **Semester V**

#### **Course (Paper) Name and No.: Commerce V (Marketing)**

- CO1 Enable the student to comprehend the concepts of marketing
- CO2 Be familiar with the basic elements of marketing mix
- CO3 Evaluate the key marketing dimensions for decision making
- CO4 Prepare the skill sets required for a career in marketing
- CO5 Understanding the importance of ethics in marketing

#### **Course (Paper) Name and No.: Financial Accounting and Auditing Paper VII**

- CO1 Learners are able to understand Revised Schedule VI, Financial Statement as per the Revised Schedule.
- CO2 Learners are able to understand the concept of internal Reconstruction, Legal aspects of Internal Reconstruction, Accounting Procedure, to draw Balance sheet if a company after reconstruction.
- CO3 Learners are able to understand the concept of Buyback of Shares, Conditions of Buyback, Methods of Buyback and accounting of Buyback.
- CO4 Learners are able to understand why investments are made, types of investments, accounting for investments

#### **Course (Paper) Name and No.: Financial Accounting and Auditing VIII (Cost Accounting)**

- CO1 Understanding of different concepts of Cost Accounting.
- CO2 Understanding and problem solving on material cost.
- CO3 Understanding and problem solving on Labour cost.
- CO4 Understanding and problem solving on overheads cost.
- CO5 Understanding and problem solving on cost Sheet.

### **Course (Paper) Name and No.: Business Economics- Paper no. V**

- CO1 Learners learn the overall macroeconomic environment in India.
- CO2 Learners learn the policy structure in agriculture sector in India.
- CO3 Learners learn the industry and services sector the Indian economy.
- CO4 Learners studied the banking and financial markets in India.

### **Course (Paper) Name and No.: Marketing Research-I**

- CO1 Comprehend the concepts of marketing research
- CO2 Enable the student to undertake marketing research
- CO3 Evaluate the various sources of data collection
- CO4 Familiar with data processing, analysis and reporting
- CO5 Integrating the use of technology in data collection and analysis

### **Course (Paper) Name and No: Export Marketing Paper –I**

- CO1 Student will able to understand importance of Export Marketing.
- CO2 Student will able to understand various Economic Grouping of the world, and trade barriers.
- CO3 Student will understand New Foreign trade Policy 2015-20 & benefits to status holder.
- CO4 Students will understand financial incentives available to Indian Exporter.

### **Course (Paper) Name and No: Direct & Indirect Tax I**

- CO1 Student will able to understand the basic concept of taxation
- CO2 Student will able to understand the legal status of persons
- CO3 Student will able to understand the concept of salaries, Income from properties, profit & gain from business, capital gain etc
- CO4 Student will able to understand deduction from gross total income (S.80A,80C,80CCC,80D,80DD, 80E, 80U,80TT)
- CO5 Student will able to understand total income for individual

## Semester VI

### Course (Paper) Name and No.: Commerce VI (Human Resource Management)

- CO1 Develop the understanding of the concepts of **Human Resource Management**
- CO2 Be familiar with the various aspects of **Human Resource Development**
- CO3 Develop an understanding of the importance of Human relations
- CO4 Evaluate and understand the various aspects of leadership, motivation, employee morale, employee grievance and their effective management in organizations
- CO5 To integrate the knowledge of the concepts of **Human Resource Management to take correct business decisions.**

### Course (Paper) Name and No.: Financial Accounting and Auditing Paper IX

- CO1 Learners are able to understand concept of amalgamation, Meaning of Purchase Consideration, Methods and AS-14
- CO2 Learners are able to understand foreign currency transactions, need for conversion, recognition of exchange differences and accounting.
- CO3 Learners are able to understand concept of liquidation, modes of liquidation and procedure of liquidation.
- CO4 Learners are able to understand concept of Underwriting, determination of liabilities and underwriting commission.
- CO5 Learners are able to understand concept of LLP, Formation and Accounts of LLP.

### Course (Paper) Name and No.: Financial Accounting & Auditing X (Cost Accounting)

- CO1 Understanding and problem solving Cost Control Accounts.
- CO2 Understanding and problem solving on Contract costing
- CO3 Understanding and problem solving on Process costing.
- CO4 Understanding and problem solving on Marginal Costing.

- CO5 Understanding and problem solving on Standard Costing.
- CO6 Understanding of emerging trends of Cost Accounting.

### **Course (Paper) Name and No.: Business Economics- Paper no. VI**

- CO1 Learners learn the theories international trade.
- CO2 Learners learn various aspects of commercial policy.
- CO3 Learners studied the structure of balance of payments and World trade Organization.
- CO4 Learners studied the foreign exchange market.

### **Course (Paper) Name and No.: Marketing Research-II**

- CO1 Understand the concepts of application of marketing research
- CO2 Enable the student to gain knowledge about various aspects of application of marketing research
- CO3 Evaluate the in house and professional marketing research agencies
- CO4 Familiar with prominent marketing research agencies
- CO5 Developing the skill to undertake small projects of marketing research

### **Course (Paper) Name and No: Export Marketing Paper –II**

- CO1 Student will able to understand factors determining export price .Need for labelling and export marketing.
- CO2 Student will understand factors influencing distribution channels, components of logistics and sales [promotion techniques.
- CO3 Student will able to understand methods of payment in export marketing. Role of commercial bank, EXIM, SIDBI in financing exporters, ECGC.
- CO4 Students will understand registration with different authorities, shipping and custom stage formalities

## **Course (Paper) Name and No: Direct & Indirect Tax II**

- CO1 Student will able to understand the basic concept of GST
- CO2 Student will able to understand the scope of supply, Mixed Supplies Composition Levy etc.
- CO3 Student will able to understand the concept of Time, Place & Value of supply
- CO4 Student will able to understand eligibility for taking Input Tax Credit
- CO5 Student will able to understand Registration, Procedure& cancellation of under GST Law

# Department of Accounting and Finance

## Programme Specific Outcomes

- PSO1 Understand the concept, development of experimental and analytical skills, developing the aptitude for academic and professional skills, acquiring basic concepts and understanding of hyphenated techniques, understanding the fundamental Accounting & Finance processes and rationale towards application of Accounting & Finance knowledge are among such important aspects.
- PSO2 Acquire the knowledge, skill in different areas of communication, decision making, innovations and problem solving in financial and business activities.
- PSO3 Get platform to pursue professional courses such as Chartered Accountants, Cost and Management Accountant, MBA, etc.
- PSO4 do their higher education and can make research in the field of accountancy and Finance.
- PSO5 To develop ICT skill and knowledge among learners in applications of internet in education leads to benefit in e-Governance.
- PSO6 Update the knowledge about the business law, taxation law corporate law and industrial law.

## Course Outcomes

### Class: F.Y.B. Com. (Accounting and Finance)

#### Semester I

##### Course (Paper) Name and No.: Business Communication I

- CO1 To make effective and impressive communication.
- CO2 To make communication in ethical manner.
- CO3 Capable to make persuasive digital communication.
- CO4 Capable to make abstract and summaries.
- CO5 Better presentation and communication using proper body language.
- CO6 Helps to understand and learn provisions as per Accounting Standards issued by ICAI

##### Course (Paper) Name and No.: Cost Accounting I

- CO1 Define the various components of total cost of a product i.e. direct & indirect cost & fixed & flexible cost.
- CO2 Determine basis for computing tender price, EOQ & Stock Level.
- CO3 Use method of time keeping & time booking & overtime, etc, valuation of Employee cost and Overheads Cost
- CO4 Helps to understand and learn provisions as per Accounting Standards issued by ICAI

##### Course (Paper) Name and No.: Commerce I

- CO1 Demonstrate the basic understanding of business management.
- CO2 Explain financial concept used in making business decision.
- CO3 Use business terms and concepts when communicating.
- CO4 Explain the techniques of SWOT analysis.
- CO5 Utilize information by applying a variety of business and industry software and hardware to major business functions.

### **Course (Paper) Name and No.: Economics –I**

- CO1 Learners will understand the concepts related to business and its applications.
- CO2 Help the learners to understand the fundamentals of demand and supply.
- CO3 Learners will be able to understand how household and business interact in various market structures .
- CO4 Learners will understand various cost and pricing methods used in the market.
- CO5 It will help the learner to understand different types of market in the economy.

### **Course (Paper) Name and No.: Financial Accounting I**

- CO1 Learners can be able to make necessary journal entries under hire purchase system
- CO2 Understanding for calculation of interest charged by hire vendor
- CO3 Maintain the financial statement of the business entity
- CO4 Helps to understand the final accounts of manufacturing concern
- CO5 Learners learnt maintaining the records of inventory according to the methods of valuation
- CO6 Helps to understand and learn provisions as per Accounting Standards issued by ICAI

### **Course (Paper) Name and No.: Cost Accounting I**

- CO1 Use business finance terms and concepts while communicating.
- CO2 Explain the financial concepts used in making financial management decisions.
- CO3 Demonstrate a basic understanding of financial management.

## **Semester II**

### **Course (Paper) Name and No.: Business Communication II**

- CO1 Improve the confidence level of students to face the crowd while giving the presentation.
- CO2 Awareness about how to prepare for an interview
- CO3 Improve the language skill of students using practical methods.

### **Course (Paper) Name and No.: Innovative Financial Services**

- CO1 Student will able to describe the types of equity securities that companies can use to raise equity capital.
- CO2 Student will able to describe the characteristics of different types of debt securities and be able to price them.
- CO3 Student will able to describe different theories of how interest rates are determined and explain the relationship between the term to maturity, risk, and interest rates.

### **Course (Paper) Name and No.: Business Mathematics**

- CO1 Demonstrate an understanding of the foundations and history of mathematics.
- CO2 Perform computations in higher mathematics.
- CO3 Read and understand middle-level proofs.
- CO4 Develop and maintain problem solving skills.
- CO5 Use mathematical ideas to model real-world problems

### **Course (Paper) Name and No.: Financial Accounting II**

- CO1 Understand difference in between single entry system and double entry system and practically able to linking up, to prepare final accounts from incomplete records.
- CO2 Learn application of branch accounting for small branches by debtor system and for big branches by stock and debtors system.
- CO3 Understand transactions between principal/Manufacture and agent, able to apply consignment accounting regarding these transactions.
- CO4 Know basic principles of insurance and able to calculate fire insurance claim regarding goods lost by fire.

### **Course (Paper) Name and No.: Auditing-I**

- CO1 To understand the principles of auditing and type of audit.
- CO2 Learner will able to understand audit planning, program and working papers.
- CO3 To understand audit sample, test check, internal control.
- CO4 Students will understand usefulness of internal audit, statutory audit.

### **Course (Paper) Name and No.: Business Law I**

- CO1 Learner will able to learn the difference between valid, void and voidable contract.
- CO2 Know the rights and duties under different contract.
- CO3 Learn how to pursue the consumer rights under consumer protection Act 1986

## **Class: S.Y.B. Com. (Accounting and Finance)**

### **Semester III**

#### **Course (Paper) Name and No.: Information Technology in Accountancy- I**

- CO1 To learn basics of computer & communication system
- CO2 To learn knowledge data delivery
- CO3 To learn concept of application in business
- CO4 To learn database & storage management
- CO5 To learn various types of memory

#### **Course (Paper) Name and No.: Financial Accounting III**

- CO1 Learners understand the dissolution of firms
- CO2 Got the knowledge of piecemeal distribution of cash for settlement of liabilities
- CO3 Understanding conversion of a firm into a ltd company
- CO4 learners learnt maintaining of accounts in the books of purchasing firm
- CO5 5) Helps to understand the application of rate for foreign currency into reporting currency

#### **Course (Paper) Name and No.: Taxation II**

- CO1 By the end of the course students will able to describe how the provisions of direct tax laws and to develop a broad understanding of the tax laws & accepted tax practices
- CO2 Students of the course will be able to explain different types of incomes & their tax ability & expenses & their deductibility.
- CO3 Students who complete this course will be able to learn various direct taxes & their implication in practical situations.
- CO4 Students of the course will able to state the use of various deductions to reduce the taxable income.

### **Course (Paper) Name and No.: Business Economics II**

- CO1 Understand the basic of national income accounting.
- CO2 Understand the cause and consequence of business cycle.
- CO3 Understand the role of fiscal and monetary policy.

### **Course (Paper) Name and No.: Cost Accounting**

- CO1 Define various components of total cost [Direct/Indirect/Fxed/Variable]
- CO2 Determine the various types of centres i.e. cost centres
- CO3 Use cost sheet for computing per unit cost & total cost
- CO4 Determine basis for computing tender price of contract

### **Course (Paper) Name and No.: Business Law-II**

- CO1 It enable the learner to appreciate the relevance of business law to individuals and business.
- CO2 Learners are able to identify the fundamental legal principles behind contractual agreements.
- CO3 Learner acquired problem solving techniques and to be able to present coherent, concise legal argument.

### **Course (Paper) Name and No.: Foundation Course in Financial Market Operations III**

- CO1 Students will able to understand the Australian Banking system & describe the role of regulatory bodies in regulating how banks manage their capital.
- CO2 Students will able to apply different valuation techniques to determine share prices.
- CO3 Students will able to describe the characteristic of different types of debt securities and be able to price them

## Semester IV

### Course (Paper) Name and No.: Information Technology in Accountancy- II

- CO1 Learn need & importance of business process, business process management in IT, BPM life cycle
- CO2 Learn practical knowledge of tally software
- CO3 Learn importance & applications of information system in management, role of computer in MIS
- CO4 Learn different IT auditing techniques

### Course (Paper) Name and No.: Financial Accounting IV

- CO1 Learners understanding about final accounts of the companies.
- CO2 Learn about redemption provisions of preference shares and debentures.
- CO3 Work with profit prior to incorporation and post incorporation profits.

### Course (Paper) Name and No.: Taxation III

- CO1 By the end of the course students will able to understand Indian Income tax system.
- CO2 Understood fundamental Concepts of Indian Income tax act 1961.
- CO3 Apply Income tax laws and solves the problems.
- CO4 Analyses and evaluates tax information and issues.
- CO5 Communicate effectively and orally income tax act information to income tax issues.

### **Course (Paper) Name and No.: Business Law III**

- CO1 Demonstrate comprehensive and accurate knowledge and understanding of those areas of company law.
- CO2 Read and study primary and secondary sources of company law, with minimal staff guidance; critically analyse, interpret, evaluate and synthesize information from a variety of sources.
- CO3 Critically analyses complex problems in the relation to the regulation of companies, apply the legal principles studied to these problems, evaluate competing arguments

### **Course (Paper) Name and No.: Research Methodology in Accounting and Finance**

- CO1 Use Literature while preparing for research, research design and further searches.
- CO2 Explain the Research terminologies and methodologies and interpret, analysis and presentation of report.
- CO3 Demonstrate a basic understanding of Research, Research Design and Report Writing

### **Course (Paper) Name and No.: Management Accounting**

- CO1 Understand the concept of management accounting.
- CO2 Analyses and interpret financial statement.
- CO3 Calculate various ratios from financial statement.
- CO4 Do cash flow analysis and manage working capital requirement estimations of the firm

### **Course (Paper) Name and No.: Foundation Course in Introduction to Management**

- CO1 Learner will be able to use business terms and concepts.
- CO2 Learners will understand the financial concepts used in business organisation.
- CO3 Learners use effective communication and managerial skills.
- CO4 Demonstrate a basic understanding of business management.

## **Class: T.Y.B. Com. (Accounting and Finance)**

### **Semester V**

#### **Course (Paper) Name and No.: Indirect tax and GST**

- CO1 Students will able to compute the assessable value of transaction related to goods and services.
- CO2 Understand how to calculate GST for various goods and services.
- CO3 Students will able to examine the method of tax credit under GST.

#### **Course (Paper) Name and No.: Financial Management II**

- CO1 Explain the financial concepts used in making financial management decisions.
- CO2 Use effective communication skills to promote respect and relationship for financial deals.
- CO3 Use business finance terms and concepts while communicating.

#### **Course (Paper) Name and No.: International Finance**

- CO1 Use international trade terms and concept when communicating.
- CO2 Explain the international trade concept used in making global decision.
- CO3 Demonstrate a basic understanding of international trade.

#### **Course (Paper) Name and No.: Cost Accounting III**

- CO1 Define the process of computation of Total Cost , Process Cost and Inter-process Profit
- CO2 Define the term with regard to Standard Costing and variance analysis.
- CO3 Define the term with regard to Marginal Costing and BEP analysis.

### **Course (Paper) Name and No.: Financial Accounting V**

- CO1 Learn the provisions of the Companies Act, 2013 regarding underwriting of shares, liability of underwriters where shares are fully underwritten or partially underwritten and also Accounting for underwriting of shares & debentures.
- CO2 Learn the provisions of the Companies Act 2013 regarding buyback of securities and accounting treatment.
- CO3 Learn AS 14 and the methods of accounting for Amalgamations, concept of transferee Company and the transferor company, purchase consideration and accounting treatment.
- CO4 Understand the procedure of internal reconstruction, its methods and accounting treatment
- CO5 Understand the procedure of liquidation of companies, its types, accounting treatment

### **Course (Paper) Name and No.: Financial Accounting VI**

- CO1 Use Business Finance terms and concepts while communicating.
- CO2 Explain the Financial terms and interpret to its best for taking financial decisions.
- CO3 Demonstrate a basic understanding of Financial Accounting.

## **Semester VI**

### **Course (Paper) Name and No.: Indirect tax II**

- CO1 Students will able to compute the assessable value of transaction related to goods and services.
- CO2 Understand legislation and administration of Foreign Trade Policy.
- CO3 Students will able to examine types of refund.

### **Course (Paper) Name and No.: Financial Management III**

- CO1 Explain the financial concepts used in making financial management decisions.
- CO2 Utilize information by adopting a variety of business and industry software and hardware to major financial function.
- CO3 Demonstrate a basic understanding of financial management

### **Course (Paper) Name and No.: Security Analysis and Portfolio Management**

- CO1 Describe the steps of the portfolio management process.
- CO2 Make investment policy recommendations, including the determination of an optimal asset allocation.
- CO3 Analyze and evaluate the performance of an investment manager.
- CO4 Analyze bond portfolio management strategies.
- CO5 Explain the concept of market efficiency.
- CO6 Explain how asset prices should be determined according to some of the main financial theories.
- CO7 Explain how derivatives products can be used in portfolio management.

### **Course (Paper) Name and No.: Financial Accounting VII**

- CO1 Prepare final accounts of Electricity companies
- CO2 Prepare final accounts of Co-operative societies
- CO3 Get the knowledge of IFRS its purpose & objectives of financial statements, characteristics, elements & measurement
- CO4 Solve the problems of accounts of Investment Accounting AS-13

### **Course (Paper) Name and No.: Cost Accounting IV**

- CO1 Define the process of budget & use the budgetary control in business organization
- CO2 Prepare standard for material, labour & overheads, sales & calculate the variances & how to take corrective actions
- CO3 Use of marginal costing & with the help of it decision making for organization

### **Course (Paper) Name and No.: Project Work**

- CO1 Understand the application of published works, learn to balance collaborative and individual work, determine an area of interest in the area of research.
- CO2 Improve the Knowledge in the research skill field, literature review, critical thinking and agility in communication skills.
- CO3 Learn about the application of various statistical tools and techniques for analysing and interpreting the data leads to draw the conclusion of the area of research study.
- CO4 Give the suggestion and recommendation about the research study leads to benefit the society at large.

# Department of Management Studies

## Programme Specific Outcomes

- PSO1 Will create operational cadre management personnel
- PSO2 Develop the lateral thinking, communication skills and social responsibilities among learners
- PSO3 Strengthen the analytical, interpersonal organization and decision making skills through presentations and seminars.
- PSO4 Adequate exposure to operational environment in the field of management
- PSO5 Encourage and inculcate the use of modern technology to solve the practical problems in the real world
- PSO6 Will prepare learners for future career success by encouraging them to develop necessary tools and skills, including written and oral communication skills, an ability to work with others, leadership qualities, and a capability to creatively solve problems

## Course Outcomes

**Class: F.Y.B.M.S.**

### **Semester I**

#### **Course (Paper) Name and No.: Introduction to Financial Accounts**

- CO1 Help the learners to understand types of business transactions and various terminologies used in business
- CO2 Learners will learn to draw financial statements i.e. Trading, Profit and loss account and balance sheet which will help them to understand financial position of the business

#### **Course (Paper) Name and No.: Business law**

- CO1 To enhance the motivation & leadership.
- CO2 To develop team spirit & morale.
- CO3 Demonstrate and understanding of the legal environment of the business.
- CO4 Apply basic legal knowledge to business transaction.

#### **Course (Paper) Name and No.: Business Statistics**

- CO1 The learners will get the knowledge of application of Statistical techniques in business decisions

#### **Course (Paper) Name and No.: Business Communication I**

- CO1 To recognize importance of business communication in corporate world
- CO2 To differentiate between formal and informal communication
- CO3 To understand the use of technology in the process of communication
- CO4 To acquire the skills of drafting various business letters
- CO5 To understand the importance of presentation and interview skills

### **Course (Paper) Name and No.: Foundation of Human skills**

- CO1 Learners will develop and nurture a deep understanding of personal motivation
- CO2 Learners will develop an understanding of and practice personal and professional responsibility
- CO3 Learners will learn to evaluate and improve upon personal leadership strengths and weaknesses
- CO4 It will help the learner to understand the importance of social responsibility & social ethics
- CO5 Learners will explore, understand, and lead, guided by the values of self-awareness, equity, social justice, inclusiveness, empowerment, collaboration, citizenship

### **Course (Paper) Name and No.: Business Economics - I**

- CO1 Learners will understand the concepts related to Business and its applications.
- CO2 Help the learners to understand the fundamentals of demand and supply
- CO3 Learners will gain the knowledge about various production techniques
- CO4 It will help the learners to understand different types of market in the economy.
- CO5 Learners will understand various cost and pricing methods used in the market

## **Semester II**

### **Course (Paper) Name and No.: Principles of Marketing**

- CO1 Learners should be familiar with the basic elements of the marketing mix and to provide framework about marketing policies.
- CO2 To know marketing strategies.
- CO3 Establish best practice for innovation among learners.
- CO4 To gain acceptance of Market changes.
- CO5 Helps to sustain Change.

### **Course (Paper) Name and No.: Industrial Law**

- CO1 Be familiar with the general approaches to the study of law and legal reasoning.
- CO2 Demonstrate familiarity with the rules of professional ethics

### **Course (Paper) Name and No.: Business Mathematics**

- CO1 The learners will get the knowledge of application of Mathematics in business, finance and economics

### **Course (Paper) Name and No.: Business Communication II**

- CO1 Develop and deliver informational, persuasive, creative and effective presentations
- CO2 Application of effective business writing
- CO3 Inculcation of interpersonal skills, collaborative skills and team spirit
- CO4 Development of effective communication abilities for career progression purpose and transition to workplace
- CO5 Develop ability to apply critical thinking and behaviour skills in corporate world

### **Course (Paper) Name and No.: Business Environment**

- CO1 Familiarize with the nature of Business Environment and its components.
- CO2 To demonstrate and develop conceptual framework of Business Environment and generate interest in International Business.
- CO3 Understand the concept of Capitalism, Socialism and Mixed Economy.
- CO4 Differentiate between needs and wants of society and can identify how these are satisfied through Business Activities.

## **Course (Paper) Name and No.: Principles Of Management**

- CO1 Learners will possess knowledge of current theory and techniques of major business discipline.
- CO2 Learners will exhibit leadership capacity and teamwork skills for business decision making.
- CO3 Learners will be able to integrate management practices & management principles.
- CO4 Learners will analyze and understand the environment of the organization.
- CO5 Learners will understand of the functions and responsibilities of managers &

## **Class: S.Y.B.M.S.**

### **Semester III**

#### **Course (Paper) Name and No.: Basics of Financial Services**

- CO1 Enable students to understand financial market and its various segments
- CO2 Students get knowledge about functioning and role of financial institutions
- CO3 To familiarize students with fundamentals of banking & banking operations
- CO4 Types and uses of Insurance contracts
- CO5 To impart knowledge about functioning and role of RBI

#### **Course (Paper) Name and No.: Corporate Finance**

- CO1 Learners will be able to estimate company's cost of capital.
- CO2 Learners will be able to value stocks and bonds and assess risk and return of assets.
- CO3 Learners will learn to calculate capital budgeting and resource allocation.
- CO4 Learners will be able explain capital structure and select a company's optimal mix of debt and equity financing.
- CO5 Learners will have overall knowledge about the mobilization of funds.

#### **Course (Paper) Name and No.: Consumer Behaviour**

- CO1 Help the learners to develop and understand about the consumer decision making process and its application in marketing function of firms.
- CO2 Learners will learn and develop the skill of understanding and analyzing consumer information to create consumer oriented marketing strategies.
- CO3 Learners will gain the knowledge about the environmental and individual influence on consumer.
- CO4 Learners will learn and understand the importance of consumer behaviour in marketing and differential consumer behaviour in Indian Context.
- CO5 Learners will learn about the different consumer decision making models.

### **Course (Paper) Name and No.: Advertising**

- CO1 This study gives a brief note on introduction to advertising, its evolution, its different types and the ethics and laws used in advertising.
- CO2 This study gives knowledge to the learners about the strategy formulation and planning process in advertising and its role in marketing mix.
- CO3 The study on creativity in advertising helps the learners to design a creative advertisement campaign by making use of the different elements of advertising.
- CO4 The students gain knowledge about the advertising budget, the evaluation process and its current trends.
- CO5 The overall study on advertising helps the learners to understand and examine the growing importance of advertising and career opportunities in advertising.

### **Course (Paper) Name and No.: Recruitment & Selection**

- CO1 Learners will understand process of recruitment & selection & various traditional & modern techniques of recruitment.
- CO2 Learners will be able to list the skills and knowledge needed to conduct full and fair recruitment and selection.
- CO3 Learners will be able to prepare job profile by defining accountabilities, standards and competencies.
- CO4 Learners will be able to understand induction & orientation process & will be prepared for interview effectively.
- CO5 After the successful completion students will understand importance of recruitment & selection, manpower planning, preparation of job description & job analysis & soft skills required for job.

### **Course (Paper) Name and No.: Motivation and Leadership**

- CO1 To enhance the motivation & leadership.
- CO2 To develop team spirit & morale.
- CO3 To encourage individuals in planning & important issues.
- CO4 To meaningful & challenging job.
- CO5 Being a role model to reaching goals.

### **Course (Paper) Name and No.: Information Technology in Business Management-I**

- CO1 The learners will be able to analyse the role played by six major types of information systems in organizations and their relationships to each other.
- CO2 Demonstrate understanding of the concepts, structure and design of different operating systems.
- CO3 Learners will exhibit proficiency in the use of Word processing, spreadsheet and presentation applications.
- CO4 Learners will be able to apprehend the concept and application of E-mail, Internet and Domain Name System.
- CO5 Demonstrate knowledge of security threats to computer systems and perform counter measures to secure it.

### **Course (Paper) Name and No.: Foundation Course(Environmental Management)III**

- CO1 Make deliberate efforts for converting environmental knowledge into action.
- CO2 Develop methods / approaches for sustainable environmental planning, development and management.
- CO3 Understand and practice the legal and regulatory policies with regard to environment protection.
- CO4 Finding solutions to the various environmental problems and challenges faced by us.
- CO5 Integrating environmental and natural resource management with the strategies, operations sand global surveillance of the organisations.

## **Course (Paper) Name and No.: Business Planning & Entrepreneurial Management**

- CO1 Spirit of entrepreneurship will be instilled among the learners. Also they will become familiar to competencies needed to become an entrepreneur
- CO2 Learners will understand the different roles and responsibilities taken by an entrepreneur, challenges faced and opportunities available to them
- CO3 Learners will be able to learn and understand the various concept in the performance management and various evaluation parameters for performance management
- CO4 Learners will be acquainted with different facets of management of an enterprise
- CO5 Leaders with concern towards nation and society at large entrepreneurial approach and skill sets to contribute for socio-economic development

## **Course (Paper) Name and No.: Accounting for Managerial Decisions**

- CO1 Help the learners to present the financial statement which can be analyse and Interpret by using
- CO2 Trend %, Common Size and Comparative
- CO3 Understand the Utility of Financial Ratios in any business
- CO4 Learners will be able to determine the cash Inflows and cash Outflows of the business from
- CO5 Operating, Investing and Financing activity

## **Course (Paper) Name and No.: Strategic Management**

- CO1 Learners will get basic idea about business policy and strategies and how does it affect the working of any business organizations.
- CO2 Learners will be able to understand the impact of internal and external environment on strategies of an organization.
- CO3 Learners will get exposure of various corporate, business and functional level strategies.
- CO4 Learners will get a chance to learn various innovative and creative strategy making models.
- CO5 Learners will be able to implement techniques, tools, models and theories of strategic management into practical business world.

## **Semester IV**

### **Course (Paper) Name and No.: Financial Institutions & Markets**

- CO1 Help the learners to understand the concept and structure of Indian financial system
- CO2 Learners will gain the knowledge of various financial Institutions and various financial regulators
- CO3 Learners will learn about various financial markets like money market, capital market, and Commodity Market etc
- CO4 Help to understand the financial system at Indian as well as global level
- CO5 Learners will be able to implement techniques, tools, models and theories of strategic management into practical business world

### **Course (Paper) Name and No.: Corporate Restructuring**

- CO1 Learners will develop understanding about corporate restructuring.
- CO2 Learners will gain accounting knowledge of internal reconstruction.
- CO3 Learners will gain accounting knowledge of external reconstruction.
- CO4 Learners will develop understanding of pre and post impact of reconstruction.
- CO5 Overall learners will develop proficiency in the area of corporate restructuring.

### **Course (Paper) Name and No.: Integrated Marketing Communication**

- CO1 Learners will get an overview of the range of tools available for Marketing Communications.
- CO2 Learners will understand the basic principles of planning and execution in marketing communications.
- CO3 Learners will get acquainted with concepts and techniques in the application for developing and designing an effective advertising and sales promotion program.
- CO4 Learners will develop a managerial perspective and an informed decision-making ability for effective and efficient tackling of promotional situations.

### **Course (Paper) Name and No.: Rural Marketing**

- CO1 Learners will be able to understand the effort put by the government in rural development and the problems in rural market and the ways to overcome it.
- CO2 Learners will gain knowledge about the consumer behaviors in rural areas and their characteristics.
- CO3 Learners will be able to understand the nature of competition in rural markets and the use of marketing mix by manufacturers.
- CO4 Learners will gain knowledge about the various distribution and communication strategies used in rural markets.
- CO5 Learners will understand the rural aspects of marketing and consumer behaviour and the abilities to design effective strategies

### **Course (Paper) Name and No.: Training & Development in HRM**

- CO1 Learners will understand the process of training & development & the importance of training & development.
- CO2 Learners will be able to understand the counselling techniques with reference to the development of employees, society & Organisation.
- CO3 Learners will be able to evaluate the process of management development.
- CO4 Learners will be able to interpret the process performance management , appraisals& ethics of appraisal.
- CO5 Learners will learn to describe advantages of training & development,& will also understand how to undertake training needs analysis.

### **Course (Paper) Name and No.: Change Management**

- CO1 To study innovative Strategies.
- CO2 To empower agents of change.
- CO3 Establish best practice for innovation among learners.
- CO4 To gain acceptance of change.
- CO5 Helps to sustain Change

### **Course (Paper) Name and No.: Information Technology in Business Management**

- CO1 Learners will be to explain various roles MIS have towards strategic goals and operational success of an organization.
- CO2 Recognize the relationship between business information needs and decision making.
- CO3 Examine and identify all components in an ERP system and the relationship among the components.
- CO4 Gain an insight of the basic concepts, scope and application of data warehouse and data mining.
- CO5 Obtain knowledge of BPO/KPO and cloud computing and ability to identify their scope and challenges

### **Course (Paper) Name and No.: Foundation Course (Ethics & Governance) - IV**

- CO1 To know the share holders value for learners.
- CO2 To develop the interest of corporate sector.
- CO3 To understand the rules & regulations of corporate sector.
- CO4 To study about investors.
- CO5 To study fast growth & profit of companies.

### **Course (Paper) Name and No.: Business Economics-II**

- CO1 Learners will understand the concepts related to Macro economics and its applications.
- CO2 Help the learners to understand the fundamentals of National Income.
- CO3 Learners will gain the knowledge about various Monetary Policies.
- CO4 It will help the learners to understand various components of Union Budget
- CO5 To acquaint the learners with various International Trade theories and foreign exchange

### **Course (Paper) Name and No.: Business Research Methods**

- CO1 Learners will be able to understand the concept and process of business research in business environment.
- CO2 Learners will gain knowledge of the use of tools and techniques for exploratory, conclusive and causal research.
- CO3 Learners will be able to understand the concept of measurement in empirical systems.
- CO4 Learners will be able to use statistical techniques for analysis of research data.
- CO5 Learners shall be able to understand the concepts of business research. Enhancing the abilities and imparting the knowledge for using the information in business research area.

## **Course (Paper) Name and No.: Production & Total Quality Management**

- CO1 Learners will be able to understand basics of productivity and total quality management
- CO2 Learners will gain knowledge about various certifications and strategies for quality improvement.
- CO3 Learners will be able to understand the designing of aspects of production systems.
- CO4 Learners will be able to understand various inventory control techniques and materials management.
- CO5 This course will enable the learners apply what they have learnt theoretically.

## **Class: T.Y.B.M.S.**

### **Semester V**

#### **Course (Paper) Name and No.: Investment Analysis & Portfolio Management**

- CO1 Help the learners to understand various Investment avenues available in market.
- CO2 Learners will learn to calculate Return and Risk involved in the securities by using various methods like HPR, Beta etc.
- CO3 Learners will gain the knowledge about Portfolio management and the techniques to manage the Portfolio with the help of graphs by using Fundamental analysis and Returns by using Technical Analysis
- CO4 Learners will learn the traditional theories related to investment and measurement tools for evaluation of portfolio performance
- CO5 This course will provide the overall knowledge about Investment avenues available and Return- Risk Relationship by using various techniques

#### **Course (Paper) Name and No.: Commodity & Derivatives Market**

- CO1 Learners will understand the meaning of financial derivatives.
- CO2 To help the learners understand difference between forward futures and options contracts
- CO3 Be aware about the growth of futures markets worldwide as well as in India.
- CO4 To help the learners understand about the concept of Derivatives and its types
- CO5 To know about Hedging and the development position of Derivatives in India.

### **Course (Paper) Name and No.: Wealth Management**

- CO1 Provide advice on personal wealth management and pension planning
- CO2 Help learners to understand the role of financial planners
- CO3 Construct a financial plan
- CO4 Assess personal financial goals and create a saving plan
- CO5 Select appropriate Insurance product to cover financial risks

### **Course (Paper) Name and No.: Direct Taxes**

- CO1 Learners will be able to understand various definitions covered under Income Tax Act, 1961.
- CO2 Learners will be able to determine residential status of an individual and would be able calculate scope of income.
- CO3 Learners will have knowledge of heads of income like Income from Salary, Income from House Property, Profits & Gains from Business & Profession, Capital Gains & Income from Other Sources.
- CO4 Learners will learn exemptions under section 10 and Deductions under Chapter VI A.
- CO5 Learners will be able to compute the taxable income of an individual.

### **Course (Paper) Name and No.: Services Marketing**

- CO1 Learners will be able to understand basic concept of service marketing and how does it differs from product marketing.
- CO2 Learners will be able to analyse impact of service recovery efforts on consumer loyalty.
- CO3 Learners will be able to understand key elements of service marketing mix.
- CO4 Learners will get knowledge about how to manage quality aspects of service marketing.
- CO5 To understand recent trends in marketing of services in various service sector.
- CO6 Learners will understand importance of ethics in service marketing.

### **Course (Paper) Name and No.: E-Commerce & Digital Marketing**

- CO1 Learners gain insight on innovative uses of e-commerce, its significance and application for developing competitive advantage.
- CO2 Learners will gain a comprehensive understanding of the e-commerce landscape, current and emerging business models, the technology and infrastructure underpinnings of the business.
- CO3 Learners gain an understanding on the importance of security, privacy, ethical issues and avenues related to e-commerce.
- CO4 Learners will gain understanding of building blocks that constitute digital marketing and the tools, techniques, knowledge to develop cohesive digital market strategies.
- CO5 Learners gain an understanding on how internet can help business grow and the different e-commerce platforms to enhance current business or incubate new businesses.

### **Course (Paper) Name and No.: Sales & Distribution Management**

- CO1 Learners will gain knowledge about different components of sales and distribution management.
- CO2 Learners will understand various facets of the job of a sales manager.
- CO3 Learners will be able to focus on decision making aspects and implementation of decisions in sales and distribution management.
- CO4 Learners will learn about different performance evaluation techniques their uses, ethics and trends in sales and distribution.
- CO5 Learners will gain knowledge of sales and distribution management and ability of decision-making and implementation of decision in sales and distribution management.

## **Course (Paper) Name and No.: Customer Relationship Management**

- CO1 Articulating CRM goals and identify milestones in relationship management.
- CO2 Bonding with customers and building their loyalty
- CO3 Capability to shift short term customer transactions to a long term relationship mode.
- CO4 Implementation of best CRM strategies and practices.
- CO5 Ability to measure the success of their relationship management efforts.
- CO6 Putting software support in place for providing effective customer services.

## **Course (Paper) Name and No.: Finance for HR Professionals & Compensation Management**

- CO1 Learners will understand the basic compensation concepts and the context of compensation practice.
- CO2 Learners will be able to illustrate different ways to strengthen the pay-for-performance link.
- CO3 Learners will understand the Legally required employee benefits.
- CO4 Learners will Identify the internal and external environmental factors that have an impact on the pay structure of an organization
- CO5 Learners will be able to demonstrate an understanding of the process of designing a pay structure taking account of the company environment

## **Course (Paper) Name and No.: Strategic Human Resource Management & HR Policies**

- CO1 The learners will be able to understand strategic human resource management so as to address business challenges and accomplish organisational goals.
- CO2 Acquaint the students with various HR strategies that create high performance culture within an organization.
- CO3 Make the students understand and assess the importance of strategic human resource management and its correlation with organizational performance.
- CO4 Familiarize students with the Human Resource Policies and its contribution towards workplace harmony.
- CO5 Gain an insight of the changes and developments in strategic human resource management

## **Course (Paper) Name and No.: Performance Management & Career Planning**

- CO1 This study acquaints the learners with a perspective of different facets of management of an enterprise.
- CO2 The study on performance management gives an overview on its features, components, its evolution and the best practices in performance management.
- CO3 The study gives knowledge about the performance management process like performance planning, benchmarking, managing and performance appraisal.
- CO4 The learners gain knowledge about the ethics under performance management and its key issues.
- CO5 This course intends to provide knowledge on career planning and development, its benefits and limitations.

### **Course (Paper) Name and No.: Industrial Relations**

- CO1 The learners will be able to demonstrate descriptive knowledge in the field of Industrial Relations.
- CO2 Apply the essential concepts of Industrial Relations at the organisational level.
- CO3 Understand the genesis of Industrial Disputes & various methods to prevent the same.
- CO4 Analyse how trade unions are helpful in effective communication between the workers and the management through collective bargaining.
- CO5 Familiarize students with the history, provisions of various legislations related to Industrial Relations in India

### **Course (Paper) Name and No.: Logistics & Supply Chain Management**

- CO1 Learners will be able to understand various technical concepts used in logistics and supply chain management.
- CO2 Learners will be able to understand global trends in logistics and supply chain management.
- CO3 Learners will be able to gain an insight into the nature of supply chain, its functions and supply chain systems.
- CO4 Learners will be able to identify impact of logistical costing on customer satisfaction.

### **Course (Paper) Name and No.: Corporate Communication & Public Relations**

- CO1 The study on Corporate Communication and Public Relation helps the learners to get a brief idea about their work life, how to understand their assignments and deliverables
- CO2 This study helps the learners about how quality work life can be improved.
- CO3 Corporate communication study can help in benefiting and improving the communication between corporate, employees and the public.
- CO4 It gives a brief idea about how effective business communication increases productivity.
- CO5 This study stresses on the aspect to work more efficiently, with less human error

## Semester VI

### Course (Paper) Name and No.: Innovative Financial Services

- CO1 Help the learners to understand traditional as well as modern financial services based on Fee based and Fund based services
- CO2 Learners will gain knowledge about various intermediaries between the industry and the investors and the process of securitization
- CO3 Help the learners to understand the facility available in the financial market regarding leasing , Hire Purchase, housing finance etc
- CO4 Learners will learn about the financial products available in the market related with consumer Durables and plastic money
- CO5 This course will provide the overall knowledge about Innovative financial services and financial Products available in current market scenario

### Course (Paper) Name and No.: Project Management

- CO1 Enable students to apply project management practices to the launch of new programs, products and services
- CO2 To provide overview of planning and controlling activities to effectively produce and deliver goods and services.
- CO3 Enable students to analyze and evaluate appropriate business strategies and practices.
- CO4 To impart knowledge about capital budgeting, capital structure and asset valuation.
- CO5 Develop strategies to initiate plan, execute, monitor and control and close projects in business environment

### **Course (Paper) Name and No.: Strategic Financial Management**

- CO1 Learners will understand the basis of various dividend policy framed by the companies and models used for calculation of dividend
- CO2 Learners will learn the assessment tools to evaluate the projects which will be base for taking Decision to start with or not to start with new projects
- CO3 Help the learners to understand the concept of corporate governance and corporate restructuring like merger, acquisition , takeover etc.
- CO4 Learners will gain the knowledge about short term finance and Banking norms on NPAs
- CO5 This course will provide the overall knowledge about strategic financial management

### **Course (Paper) Name and No.: Indirect Taxes**

- CO1 Learners will learn the definitions covered under GST.
- CO2 Learners will learn levy & collection of GST and composition scheme.
- CO3 Learners will understand supply concept in terms of place, time and value of supply.
- CO4 Learners will learn the documentation and filing of returns.
- CO5 Learners will gain knowledge on GST and application of the same in an organization.

### **Course (Paper) Name and No.: Brand Management**

- CO1 Learners will be able to understand the meaning and significance of brand management.
- CO2 Learners will be able to know how to build, sustain and grow brands.
- CO3 Learners will get idea about various sources of brand equity.
- CO4 Learners will be able to plan and implement various brand management programmes.
- CO5 This course will enable the learners apply what they have learnt theoretically

### **Course (Paper) Name and No.: Retail Management**

- CO1 Learners will gain knowledge of all functional areas of retailing and essential principles of retailing.
- CO2 Learners will get knowledge of essential principles of retailing.
- CO3 Learners will gain insight of the Indian retailing scenario.
- CO4 Learners will develop a sense of legal and ethical aspects of retail management.
- CO5 Learners will be able to understand retail management terminology

### **Course (Paper) Name and No.: International Marketing**

- CO1 Ability to analyze environmental variables that influence international marketing.
- CO2 Ability to research, select and enter a new international market.
- CO3 Develop strategies and tactics that can lead to successful international marketing.
- CO4 More typical management decisions peculiar to problems faced in international arena.
- CO5 Produce a comprehensive international marketing plan.
- CO6 Perform the functional tasks constituting marketing intelligence and mix adaptations

### **Course (Paper) Name and No.: Media Planning & Management**

- CO1 Learners will get an overview of different features, impact and role of media in marketing.
- CO2 Learners will get knowledge of underlying criteria for evaluating the advantages and failure in data sources, media research, media mix and media strategies.
- CO3 Learners will gain insight in different budgeting techniques used, buying processes and tactics, and scheduling of media.
- CO4 Learners will develop a sense of judgment when evaluating media with the help of different media measurement metrics and media buys.
- CO5 Learners will be able to solve marketing problems through understanding how the media operates from the perspective of the advertiser, the agency and the medium itself.

### **Course (Paper) Name and No.: HRM in Global Perspective**

- CO1 Demonstrate an understanding of key terms, theories and practices within the field of IHRM.
- CO2 Familiarize students with the basic concepts and challenges of Expatriates and Repatriates.
- CO3 Learners will be able to have profound understanding of Global Workforce Management.
- CO4 Students will be able to explicate the influence of cross culture on Human Resource Management.
- CO5 An analysis of trends and challenges of IHRM guiding students to arrive at potential remedies of it.

### **Course (Paper) Name and No.: Organisational Development**

- CO1 Learners will be able to understand basics of Organisational development & role of OD practitioner.
- CO2 Learners will understand how human process issues can be used by the OD consultant to diagnose organisation effectiveness.
- CO3 Learners will evaluate the implementation of OD interventions and judge their usefulness against other change tools and techniques;
- CO4 Learners will be able to collect and evaluate data to judge the effectiveness of OD interventions;
- CO5 Learners will formulate an approach for organization development in response to appropriate organizational diagnosis, business imperatives and internal and external contextual forces.

### **Course (Paper) Name and No.: HRM in Service Sector Management**

- CO1 Learners will be able to understand the concept and growing importance of HRM in service sector.
- CO2 Learners will understand the ways of managing human resources in service sector.
- CO3 Learners will be able to understand the significance of human element in creating customer satisfaction through service quality.
- CO4 Learners will gain knowledge about trending issues and challenges of HR in various service sectors.
- CO5 This course will enable the learners apply what they have learnt theoretically

### **Course (Paper) Name and No.: Indian Ethos in Management**

- CO1 Helping learners to imbibe values and practices of Indian Ethos in Management.
- CO2 Learners will be able to establish correlation between Traditional and Modern Management System.
- CO3 Learners will be able to discover a wide spectrum of Stress Management Techniques.
- CO4 Understand and analyse the concept and importance of Learning System in India.
- CO5 Allow students to have an essence of values and its importance in work culture

### **Course (Paper) Name and No.: Operation Research**

- CO1 Understand the meaning, purpose and tools of Operations Research.
- CO2 An ability to identify, formulate and solve complex problems by minimizing cost
- CO3 Learners will identify and express a decision problem and solve it graphically and by Simplex method.
- CO4 To help the learners to recognize and formulate assignment and transportation problems, and how to reach optimal solution
- CO5 Identify parameters that will influence the optimal solution

# Programme- M.Com

## Programme Outcomes

- PO1 After completing two years for Masters in Commerce (M.Com) programme, students would gain knowledge in conventional as well as contemporary areas in the discipline of Commerce and Accountancy.
- PO2 The Commerce and Accountancy focused curriculum offers specialization in various areas of Accountancy which would equip the student to face the modern-day challenges in commerce and business and they will be prepared to accept responsibilities in the business world
- PO3 To enable the students for conducting business, accounting and auditing practices
- PO4 Learners will be able to prove proficiency in pursuing higher and professional studies and advance research in various disciplines of commerce
- PO5 Inculcate the element of research amongst the learners through projects, to develop their overall personality

## Course Outcomes

**Class: M. Com. I**

### **Semester I**

#### **Course (Paper) Name and No.: Business Ethics and Corporate Social Responsibility**

- CO1 Understanding concepts of Business ethics and ethical business practices.
- CO2 Understanding various areas of Corporate Social Responsibility and CSR Policy

#### **Course (Paper) Name and No.: Strategic Management**

- CO1 Understanding concepts of Strategic Management and their use in business.
- CO2 Understanding strategy formulation, implementation and evaluation.
- CO3 Better knowledge about global strategies and emerging strategic trends.

#### **Course (Paper) Name and No.: Cost and Management Accounting**

- CO1 Learners are able to understand concept of Marginal Cost, Co, BEP and application of Marginal Costing.
- CO2 Learners are able to understand concept of decision making, Managerial decision making, process cost and various types of decisions.
- CO3 Learners are able to understand concept of divisional performance, Responsibility Centres and measures of performance evaluations.
- CO4 Learners are able to understand concept of cost control and cost reduction, standard costing and variance analysis.
- CO5 Learners are able to understand concept of budgetary control, importance of budgetary control and different types of budgets.

## Semester II

### **Course (Paper) Name and No.: Research Methodology for Business**

- CO1 Understanding basic of Research Methodology.
- CO2 Developing the fundamental skills in formulating research problems.
- CO3 Knowledge of the basic statistical tools and techniques applicable for research.
- CO4 Developing the skill of research reporting.

### **Course (Paper) Name and No.: E-Commerce**

- CO1 Understand the emerging world of e-commerce and current challenges and issues in e-commerce.
- CO2 Understanding World wide web and E-enterprise and Electronic payment system.
- CO3 Understanding Legal and Regulatory Environment and Security issues of E-commerce

### **Course (Paper) Name and No.: Corporate Finance**

- CO1 Learners are able to develop the objectives of financial management
- CO2 Learners are able to understand to develop and apply the techniques of investment in the financial decision making in the business.
- CO3 Learners are able to understand the concept of time value of money.
- CO4 Learners are able to understand the concept of financial decisions

## **Class: M. Com. II**

### **Semester III**

#### **Course (Paper) Name and No.: Advanced Financial Accountancy**

- CO1 Learners are able to develop the concept of foreign currency conversion.
- CO2 Learners are able to develop the concept of final accounts and statutory requirements of Banking companies.
- CO3 Learners are able to develop the concept of final accounts and statutory requirements of insurance companies.
- CO4 Learners are able to develop the concept of final accounts and statutory requirements of co-operative Societies.

#### **Course (Paper) Name and No.: Direct Tax**

- CO1 Learners have precise understanding of all basic concepts of Direct Tax.
- CO2 Learners are able to differentiate between Income Taxable & Exempt Income along with the determination of Residential Status of Assesse.
- CO3 Learners will be able to segregate the Income into the various Heads of Income and compute the tax liability according to the applicable provisions.
- CO4 Learners become aware of the various deductions available to Assesse from the Gross Total Income .
- CO5 Learners will calculate the Tax liability of Individuals , Firms & Company.
- CO6 Learners understand the procedure for filing of Income Tax Returns

## Semester IV

### Course (Paper) Name and No.: Corporate Financial Accounting

- CO1 Learners are able to develop the concept of corporate financial reporting.
- CO2 Learners are able develop the concept of International Financial Reporting Standard.
- CO3 Learners are able to develop the concept of valuation of business for amalgamation and merger.
- CO4 Learners are able to develop the concept consolidated financial statement

### Course (Paper) Name and No.: Indirect Tax ( G.S.T)

- CO1 Learners will get precise understanding of the definitions, concepts and title under G.S.T.
- CO2 Learners become aware of the rules & procedures for registration under G.S.T.
- CO3 Learners are able to compute the Tax liability & place of collection of Tax under Integrated G.S.T. Act 2017.
- CO4 Learners are able to differentiate between origin & movement of goods & services under the Integrated G.S.T Act 2017.
- CO5 Learners learn the procedure for Challan generation , time & amount of tax along with the provisions for T.D.S and T.C.S.

### Course (Paper) Name and No.: Advanced Cost Accounting

- CO1 Learners are able to develop the concept of Process Costing.
- CO2 Learners are able to develop the concept of Cost allocation and Activity Based Costing system.
- CO3 Learners are able to develop the concept of Responsibility Accounting.
- CO4 Learners are able to develop the concept of Strategic Cost Management.

## **Course (Paper) Name and No.: Financial Management**

- CO1 Learners are able to develop the concept of types of financing.
- CO2 Learners are able to develop the concept of Investment decisions and capital budgeting.
- CO3 Learners are able to develop the concept of Working Capital Management.
- CO4 Learners are able to develop the concept Financial Planning.
- CO5 Learners are able to develop the concept Financial Policy and strategic management

# **Faculty of Science**

# Programme- B.Sc.

## Programme Outcomes

- PO1 The learners will understand the basic concepts, methods and application of science.
- PO2 The learners will be able to apply fundamental knowledge in completion of task and for acquiring professional skills.
- PO3 The employability, skills and prospects for research of the learners will be enhanced.
- PO4 Learners will be able to use various scientific techniques.
- PO5 Learners will be able to handle scientific instruments.
- PO6 Learners will be aware of contemporary issues in various research areas.
- PO7 Learners will be able to identify social problems and to provide solutions through subject knowledge
- PO8 Learners will have high social values, good communication skills, an understanding of professional and ethical responsibilities.

# Department of Chemistry

## Programme Specific Outcomes

- PSO1 The students will have sound understanding of fundamental and application based principles and theories in Physical, Inorganic, Organic and Analytical Chemistry
- PSO2 Students will learn various techniques to perform scientific experiments as well as accurately record and analyse the results of such experiments
- PSO3 Student will learn the usage of analytical instruments, select, and apply appropriate techniques and resources for the analysis
- PSO4 Extensive laboratory and classroom work will skill the students with in problem solving, critical thinking and analytical reasoning as applied to scientific problems
- PSO5 Students will be acquainted with new areas in both chemistry and allied fields of science and technology
- PSO6 Students will understand the applications and impact of the chemistry in societal, and environmental contexts, and demonstrate it's knowledge and need for sustainable development
- PSO7 Students will learn to apply ethical practices such as limited and safe use of hazardous chemicals, responsibility toward environmental and health safety
- PSO8 Students will be able to work in team and thus get prepared as a perfect professional chemist with respect to knowledge, responsibility and teamwork

## Course Outcomes

**Class: F.Y.B. Sc. Chemistry**

**Semester I**

### **Course (Paper) Name and No.: Paper I**

- CO1 Understand different types of systems like open and closed system.
- CO2 Understand various properties of a system under study.
- CO3 Learn zeroth and first law of thermodynamics.
- CO4 Acquire the concepts of heat, work and internal energy.
- CO5 Apply the knowledge of heat, work and internal energy to system under study.
- CO6 Acquire knowledge of different form of heat changes taking place in dissolution and chemical reactions.
- CO7 Learn various ways of defining concentration of a compound in solution.
- CO8 Apply the knowledge acquired for calculating the concentration of a compound in solution.
- CO9 Convert one concentration unit to other.
- CO10 learn Rutherford atomic model and bohr theory with its limitation.
- CO11 describe the structure of hydrogen atom .
- CO12 explain hydrogen energy levels, shells , subshells and orbitals.
- CO13 explain shielding effect and effective nuclear charge .
- CO14 understand Aufbau principle.
- CO15 classify the elements as the main group, transition and inner transition elements.
- CO16 explain periodicity in properties for atomic and ionic size.
- CO17 describe electron gain enthalpy and ionization enthalpy.
- CO18 describe electronegativity by pauling, mulliken and Alfred rochow method
- CO19 Write the IUPAC name of different organic compound.
- CO20 Explain the hybridization of C,N,O in the given organic compound.
- CO21 Determine the structure of organic compound from the IUPAC name of that compound.

- CO22 Describe the electronic effects like Inductive effect, resonance, hyperconjugation etc.
- CO23 Classify the reactive intermediates like carbocation, carbanion, and free radical.
- CO24 Compare the homolytic and heterolytic fission of bond with examples.
- CO25 Classify the different types of organic reactions.

### **Course (Paper) Name and No.: Paper II**

- CO1 Derive an expression for rate constant of a first order reaction.
- CO2 Derive an expression for rate constant of second order reaction with equal initial concentration of two reactant.
- CO3 Discuss the following methods used in determination of order of reaction.
  - a) Graphical Method b) Half life time c) Ostwald's isolation method
- CO4 Explain liquid Crystal and its Characteristics
- CO5 Types of liquid crystals
- CO6 Measuring of surface tension using stalagmometer
- CO7 Explain the factors on which viscosity of a liquid depends
- CO8 Measurement of refractive index experimentally
- CO9 Explain what is mean by main group elements.
- CO10 Learn and explain metallic and non metallic nature of main group elements.
- CO11 Understands the concept of electronegativity of main group elements
- CO12 Learn about what is mean by anomalous behavior and anomalous behavior of second period elements.
- CO13 Understands and explain allotropic modifications of group – 14, 15 and 16 elements
- CO14 Learn about the concept of diagonal relationship between 2<sup>nd</sup> period elements and 3<sup>rd</sup> period elements.
- CO15 Get the knowledge about chemistry of carbides, oxides and hydrides of group-I and group-II elements.
- CO16 Learn and explain the preparation, properties and uses of some important compounds like NaHCO<sub>3</sub>, Na<sub>2</sub>CO<sub>3</sub>, NaCl, NaOH, CaO and CaCO<sub>3</sub>.

- CO17 Know the general environmental aspects of oxides of carbon, oxides and oxyacids of sulphur and nitrogen.
- CO18 Get the knowledge about Photochemical smog, Acid rain, Global warming - its control techniques and health hazards.
- CO19 Distinguish between different types of isomers.
- CO20 Differentiate chiral and achiral molecules
- CO21 Recognize and draw structural isomers (constitutional isomers), stereoisomers including enantiomers and diastereomers, racemic mixture, and meso compounds.
- CO22 Identify the stereocenters in a molecule and assign the configuration as R or S.
- CO23 Know the relationship between enantiomers and their specific rotations.
- CO24 Draw all the stereoisomers of organic compounds, and recognize diastereomers, enantiomers, meso compounds and centers of symmetry.
- CO25 Recognize and discuss the stereoisomers of chiral compounds that do not contain a stereogenic carbon center and assign the configuration of the stereoisomers.
- CO26 Drawing condensed structural formulas, bondline formulas, perspective drawings, Newman projections, Fischer projections.
- CO27 Conformation analysis of alkanes (ethane, propane and n-butane); predicting the relative stability with energy diagrams.

### **Course (Paper) Name and No.: Practical**

- CO1 Perform the standardization of NaOH solution of various concentration.
- CO2 Prepare the solutions of different normality.
- CO3 Describe the reaction of hydrolysis of ester by HCl
- CO4 Determine the strength of  $\text{Na}_2\text{CO}_3$  and  $\text{NaHCO}_3$  in a solution of two by titration with standard acid.
- CO5 Examine the rate of reaction of hydrolysis of ester.
- CO6 Calculate the enthalpy of dissolution of salt.
- CO7 Determine the strength of commercial sample of acid.

- CO8 Calculate and report the amount of acetic acid in vinegar sample by titrimetric method.
- CO9 Determine the percentage purity of ZnO containing  $\text{ZnCO}_3$ .
- CO10 Determine the percentage purity of  $\text{BaSO}_4$  containing  $\text{NH}_4\text{Cl}$ .
- CO11 Determine the purity of organic compound by recrystallization.
- CO12 Decide the melting point of pure compound.
- CO13 Determine the purity of organic compound by sublimation
- CO14 Develop the chromatographic plate for separation of mixtures.
- CO15 Perform the experiment of separation of mixture by thin layer chromatography.
- CO16 Separate the liquid mixture by distillation method.

## Semester II

### Course (Paper) Name and No.: Paper I

- CO1 Learn ideal gas laws, kinetic theory of gases.
- CO2 Learn deviation of real gases from ideal gas laws.
- CO3 Apply knowledge acquired to real systems.
- CO4 Derive van der Waals equation of state.
- CO5 Understand Joule-Thomson effect and its significance.
- CO6 Acquire knowledge of reversible and irreversible reactions.
- CO7 Learn laws governing a chemical reaction and the terms involved.
- CO8 Apply the acquired knowledge to calculate different parameters concerning a chemical reaction.
- CO9 Learn second law of thermodynamics.
- CO10 Learn thermodynamic derivation of equilibrium constant.
- CO11 Apply the acquired knowledge to calculate equilibrium constant.
- CO12 describe concept of qualitative analysis like precipitation equilibria, common ion effect etc.

- CO13 describe introductory part of coordination compounds as well as terminology in coordination compounds.
- CO14 classify the ligands.
- CO15 describes Arrhenius , Lowry bronsted , Solvent – Solute concept of acids- bases.
- CO16 explain hard and soft acids and bases with applications.
- CO17 understand mechanism of organic reactions like friedel acylation / alkylation.
- CO18 explain calculations of titration curve involving strong acid and strong base.
- CO19 Describe the mechanism of organic reaction.
- CO20 Compare the different elimination reactions with examples
- CO21 Identify and classify the organic reactions.
- CO22 Explain Markownikoff's and Antimarkownikoff's rule with example.
- CO23 Predict the product of given organic reactions.
- CO24 Discuss reaction of alkynes with examples.
- CO25 Lists the different reactions of alkenes.
- CO26 Predict the mechanism of organic reaction.
- CO27 Describe the electrophilic, Nucleophilic and free radical reactions.

### **Course (Paper) Name and No.: Paper II**

- CO1 Difference between amorphous and crystalline solid
- CO2 Explain law of crystallography
- CO3 Explain law of rationality
- CO4 Explain Planck's theory of quantization of radiation
- CO5 Describe different types of interaction between radiation and matter
- CO6 Explain different type of electromagnetic spectrum and give importance of UV, Visible and IR regions in spectroscopic studies.
- CO7 Define the term degree of ionization. What are factors that affects the degree of ionization?
- CO8 Derive Henderson's equation for i) Acidic buffer ii) Basic buffer.

- CO9 Explain how a buffer consisting of a weak acid/base and salts resist change in pH
- CO10 Deduce the expression for ionic product of water
- CO11 Explain the types of chemical bonds and can do the comparison between ionic and covalent bonds.
- CO12 Define polarizability ( Fajan's rule ) and can understand the shapes of molecules.
- CO13 Draw the Lewis dot structure
- CO14 Explain the Sidgwick Powell Theory and basic VSEPR theory for  $AB_n$  type molecules with and without lone pair of electrons
- CO15 Understands the isoelectronic principles, applications and limitations of VSEPR theory.
- CO16 Understands the concept of Reduction potentials: half reactions, balancing redox reactions
- CO17 Explain Redox stability in water by: i) Latimer and Frost diagrams ii) pH dependence of redox potentials.
- CO18 Understands the applications of redox chemistry like :
- i) extraction of elements (example : isolation of copper by auto reduction)
  - ii) redox reagents in volumetric analysis  $I_2$  and  $KMnO_4$
  - iii) titration curves: i) single electron system ii) multi electron system
- CO19 Recognize and distinguish between aromatic and antiaromatic compounds by their structures.
- CO20 Know the properties of aromatic and antiaromatic compounds, and the chemical consequences of aromaticity.
- CO21 Recognize and be able to write the mechanism of electrophilic aromatic substitution.
- CO22 Students can be able to understand the basics of electrophilic aromatic substitution reactions of the following types: halogenation, nitration, sulfonation, and Friedel-Crafts acylation & alkylation.
- CO23 Students can be able to write the mechanism of electrophilic aromatic substitution reactions of the following types: halogenation, nitration, sulfonation, and Friedel-Crafts acylation & alkylation.

## Course (Paper) Name and No.: Practical

- CO1 To determine the rate constant for the separation reaction between ethyl acetate and NaOH.
- CO2 To determine the dissociation constant ( $K_a$ ) of weak acid ( $\text{CH}_3\text{COOH}$ ) using Hendersons equation  $p_H$  metrically.
- CO3 Verify Beer-Lamberts law using  $\text{KMnO}_4$  solution by coloumetric method.
- CO4 Standardize the commercial sample of HCl using borax.
- CO5 Analysis qualitatively cations and anions from a sample.
- CO6 To determine the percentage of copper (IT) present in a given sample by titration.
- CO7 Characterize organic compound containing C,H,(O),N,S,X elements.

## Class: S.Y.B. Sc. Chemistry

### Semester III

#### Course (Paper) Name and No.: General Chemistry - I

- CO1 Understand and apply laws of thermodynamics to chemical systems.
- CO2 Understand variation of Gibbs free energy with temperature and pressure.
- CO3 Understand concept of partial molal properties.
- CO4 Apply understanding of the concept of partial molal properties for determining feasibility of a chemical reaction.
- CO5 Determine feasibility of a chemical reaction from the relation between equilibrium constant and Gibbs free energy.
- CO6 Calculate heat of reaction knowing equilibrium constant of gaseous as well as aqueous reaction.
- CO7 Comprehend concept of electrolysis.
- CO8 Explain dependence of conductance on parameters such as concentration
- CO9 Understand Kohlrausch's law of independent migration of ions.
- CO10 Apply Kohlrausch's law for the determination of degree of dissociation and dissociation constant of a weak electrolyte conductometrically.
- CO11 Apply Kohlrausch's law for the determination of solubility and solubility product of sparingly soluble salts conductometrically.
- CO12 Apply Kohlrausch's law for the determination of ionic product of water conductometrically.
- CO13 Understand concept of transference number of transport number of ions.
- CO14 Learn experimental determination of transport number using moving boundary method.
- CO15 Calculate transport number of given cation and/or anion.
- CO16 Recognize different factors affecting transport number of an ion.
- CO17 Explain Ionic Bonding and conditions for formation of ionic bond;
- CO18 Explain Types of ionic crystals with examples,

- CO19 Apply Radius ratio rule in structure determination;
- CO20 Explain Lattice energy and factors affecting Lattice energy;
- CO21 Calculate Lattice energy using Born-Landé equation and Kapustinskii equation,
- CO22 Represent Born-Haber cycle for the formation of ionic bond;
- CO23 Appreciate Importance of Born-Haber cycle
- CO24 Explain the Valence Bond approach for the formation of covalent bond;
- CO25 Appreciate postulates of Valence Bond theory;
- CO26 Describe formation of H<sub>2</sub> molecule and potential energy curve;
- CO27 Explain the formation of mononuclear diatomic molecules;
- CO28 Define the term resonance and give conditions for resonance;
- CO29 Understand the concept of formal charge;
- CO30 Explain the different types of hybridisation and draw shapes of simple covalent molecules;
- CP31 Understand equivalent and non-equivalent hybrid orbitals;
- CO32 Compare atomic orbitals and molecular orbitals
- CO33 Understand linear combination of atomic orbitals
- CO34 Explain: Alkyl halides: Nucleophilic substitution reactions : S<sub>N</sub><sup>1</sup>, S<sub>N</sub><sup>2</sup>, S<sub>N</sub><sup>i</sup>
- CO35 Explain stereochemistry of : S<sub>N</sub><sup>1</sup>, S<sub>N</sub><sup>2</sup>, S<sub>N</sub><sup>i</sup>
- CO36 Discuss Factors affecting nucleophilic substitution reactions
- CO37 Explain : Aryl Halides Reactivity, towards nucleophilic aromatic substitution reactions
- CO38 Discuss addition –Elimination mechanism and benzyne mechanism
- CO39 Appreciate important of: Organomagnesium and Organolithium compounds
- CO40 Discuss Nomenclature , Nature, type and reactivity of carbon – metal bond
- CO41 Understand practical aspect of Preparation of Organo metallic compounds
- CO42 Appreciate structure stability and reactions
- CO43 Describe reactions containing acidic hydrogen, carbonyl compounds, CO<sub>2</sub>, Cyanides and epoxides.
- CO44 Understand Alcohols, Phenols and Epoxides
- CO45 Explain Alcohols Nomenclature , Acidity, Preparation, Reactions, properties

- CO46 Understand the concept of hydration, Hydrolysis , Reduction , use of Grignard reagent
- CO47 Explain: Phenols, Preparation, Physical properties, acidity, resonance, stabilisation, reactions
- CO48 Understand the structure of epoxides
- CO49 Compare Nomenclature , preparation, reaction
- CO50 Understand Ring opening reactions, hydrolysis, alcohols, cyanide , ammonia , amines, Grignard reagents and alcoxides

### **Course (Paper) Name and No.: General Chemistry-II**

- CO1 Classify complex chemical reactions like Reversible or opposing.
- CO2 Explain effect of temperature on the rate of reaction, Arrhenius equation, concepts of energy activation.
- CO3 Explain theories of reaction rates like collision theory and activated complex theory.
- CO4 Describe Thermodynamics of ideal solutions.
- CO5 Explain distillation of solutions.
- CO6 Understand Partial miscibility of liquids.
- CO7 Understand Immiscibility of liquids.
- CO8 Explain Nernst distribution law and its applications
- CO9 Describe electron deficient compounds with respect to Lewis acidity and applications.
- CO10 Explain preparation of simple boranes.
- CO11 Describe structure and bonding in diborane and tetraborane.
- CO12 Explain synthesis of borax.
- CO13 Describe occurrence, structure and inertness of  $\text{SiO}_2$ .
- CO14 Prepare silicon tetrachloride and describe its structure.
- CO15 Explain occurrence and extraction of Germanium.
- CO16 Explains concept of preparation of extra pure Silicon or Germanium.
- CO17 Explain trends in chemical reactivity.
- CO18 Describes Bosch - Haber process for synthesis of ammonia.

- CO19 Students will learn the naming systems of aliphatic, acyclic and aromatic aldehydes and ketones.
- CO20 Understand the structure of carbonyl compounds and its importance in predicting the possible reactivity of aldehydes and ketones.
- CO21 Learn the synthetic approach of various methods of preparation of aldehydes and ketones.
- CO22 Students will be able to understand the general mechanism of nucleophilic addition reactions.
- CO23 Study of reactions of various nucleophilic reagents with aldehydes and ketones.
- CO24 Writing and understanding the mechanism of some important name reactions involving aldehyde and ketone.
- CO25 Students will understand fundamental concept of keto-enol tautomerism and mechanism of enolization.
- CO26 Concept of active methylene compound, formation of enolate and its application.
- CO27 Study of conversion of active methylene compounds into  $\beta$ -keto ester, ketone, mono and dicarboxylic acids.

### **Course (Paper) Name and No.: Analytical chemistry III**

- CO1 Explain the important terms in Analytical chemistry.
- CO2 Describe the purpose of chemical analysis
- CO3 Classify different methods of analysis.
- CO4 Name the different sampling technique.
- CO5 Identify and explain terms involved in sampling.
- CO6 Reports the errors in analysis.
- CO7 Categorize the errors in analysis.
- CO8 Distinguish between classical and non-classical methods of analysis.
- CO9 Classify and describe different types of titration.
- CO10 Explain the gravimetric analysis.

- CO11 **Titrimetric Methods**- Terms involved in Titrimetric methods of analysis. Comparing volumetry and Titrimetry
- CO12 **The Conditions suitable for titrimetry**
- CO13 **Types of titrimetry** – Neutralisation (Acidimetry, alkalimetry), Redox, (Iodometry, Iodimetry,) Precipitation and Complexometric titrations and indicators used in these titrations
- CO14 **Tools of Titrimetry**: Graduated glasswares and Calibration  
Standard solutions (Primary and Secondary standards in Titrimetry) and Calculations in Titrimetry.
- CO15 **Neutralisation Titrations** -  
Concept of pH and its importance in Neutralisation Titrations  
End point and Equivalence point of Neutralisation titrations
- CO16 **Determination of End point by using** -  
i. Indicators causing colour change  
ii. Change in potential, (by potentiometry)  
iii. Change in conductance (by conductometry)
- CO17 **Construction of titration curve (on the basis of change in pH )of a titration of** -  
i. Strong acid-weak base ii. Strong base-weak acid
- CO18 **Gravimetric analysis - General Introduction to Gravimetry.**
- CO19 **Types of Gravimetric Methods** -  
Precipitation Gravimetry:
- CO20 i. Steps involved in precipitation gravimetry analysis  
ii. Conditions for precipitation  
iii. Completion of precipitation,  
iv. Role of Digestion, Filtration, Washing, Drying Ignition of precipitate.
- CO21 **Applications of Gravimetric Analysis**
- CO22 **Basic Concepts in Instrumental methods** -  
Relation between the Analyte, Stimulus and measurement of change in the observable property

- CO23 **Block Diagram of an Analytical instrument.**
- CO24 Types of Analytical Instrumental methods based on
- i. Optical interactions (eg. Spectrometry: uv-visible, Polarimetry)
  - ii. Electrochemical interactions (eg. Potentiometry, Conductometry,)
  - iii. Thermal interactions (eg. Thermogravimetry)
- CO25 **Spectrometry -**  
Interaction of electromagnetic radiation with matter: Absorption and Emission spectroscopy
- CO26 **Basic Terms:** Radiant Power, Absorbance, Transmittance, Monochromatic light, Polychromatic light, Wavelength of maximum absorbance, Absorptivity and Molar Absorbitivity
- CO27 Statement of Beer's Law and Lambert's Law, Combined Mathematical Expression of Beer-Lambert's Law, Validity of Beer-Lambert's Law, Deviations from Beer-Lambert's Law ((Real deviations, Instrumental deviations and Chemical deviations)
- CO28 **Instrumentation for absorption spectroscopy:** Colorimeters and Spectrophotometers
- CO29 Block Diagrams for Single beam and Colorimeter, and Spectrophotometer (Principles, Construction and working-Details of Components expected i.e , source ,Sample holder , Filters/Monochromators, Detectors such as Photomultiplier tube)
- CO30 **Applications of UV-Visible Spectrophotometry**
- (a) Qualitative analysis such as Identification of functional groups in Organic compounds ,Chromophores and Auxochrome,*cis* and *trans* isomers
  - (b) Quantitative analysis by Calibration curve method
- CP31 **Photometric Titrations:** Principle ,Instrumentation, Types of Photometric titration Curves with examples

## Course (Paper) Name and No.: Practical

### CO1 **Paper I: Physical Chemistry**

Understand practical aspects of Preparation To verify Ostwald's dilution law for weak acid conductometrically

CO2 Explain to determine dissociation constant of weak acid conductometrically.

CO3 Discuss

To determine the critical solution temperature (CST) of phenol - Water System.

CO4 Explain

Determination of energy of activation of acid catalyzed hydrolysis of methyl acetate.

CO5 Discuss

To investigate the reaction between  $K_2S_2O_8$  and KI with equal initial concentrations of the reactants

CO6 Appreciate

To determine solubility of sparingly soluble salts (any two) conductometrically.

### CO7 **Paper II: Inorganic Chemistry**

Discuss

Identification of cations in a given mixture and Analytically separating them

[From a mixture containing not more than two of the following: Pb(II), Ba(II), Ca(II), Sr(II), Cu(II), Cd(II), Mg(II), Zn(II), Fe(II), Fe(III), Ni(II), Co(II) Al(III), Cr(III)]

CO8 Understand practical aspect of Preparation

Crystallisation of potassium iodate and to estimate its purity before and after the separation.

CO9 Appreciate

Estimation of total hardness

CO10 Describe.

Investigation of the reaction between Copper sulfate and Sodium Hydroxide (Standard EDTA solution to be provided to the learner).

**CO11 Paper III: Organic Chemistry**

**Short organic preparation and their purification:**

Understand **Preparation of:**

1. Cyclohexanone oxime from cyclohexanone.
2. Glucosazone from dextrose or fructose
3. Tribromoaniline from aniline.
4.  $\beta$ -Naphthylbenzoate
5. m-Dinitrobenzene from nitrobenzene
6. Phthalic anhydride from phthalic acid by sublimation
7. Acetanilide from aniline
8. p-Bromoacetanilide from acetanilide
9. Iodoform from acetone

## **Semester IV**

### **Course (Paper) Name and No.: General Chemistry I**

- CO1 Comprehend difference between galvanic cells and electrolysis.
- CO2 Know different forms of electrodes used in electrochemistry.
- CO3 Represent electrochemical cells.
- CO4 Write redox reactions taking place in electrochemical cells.
- CO5 Calculate thermodynamic parameters from EMF of cell.
- CO6 Determine equilibrium constant from EMF of cell.
- CO7 Acquire knowledge of types of galvanic cells.
- CO8 Learn problems arising in using electrolyte concentration cells.
- CO9 Learn methods in which problems relating to use of electrolyte concentration cells can be solved.
- CO10 Understand construction and working of hydrogen electrode and quinhydrone electrode for the determination of pH.

- CO11 Compute pH of given solution using hydrogen gas electrode and/or quinhydrone electrode
- CO12 Learn Gibbs phase rule as applied to phase equilibria.
- CO13 Understand different terms present in Gibbs phase rule.
- CO14 Apply Gibbs phase rule to one component systems.
- CO15 Apply Gibbs phase rule to two component systems.
- CO16 Learn importance of Clausius- Clapeyron equation in phase equilibria.
- CO17 Calculate change in melting or boiling point of a given compound with pressure using Clausius- Clapeyron equation.
- CO18 learn the position of transition metals in the periodic table; natural occurrence principal ores and minerals;
- CO19 Know the electronic configurations of transition elements;
- CO20 Appreciate the relative stability of various oxidation states in terms of electrode potential values ;
- CO21 Describe Origin of colour for transition metals and their compounds;
- CO22 Explain magnetic properties of transition metal compounds;
- CO23 Describe the Chemistry of Titanium and vanadium with respect to occurrence,extraction and properties of Oxides and chlorides;
- CO24 Understand its use in titrimetric analysis
- CO25 Understand the qualitative tests for various transition metal ions-1st transition series
- CO26 Know the meaning of basic terms in Coordination Chemistry;
- CO27 Explain Types of ligands,
- CO28 Explain characteristics of complex ions;
- CO29 Learn the rules of nomenclature of coordination compounds.
- CO30 Write the rules formulas and names of coordination compounds
- CP31 Define different Types of isomerism in coordination compounds;
- CO32 Understand the nature of bonding in coordination compounds in terms of VBT;
- CO33 Appreciate the importance and applications of coordination compounds in our day to day life;

- CO34 Appreciate the postulates of Werner's coordination theory;
- CO35 Explain EAN rule and eighteen electron rule;
- CO36 Distinguish inner orbital complexes and outer orbital complexes;
- CO37 Explain Nomenclature, structure and physical properties, acidity, effects of substituents on acid strength of aliphatic and aromatic carboxylic acids
- CO38 Understand the Preparation of carboxylic acids, oxidation alcohols alkyl, Alkyl benzene, use of Grignard reagents and hydrolysis of nitriles
- CO39 Discuss reactions of acidity, Decarboxylation, reduction with  $\text{LiAlH}_4$ , diborane,
- CO40 Describe Hell-Volhard Zelinsky reaction
- CO41 Conversion of carboxylic Acid to acid chlorides, esters, amides and acid anhydride
- CO42 Describe Mechanism Nucleophilic acyl substitution and acid catalysed nucleophilic acyl substitution
- CO43 Understand the mechanism of Claisen and Dieckmann condensation
- CO44 Describe sulphonic acids
- CO45 Understanding Nomenclature, preparation of aromatic sulphonic acid
- CO46 Explain Acidity of benzene sulphonic acid
- CO47 Comparative study of acidity of carboxylic and sulfonic acid
- CO48 Explain salt formation and desulphonation
- CO49 Understand reactions with alcohol, Phosphorous pentachloride IPSO substitution

### **Course (Paper) Name and No.: General Chemistry-II**

- CO1 Explain laws of crystallography.
- CO2 Describe the characteristics of cubic system.
- CO3 Calculate interplanar distance in cubic lattice.
- CO4 Explain types of catalyzed reactions.
- CO5 Understands mechanics and kinetics of catalyzed reactions.
- CO6 Understands Mechanics of enzyme catalyzed reactions.
- CO7 Explain efficiency of nanoparticles as catalyst.

- CO8 Explain the concept of hydration of cation with respect to effect of charge and radius.
- CO9 Describe the terms involved in Latimer equations.
- CO10 Explain relationship between pka, acidity and  $Z^2/r$  ratios.
- CO11 Classify cations on the basis of acidity with pka values range.
- CO12 Explain concept of hydration of anions with respect to effect of charge and radius.
- CO13 Explains physical properties of concentrated oxoacids.
- CO14 Describes uses and environment aspects of concentrated acids like sulfuric acid, nitric acid and phosphoric acid.
- CO15 Students will learn the method of nomenclature of aliphatic and aromatic amines.
- CO16 Understand the basicity of amines and the effect of substituent on basicity with examples.
- CO17 Study of variety of common methods of preparation of amines including reduction, ammonolysis, rearrangement of amides to amine.
- CO18 Understanding of the reactivity of amines towards salt formation, acylation, alkylation, with nitrous acid, electrophilic substitution reactions like bromination, nitration and sulphonation.
- CO19 Students will learn concept of diazonium salt and its method of preparation with mechanism.
- CO20 Study of synthetic application of diazonium salt such as Sandmeyer reaction, Gattermann reaction, Gomberg reaction, reduction to aryl hydrazine, hydrazobenzene, coupling with phenols, replacement reactions.
- CO21 Classification of heterocyclic compounds and its method of nomenclature.
- CO22 Understanding and interpretation of aromaticity of five member and six member heterocyclic compound containing one hetero atom.
- CO23 Students will learn general methods of synthesis of furan, pyrrole, thiophene and pyridine.
- CO24 Student will be able to write the resonance structures and predict the site at which electrophilic substitution takes place on the basis of stability of intermediate.

- CO25 Student will be able to write the resonance structures of furan, pyrrole, thiophene and predict the site at which electrophilic substitution takes place on the basis of stability of intermediate.
- CO26 Students will understand the electron distribution based on resonance structures of pyridine and predict the susceptibility of nucleophilic substitution reactions.
- CO27 Students will learn to compare the basicity of pyrrole, pyridine, piperidine and piperidine.
- CO28 Study of sulphonation, reduction and Chichibabin reactions of pyridine.

### Course (Paper) Name and No.: Analytical chemistry III

- CO1 Classify separation methods.
- CO2 Explain different separation methods.
- CO3 Explain the basic principles of electrophoresis.
- CO4 Classify and compare the chromatographic methods.
- CO5 Describe the solvent extraction.
- CO6 Explain the various applications of chromatography.
- CO7 Differentiate between single step and multistep extraction process.
- CO8 Explain the principle of paper and thin layer chromatography.
- CO9 **Instruments based on the electrochemical properties of the analytes**
- CO10 **Potentiometry:-** Principle. 2.1.2. Role of Reference and indicator electrodes
- CO11 Applications in Neutralisation reactions with reference to the titration of a Strong acid against a Strong Base (using quinhydrone electrode)
- CO12 **Graphical methods for detection of end points**
- CO13 **pHmetry:** Principle 2. Types of pH meters. Principle, Construction Working and Care of Combined Glass electrode Applications in Titrimetry (Strong acid-Strong Base) biological and environmental analysis

**CO14 Conductometry:**

Principle

2. Conductivity cell its construction and care

**CO15 Applications in Neutralisation Titrimetry with respect to**

i. Strong Acid-Strong Base

ii. Strong Acid-Weak Base

iii. Strong Base-weak Acid

iv. Weak Acid- Weak Base.

**CO16 Advantages & limitations of conductometric titrations**

**CO17 Nature of Indeterminate Errors:**

The true and acceptable value of a result of analysis

Measures of central tendency: mean, median, mode, average

Measures of dispersion: Absolute deviation, relative deviation, relative average deviation, standard deviation, ( $s, \sigma$ ) variance, coefficient of variation

**CO18 Distribution of random errors:**

Gaussian distribution curve.

Equation and salient features of Gaussian distribution curve

**CO19 Concept of Confidence limits and confidence interval and its computation using –**

(i) Population standard deviation (ii) Student's  $t$  test (iii) Range

**CO20 Criteria for rejection of doubtful result-**

(i) 2.5 d rule (ii) 4.0 d rule (iii) Q test

**CO21 Test of Significance –**

(i) Null hypothesis (ii) F-test ( variance ratio test)

**CO22 Graphical representation of data and obtaining best fitting straight line –**

(a) For line passing through origin

(b) For line not passing through origin

## Course (Paper) Name and No.: Practical

### CO1 Paper I: Physical Chemistry

Explain

To determine standard EMF and the standard free energy change of Daniel cell potentiometrically .

### CO2 Understand the

To determine the amount of HCl in the given sample potentiometrically.

### CO3 Explain

Compare the strengths of HCl and H<sub>2</sub>SO<sub>4</sub> by studying kinetics of acid hydrolysis of methyl acetate.

### CO4 Understand the Industrial visit report.

### CO5 Paper II: Inorganic Chemistry

Compare Inorganic preparation – Nickel dimethyl glyoxime using microscale method

### CO6 Understand

Complex cation – *Tris* (ethylene diamine) nickel (II) thiosulphate

### CO7 Discuss

Complex anion – Sodium Hexanitrocobaltate (III) The aim of this experiment is to understand the preparation of a soluble cation (sodium) and a large anion hexanitrocobaltate(III) and its use to precipitate a large cation (potassium)

### CO8 Understand practical aspect of Preparation

Inorganic salt – Calcium or magnesium oxalate using PFHS technique

### CO9 Paper III: Organic Chemistry

**Qualitative Analysis of bi-functional organic compounds on the basis of**

**1. Preliminary examination 2. Solubility profile 3. Detection of elements C, H, (O), N, S, X. 4. Detection of functional groups 5. Determination of physical constants (M.P/B.P)**

Solid or liquid Compounds containing not more than two functional groups from among the following classes may be given for analysis to be given: Carboxylic acids, phenol, carbohydrates, aldehydes, ketones, ester, amides, nitro, anilides, amines, alkyl and aryl halides.

## Class: T.Y.B. Sc. Chemistry

### Semester V

#### Course (Paper) Name and No.: Physical Chemistry

- CO1 Memorize concept of dipole moment, polar and non- polar molecules.
- CO2 Differentiate Rotational Spectroscopy Vibrational Spectroscopy Raman Spectroscopy.
- CO3 Apply spectroscopic data for solving different numericals
- CO4 In-list different examples of colligative properties.
- CO5 Understand Raoult's law, Clapeyron equation, van't Hoff Factor.
- CO6 Create own model to show osmosis and reverse osmosis
- CO7 Apply Arrhenius Equation for solving of Numericals
- CO8 Define basic terms of radioactivity i.e. decay constant, half life time, average life and units of radioactivity.
- CO9 Compare G.M. Counter and Scintillation Counter method for detection of radioactivity
- CO10 Apply Carbon Dating method to estimate age of fossils of plants and animals.
- CO11 Understand Surface tension, Adsorption, Absorption, Adsorbate, Adsorbent.
- CO12 Differentiate Freundlich Adsorption Isotherm, Langmuir Adsorption Isotherm and B.E.T. Equation
- CO13 Explain the terms Electrophoresis, Electroosmosis, Dorn Effect, Micelle, Surfactant, Streaming Potential.
- CO14 Apply how the BET equation can be used to determine the surface area of an adsorbent.

#### Practical's

- CO1 Handle and Understand principles of different instruments like Potentiometry, Conductometry, pH Metry.
- CO2 Determine molecular weight of substance by using Rast Method
- CO3 With the help of Fractional change method find out order of reaction.

## **Course (Paper) Name and No.: Inorganic Chemistry**

- CO1 describe molecular symmetry and concept of point group;
- CO2 explain different types of point group with examples;
- CO3 Appreciate importance of symmetry in chemistry;
- CO4 Explain lattice energy and factors affecting lattice energy;
- CO5 Assign the point group for given molecule;
- CO6 Describe molecular orbital theory of heteronuclear diatomic molecules;
- CO7 Compare homonuclear and heteronuclear diatomic molecules;
- CO8 Understand application of molecular orbital theory to poly atomic species;
- CO9 Explain important terms viz. crystal lattice, lattice point, unit cell and lattice constants;
- CO10 Explain seven basic crystal systems;
- CO11 Explain closest packing of rigid spheres and different types of closest packing of rigid spheres;
- CO12 Calculate the packing density of different types of cubic unit cells;
- CO13 Describe the imperfections in solids and their effect on properties;
- CO14 Explain consequences of frenkel and schottky defects and differentiate them;
- CO15 Explain the terms superconductivity, transition temperature and meissner effect;
- CO16 Explain different types of super conductors;
- CO17 Give application of superconductors;

## **Course (Paper) Name and No.: Organic Chemistry**

- CO1 Understanding and recall of basic concepts such as use of curved arrows, bond fission transition state and intermediates in writing the mechanism of organic reactions.
- CO2 The comprehensive study of electrophiles, nucleophiles and distinction between electrophilicity and acidity, nucleophilicity and basicity.
- CO3 The students will define neighboring group participation and its involvement in nucleophilic substitution reaction. The student understands the kinetics and stereochemical outcomes of NGP.

- CO4 Students will be able to understand the tetrahedral mechanism of acyl nucleophilic substitution with reference to acid catalyzed esterification of carboxylic acids and base promoted hydrolysis of esters.
- CO5 Pericyclic reactions and its classification into electrocyclic, sigmatropic, cheletropic, group transfer and cycloaddition reactions. Students will be exposed to the reactions with concerted mechanism with cyclic transition state.
- CO6 Students will study and understand the pyrolysis reactions involving intramolecular elimination at high temperature.
- CO7 Students will be able to distinguish between thermal reactions and photochemical reactions.
- CO8 Schematic representation of fate of excited molecule by Jablonski diagram. The students will understand the phenomenon of fluorescence, phosphorescence, intersystem crossing.
- CO9 Understanding the concept of photosensitization in photochemical reactions.
- CO10 The systematic study of photochemical reactions of olefins and carbonyl compounds.
- CO11 Students will study molecular chirality and elements of symmetry. They will also study chirality of compounds without stereogenic center.
- CO12 Students will be able to understand scope, meaning and examples of insecticides, herbicides, fungicides, rodenticides and plant growth regulators.
- CO13 They will come to know advantages and disadvantages of agrochemicals.
- CO14 Students will understand how to synthesize IAA, Endosulphan and their applications.
- CO15 Students will study the importance of Biopesticides.
- CO16 Students will study and understand preparation and reactivity of pyridine-N-oxide, quinoline and isoquinoline.
- CO17 Students will be able to write the IUPAC names of bicyclic compounds including spiro, fused and bridged compounds.
- CO18 They will also be able to write the IUPAC names of biphenyls, cumulenes, quinolines and isoquinolines.

- CO19 Students will learn types of organic synthesis, criteria for ideal synthesis, concept of selectivity, multicomponent synthesis.
- CO20 Students will learn twelve principles of green chemistry, concept of atom economy and E-factor.
- CO21 Students will come to know the importance of green reagents, green starting materials, green solvents and green catalyst in organic synthesis.
- CO22 Students will be able to plan the synthetic route of compounds like m-nitrophenol, o-chlorobenzoic acid, alcohols and alkanes.
- CO23 Students will be exposed to the knowledge of spectral methods of structure determination of organic compounds.
- CO24 Fundamental understanding of advantages and disadvantages of physical methods structure elucidation.
- CO25 Students will know the concept of electromagnetic radiations, wavelength, frequency and their units.
- CO26 Understanding of the basic theory, concepts, solvents, nature of spectrum in UV-visible spectroscopy.
- CO27 Explanation for chromophore-chromophore and chromophore-auxochrome interactions and its impact on absorption of wavelength.
- CO28 Basic theory of mass spectroscopy, nature of spectrum, importance of base peak, isotopic peak, and molecular ion peak will ensure the expertise to the students to interpret the spectra.
- CO29 Students will learn the general rules of fragmentation, nitrogen rule and the fragmentation pattern of alkanes and aliphatic carbonyl compounds.
- CO30 Introduction to terpenoids, isoprene rule, special isoprene rule and gem-dialkyl rule will be understood by the students.
- CO31 Students will learn the steps evolved in structure determination of natural products and further the confirmation of the structure from its synthesis of citral and nicotine.
- CO32 Introduction to hormones as well as study of structure, physiological action and synthesis of adrenaline.

### **Practical's**

- CO1 Students will able to identify chemical type of component present in binary mixture
- CO2 Students will develop basic skill in the separation technique of solid-solid mixture.
- CO3 Students will learn to separate the mixture into components
- CO4 These practicals enable the student to identify unknown organic compound by microscale technique.
- CO5 Students will get training of systematic qualitative analysis of organic compound

### **Course (Paper) Name and No.: Analytical Chemistry**

- CO1 Students will learn importance of quality concept in industry, different grade chemicals and scientific techniques of sampling
- CO2 Students will understand theoretical aspects of types of chemical titrations
- CO3 Student get acquainted with different measurements techniques based on various spectroscopic techniques
- CO4 Students will learn modern and sophisticated separation techniques

### **Practical's**

- CO1 Students will get hands on practice of various techniques of quantitative estimation
- CO2 Students will get an opportunity to handle and understand principles of different instruments such as colorimeter, spectrophotometer, pH meter, flame photometer and turbidimeter
- CO3 Students will come across with different types of samples such as cosmetics, polluted water, fertilizer, food, chemicals etc. and their analysis

## Course (Paper) Name and No.: Drugs

- CO1 Describe the basic scientific concepts and principles that serve as the foundational underpinnings of the pharmacological sciences including pharmacokinetics; pharmacodynamics; drug metabolism; and drug-drug interactions; and explain how these fundamental pharmacological properties can influence route of administration, drug action; drug efficacy and potency; drug levels in the body; potential for drug interactions; drug toxicity; and the appropriate choice of drug for pharmacotherapy in a given patient.
- CO2 Explain how to use drug-specific and patient-specific pharmacokinetic parameters to calculate the physiochemical properties that influence rates of drug disposition and clearance in the body, and how these parameters can be used to monitor, design and modify appropriate dosing regimens of drugs in specific patient populations.
- CO3 Describe the process by which new drugs are discovered, developed, tested and finally approved by the Federal Drug Administration for use in the clinic.
- CO4 List the major drugs and drug classes currently used in medical practice.
- CO5 Describe the specific pharmacology of the major drugs and drug classes currently used in medical practice including their indications, contraindications, clinical use, mechanisms of action, physiological effects, pharmacokinetic properties, major adverse effects and clinically significant drug interactions; and apply this knowledge together with both disease specific and patient-specific factors to select the most appropriate medication(s) for the effective pharmacotherapy of a given disease or condition in a specific patient.
- CO6 Recognize the currently accepted diagnostic criteria required to specific diagnose disease and initiate drug therapy and the anticipated therapeutic goals likely to be achieved by therapeutic intervention for the most commonly encountered pathophysiological state(s) and/or disease mechanism(s), as well as any clinical testing requirements for monitoring drug effectiveness and potential toxicity.

- CO7 Explain the physiological, pharmacological, and psychological effects of acute and chronic exposure of individuals to drugs of abuse, and describe the consequences of sudden withdrawal of such a drug from a drug dependent individual.
- CO8 Describe the effective use of non-pharmacological therapeutic interventions in the treatment of specific diseases, conditions and symptoms.
- CO9 Discuss the basic principles of toxicology; the mechanisms by which excess exposure to certain drugs, toxins, chemicals, heavy metals and poisons can lead to adverse toxicological effects; and the basic principles of clinically managing the poisoned patient.
- CO10 Students will be able to describe the term "addiction" and explain various theories of causation.
- CO11 Students will be able to Identify and describe different approaches used in the treatment of addictions.
- CO12 Define the routes of administration, methods of ingestion, tolerance, withdrawal and interactions of these drugs with other psychoactive and non-psychoactive drugs.
- CO13 Describe warning sign, symptoms, and the course of substance use disorders.
- CO14 To familiarize the basic classification of drugs
- CO15 To learn about the structure and synthesis of antibiotics

#### **Practical's**

- CO1 Students can able to do the synthesis's of simple drugs i.e aspirin
- CO2 Students can able to perform estimation of Ibuprofen.
- CO3 Students can able to find out acid neutralizing capacity of antacid.
- CO4 Students can able to do the separation of chlorophyll pigment.
- CO5 Students able to do the dyeing of cotton.
- CO6 Students can able to write monogram of any drug.

## Semester VI

### Course (Paper) Name and No.: Physical Chemistry

- CO1 Recall the concept Ionic Strength, activity and activity Coefficient.
- CO2 Differentiate between Concentration cell and chemical cell.
- CO3 Apply Nernst equation for numerical solving
- CO4 Set up an experiment to show decomposition potential and overvoltage
- CO5 In-list the examples of different polymeric materials.
- CO6 Classified the polymers based on source, structure, thermal response and physical properties.
- CO7 Explain light emitting polymers with their advantages.
- CO8 Define basic terms of Quantum Chemistry i.e. Black body radiation, photoelectric effect, Compton Effect de Broglie's relationship
- CO9 Know the significance of operator in quantum mechanics.
- CO10 Understand the theory of progressive and standing waves.
- CO11 Know Construction Silicon solar cell, Oxygen Fuel Cell.
- CO12 Understand Nuclear Spin, Nuclear magnetic moment, Spin angular moment
- CO13 Draw the diagram of NMR Spectrometer.
- CO14 Know the principle of ESR Spectroscopy.
- CO15 Apply principle NMR and ESR for Numerical solving.

#### Practical's

- CO1 Handle and Understand principles of different instruments like Colorimetry, Potentiometry, Conductometry.
- CO2 Determine molecular weight of any high polymer polyvinyl alcohols by viscosity measurement.
- CO3 Interpret the order of reaction graphically from given experimental data and to calculate the specific rate constant.

## Course (Paper) Name and No.: Inorganic Chemistry

- CO1 Explain merits and Limitations of Valence Bond Theory.
- CO2 Explain the shapes of d- orbitals
- CO3 Explain the basic concepts of Crystal Field Theory
- CO4 Explain the Splitting of *d* orbitals in different geometries;
- CO5 Calculate Crystal field stabilization energy(CFSE), for octahedral complexes
- CO6 Describe Distortions from the octahedral geometry
- CO7 Crystal field splitting parameters  $\Delta$  ; its calculation and factors affecting it in octahedral complexes, Spectrochemical series.
- CO8 Explain Consequences of crystal field splitting on various properties of metal complexes of the first transition series.
- CO9 Explain Limitations of CFT ;
- CO10 Explain Evidences for covalence in metal complexes
- CO11 Understand Molecular Orbital Theory for coordination compounds:
- CO12 Identify the central metal orbitals and their symmetry Suitable for formation of  $\sigma$  bonds with ligand orbitals.
- CO13 Construct ligand group orbitals
- CO14 Construct-  $\sigma$  molecular orbitals for an  $ML_6$  complex
- CO15 Explain Effect of  $\pi$ -bonding on complexes
- CO16 Understand Thermodynamic and kinetic stabilities of metal complexes;
- CO17 Explain Stability constants: stepwise, overall stability constants, their interrelationship.
- CO18 Explain Factors affecting thermodynamic stability of complexes .
- CO19 Compare Inorganic and organic reactions
- CO20 Explain Types of reactions in metal complexes.
- CO21 Describe Inert and labile complexes ;
- CO22 Correlate electronic configurations and lability of complexes.
- CO23 Explain Ligand substitution reactions considering Associative and Dissociative mechanisms.
- CO24 Explain Acid hydrolysis, base hydrolysis and anation reactions

- CO25 Describe origin of electronic spectra
- CO26 Describe the different types of electronic transitions in coordination compounds:
- CO27 Learn the Selection rules for electronic transitions.
- CO28 Appreciate rules for determination of ground state term.
- CO29 Determine Terms for  $p^2$  and  $d^1$  electronic configurations

### **Course (Paper) Name and No.: Organic Chemistry**

- CO1 Students will able to distinguish between stereoselectivity and stereospecificity.
- CO2 Students will learn stereochemistry of substitution reaction, elimination and addition reaction.
- CO3 Students will understand general structure, configuration, classification and properties of  $\alpha$ -amino acids.
- CO4 Students will learn the preparation methods of  $\alpha$ -amino acids like Strecker synthesis, amidomalonate synthesis and azalactone synthesis.
- CO5 Students will study isoelectric points and zwitter ion.
- CO6 They will learn polypeptide and proteins which include peptide bond , nomenclature and representation of polypeptides with examples
- CO7 Writing the mechanism of molecular rearrangements with example and stereochemistry.
- CO8 The comprehensive study of pinacol-pinacolone rearrangement involving migration of electron deficient carbon.
- CO9 The students will understand the Beckmann rearrangement of conversion of ketoxime to N-substituted amide. The stereochemistry of the reaction will be learnt and able to predict the appropriate group migration in rearrangement.
- CO10 Students will able to understand the mechanism involved in Favorski rearrangement, Michael addition and Wittig reaction. Applications of these reactions will be learnt.
- CO11 The systematic study of photochemical reactions of olefins and carbonyl compounds.
- CO12 Classification of carbohydrates, concept of reducing and non-reducing sugar and DL notation in carbohydrates.

- CO13 Writing the structures of carbohydrates in Fisher projection and Haworth formula.
- CO14 Students will learn the interconversion of open chain and Haworth forms of monosaccharide with 5 and 6 carbons.
- CO15 Definition of enantiomers, diastereomers, anomers and epimers.
- CO16 Concept of mutarotation in glucose and its mechanism will be studied.
- CO17 Study of chain lengthening and chain shortening reactions, reactions of carbohydrates with example of D-glucose and D-fructose.
- CO18 Basic theory of IR Spectroscopy, types of vibrations, nature of IR spectrum and importance of finger print region will be learnt.
- CO19 The study of basic principle, nature of spectrum, chemical shift reference standard and solvent used in PMR spectroscopy will be understood.
- CO20 Factors affecting chemical shift and explanation for chemical shift value will be understood. Spin-spin coupling, importance of coupling constant, D<sub>2</sub>O exchange technique in interpretation of spectrum will be studied.
- CO21 Spectral characteristics of different classes of organic compounds will be learnt.
- CO22 Students will be able to solve problems of structure elucidation of simple organic compounds using UV-Visible, IR, NMR and Mass technique. Students will learn to calculate index of hydrogen deficiency in given molecular formula.
- CO23 Introduction to nucleic acids and its controlled hydrolysis. The sugars and bases in nucleic acids and their structures.
- CO24 Drawing of structures of nucleosides and nucleotides in DNA and RNA.
- CO25 Explanation and drawing of structures of DNA and RNA including base pairing.
- CO26 Introduction to monomer, polymer, homopolymer, copolymer, thermoplastic & thermoset.
- CO27 Students will learn different types of addition & condensation polymers & their uses.
- CO28 Students will come to know the stereochemistry in polymers. They will learn the mechanism of stereochemical control of polymerization using Ziegler-Natta catalyst.
- CO29 Students will study natural and synthetic rubber and additive to polymers.
- CO30 Students will be able to understand the importance of biodegradable polymers and their classification and uses.

CO31 Students will learn importance and functional group transformation and selectivity of catalyst like Raney Ni, Pt and PtO<sub>2</sub>, Lindlar catalyst.

CO32 Students will understand the functional group transformation and selectivity of reagents like LiAlH<sub>4</sub>, Red Al, NaBH<sub>4</sub>, SeO<sub>2</sub>, m-CPBA and NBS

#### **Practical's**

CO1 Students will able to identify chemical type of component present in binary mixture.

CO2 Students will develop basic skill in the separation technique of solid-liquid and liquid-liquid mixture.

CO3 Students will learn to separate the mixture into components by fractional distillation.

CO4 Competency in handling and performing fractional distillation.

CO5 These practicals enable the student to identify unknown organic compound by microscale technique.

CO6 Students will get training of systematic qualitative analysis of organic compound.

### **Course (Paper) Name and No.: Analytical Chemistry**

CO1 Students will understand basic principles and applications of electroanalytical techniques

CO2 Students will learn principle of different separation techniques

CO3 Students will appreciate different aspects of food processing and cosmetics industry and the analysis

CO4 Students will get familiar with various thermal methods of analysis and various method validation parameters and their importance.

#### **Practical's**

CO1 Students will get hands on practice of various techniques of quantitative estimation.

CO2 Students will get an opportunity to handle and understand principles of different instruments such as colorimeter, spectrophotometer, pH meter, flame photometer and turbidimeter

CO3 Students will come across with different types of samples such as cosmetics, polluted water, fertilizer, food, chemicals etc. and their analysis

## Course (Paper) Name and No.: Drugs

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# Department of Microbiology

## Programme Specific Outcome

- PSO1 The program is aimed at equipping the students with basic knowledge in various branches of Microbiology such as Microbial Genetics, Molecular Biology, Virology, Medical Microbiology, Immunology, Microbial Biochemistry and Industrial Microbiology. Additionally, it also makes students aware of interdisciplinary sciences such as Bioinformatics and Bioinstrumentation
- PSO2 At the end, student will have employability in food industry, pharmaceutical industry, Agricultural industry and fishery. Students will work as microbiologist in QA and production departments
- PSO3 Students will develop basic understanding of the subject and will have developed life skills to solve environmental and hygiene related problems

## Course Outcomes

### Class: F.Y.B. Sc. Microbiology

#### Semester I

##### Course (Paper) Name and No.: Fundamentals of Microbiology-I

- CO1 Learners will know the history and scope of Microbiology in industries
- CO2 Learners will understand the microbial diversity
- CO3 Learners will understand the prokaryotic and eukaryotic cytoskeleton and cellular structure in detail at microscopic level
- CO4 Learners will understand the biochemistry of macromolecules present in cell

##### Course (Paper) Name and No.: Basic Techniques in Microbiology

- CO1 Learners will understand the staining techniques routinely used in microbiology
- CO2 Learners will learn how to handle microbial cultures while performing microbiology experiments
- CO3 Learners will learn about nutritional requirements of micro organisms
- CO4 Learners will understand the staining techniques routinely used in microbiology

#### Semester II

##### Course (Paper) Name and No.: Basics of Microbiology II

- CO1 Learners will know about the diversity of micro-organisms and significance in industry and medical sciences
- CO2 Learners understand the growth requirements of microbes and their study using different analytical techniques

**Course (Paper) Name and No.: Exploring Microbiology**

- CO1 Learners will know about various microbial associations found around the world
- CO2 Learners can understand the various disease caused by pathogenic microbes and the defense system found in human against the pathogens
- CO3 Learners can understand the working principle and methods of handling of microscopic instruments

## **Class: S.Y.B. Sc. Microbiology**

### **Semester III**

#### **Course (Paper) Name and No.: Biomolecules & Microbial Taxonomy**

- CO1 The course in enhance the employability of learners
- CO2 The course will enhance skills of learners
- CO3 The course will enhance the prospects of learner for molecular research.
- CO4 The course will broaden the vision of learners for looking at various characteristics of microbes

#### **Course (Paper) Name and No.: Environmental Microbiology**

- CO1 Acquire knowledge on soil microbiology and understand the biogeochemical cycles prevail in environment. Understand various biogeochemical cycles – Carbon, Nitrogen, Phosphorus cycles etc. and microbes involved
- CO2 Know the microbial analysis of drinking water and understand the basic principles of environment microbiology and be able to apply these principles to understanding and solving environmental problems – waste water treatment and bioremediation
- CO3 To evaluate the concentration of bacteria and fungi in the indoor environment and estimate the health hazard and to create standards for indoor air quality control

#### **Course (Paper) Name and No.: Basic and Advanced Microbiology**

- CO1 Describe the basis of various basic and advanced microbial techniques
- CO2 Determine suitable agent/s for effective control of microorganisms
- CO3 Describe the different applications of bioinformatics and use the tools like BLAST
- CO4 Discuss the basics of recombinant DNA technology and its applications

## Semester IV

### Course (Paper) Name and No.: Metabolism & Basic Analytical Techniques

- CO1 The course will enable learner to develop interdisciplinary approach for studying the microorganisms
- CO2 The course will enhance learners understanding about biocatalyst and will enhance their employability
- CO3 The course will make learner skillful and will enhance their employability

### Course (Paper) Name and No.: Host Defense & Public Health, Food & Dairy Microbiology

- CO1 Understand the importance of all the other entities involved ie T cells, B cells, NK cells, APCs, Cytokines, etc
- CO2 Correlate virulence factors with the pathogenesis & clinical features of the disease
- CO3 Be impressed on the role of microorganisms in food (beneficial as well as harmful) and the factors influencing their growth
- CO4 Understand basic aspects of microbiology followed various microorganisms associated with fluid milk and milk products and able to learn the quality and safety monitoring aspects of milk and milk products

### Course (Paper) Name and No.: Advances & Applications of Microbiology & Soft Skills

- CO1 After the completion of this course, student will:
- CO2 Know the various polymers, methods of synthesis and applications of nanomaterials
- CO3 Know the principles, construction and applications of biosensors
- CO4 Able to perceive research, write research report and abstract by practicing
- CO5 Able to use basics of biostatistics in result analysis and make media, inoculum and ultimately biofertilizers
- CO6 Ecofriendly methods to control agricultural pests and clean the polluted environment

## **Class: T.Y.B. Sc. Microbiology**

### **Semester V**

#### **Course (Paper) Name and No.: Microbial Genetics I**

- CO1 Learners will know about the DNA replication process
- CO2 Learners will know about the gene expression mechanism in bacteria
- CO3 Learners will have a better understanding in mutations and the repair mechanisms in bacteria as well as the exchange of genetic material among the bacteria

#### **Course (Paper) Name and No.: Medical Microbiology & Immunology**

- CO1 Learners understand the basic mechanisms acquired by pathogens of respiratory and Urinary tract to cause infection.
- CO2 Learners gain information regarding the prognosis and course of infection of skin and gastrointestinal tract.
- CO3 Learners acquire knowledge of various mechanism adapted by organisms to cause infection
- CO4 Learners understand the functioning of immune system
- CO5 Learners acquire knowledge of diagnostic skills involved in detection of pathogens

#### **Course (Paper) Name and No.: Microbial Biochemistry I**

- CO1 The course will enhance skills of learners for research methodology
- CO2 The course will upgrade students' knowledge about various mechanisms of ATP synthesis
- CO3 The course will make learner skillful and will enhance their employability

### **Course (Paper) Name and No.: Bioprocess Technology Part-I**

- CO1 Applications of microbes and its strain improvement in Industrial Microbiology.
- CO2 Determine growth and productivity parameters of batch continuous, fed batch and solid substrate fermentations.
- CO3 Describe the design of bioreactors for different applications and its process parameters.
- CO4 Design media, growth conditions and techniques for producing and recovering different types of products of commercial value.
- CO5 Understand the importance of the containment and levels of containment

### **Semester VI**

#### **Course (Paper) Name and No.: Microbial Genetics I**

- CO1 Learners can use different tools of genetic engineering in molecular biology experiments
- CO2 Learners can transform natural cell into transformed cell which can be used at commercial production of proteins
- CO3 Learners can understand the regulatory mechanism found in viruses to control gene expression

#### **Course (Paper) Name and No.: Medical Microbiology & Immunology**

- CO1 Learners acquire knowledge of mechanism of infection of central nervous system and sexually transmitted diseases.
- CO2 Learners acquire the ability to understand the application and use of antibiotics in treatment of various infections.
- CO3 Learners will understand the mechanism of immune system and formation of immune response.
- CO4 Knowledge of importance and use of vaccines in disease prevention

### **Course (Paper) Name and No.: Microbial Biochemistry II**

- CO1 The course will enhance learners understanding about lipid metabolism and will enhance their employability
- CO2 The course will enhance learners understanding about proteins and nucleic acid metabolism and will enhance their employability
- CO3 The course will enhance learners understanding about regulation of metabolism and will develop research aptitude
- CO4 The course will enhance learners understanding about metabolism of inorganic compounds and will enhance their employability

### **Course (Paper) Name and No.: Bioprocess Technology Part II**

- CO1 Understand the actual process involved in fermentations of important products
- CO2 Apply the knowledge of applications of animal and plant tissue culture techniques
- CO3 Learn the applications of immobilized enzymes in various fields
- CO4 Understand the working of important instruments used in biochemical analysis and bioassay.
- CO5 Learn the salient features of quality management, regulatory procedures and IPR
- CO6 Techniques involved in running a bioassay, immobilization of cells & sterility testing
- CO7 Preliminary techniques in animal & plant tissue culture

# Department of Biotechnology

## Programme Specific Outcome

- PSO1 Students will learn the basic concepts of Chemistry and analytical chemistry applied in Biological Sciences
- PSO2 An education in Cell biology, Biochemistry, Animal and plant physiology, human genetics and Immunology will impart knowledge to the students to cellular structure, biomolecules, metabolic pathways, its regulation along with defence mechanism and physiological processes in plants and animals
- PSO3 Students will also learn the concepts of biodiversity, ecology environment and its conservation
- PSO4 Students will gain basic information of microbial cultures, sterilization methods and enzyme production. They will be taught bio-safety guidelines and good laboratory practices
- PSO5 Introduction of recent topics like Drug delivery, Marine biotechnology, Bioinformatics will impart knowledge of mechanism of drug delivery, drug designing and applications of marine organisms as food, nutraceutical and cosmetics etc
- PSO6 Students will understand the principles and the applications of molecular biology and genetic engineering methods with an emphasis on the application of recombinant DNA technology to animals, plants and microbial organisms
- PSO7 Recognition of the importance of Bioethics, IPR, entrepreneurship, scientific writing Communication, and management skills so as to usher next generation of Indian industrialist
- PSO8 Students will get hands on training of techniques used in Cell Biology, Biochemistry, Microbiology, Immunology, Molecular Biology and Genetic Engineering

## Course Outcomes

### Class: F.Y.B. Sc. Biotechnology

#### Semester I

##### Course (Paper) Name and No.: Paper I Basic Chemistry

- CO1 Student will able to identify & Classify the organic & inorganic compounds on the basis of bond present & isomerism
- CO2 Student will be able to understand the concept of stoichiometry and will be able to solve the problems on it

##### Course (Paper) Name and No.: Paper II Analytical Chemistry

- CO1 Students will use knowledge of titrimetric and volumetric analysis.
- CO2 Students will use the knowledge regarding chemical calculations and calibrations of glassware and its importance in research.
- CO3 Students will learn to handle basic analytical techniques and tools like chromatography and colorimetry

##### Course (Paper) Name and No.: Paper III Biodiversity and Ecology

- CO1 Understanding of environmental conservation processes and its importance, pollution control, biodiversity and protection of endangered species by students.
- CO2 The students will acquire the knowledge of microbial and viral cell structure, growth and metabolism understand the microbial diversity, taxonomy and dynamics of microbial interactions with other populations.
- CO3 The student is able to define scientific models and questions about the effect of complex biotic and abiotic interactions on all biological systems, from cells and organisms to populations, communities and ecosystems

### **Course (Paper) Name and No.: Paper IV Basic Microbiology**

- CO1 Students are able to know principle, working, ray diagram application of microscope and advanced microscope. Students will be able to develop skill for visualization of microorganisms with different staining techniques.
- CO2 Students will learn how different types of chemical and physical methods of sterilization can be applied on laboratorial scale as well as industrial scale.
- CO3 Students will understand the growth and reproduction of bacteria. Students will be able to understand the enumeration techniques for microorganisms. Students will understand and perform the basic growth and cultivation techniques of microorganisms

### **Course (Paper) Name and No.: Paper V Introduction to Biotechnology & Cell Biology**

- CO1 Students will gain knowledge about field of Biotechnology.
- CO2 Students will be able relate the morphological changes that occur in transformed cells
- CO3 Students will gain the knowledge of how do cells conduct, coordinate, and regulate cell division
- CO4 Students will be familiar with cytological differences between components of prokaryotic and eukaryotic cells

### **Course (Paper) Name and No.: Paper VI Genetics**

- CO1 Describe the fundamental molecular principles of genetics
- CO2 Understand the relationship between phenotype and genotype in human genetic traits.
- CO3 Describe the basics of genetic mapping

## Semester II

### Course (Paper) Name and No.: Paper-I (Biochemistry)

- CO1 Student will acquire the knowledge of Classification, Structure, and Characterization of Biomolecules.
- CO2 Students will have knowledge of structure/ conformational freedom of biomolecules.
- CO3 Students will be able to understand biochemistry at atomic level.
- CO4 Student will acquire the knowledge of Classification, Structure, and Characterization of Biomolecules.

### Course (Paper) Name and No.: Paper II (Bioorganic Chemistry –II)

- CO1 To impart the skill of kinetics and reactions.
- CO2 Understand basic terms used in thermodynamics.
- CO3 Learn first law of thermodynamics and its expression in terms of relationship between Heat (q), work (w) and internal energy (U).
- CO4 Understand second law of thermodynamics and its implications.

### Course (Paper) Name and No.: Paper III (Plant and Animal Physiology)

- CO1 Students will be able to explain how terrestrial vascular plants acquire and use the energy and material resources needed to complete their life cycle, highlighting relationships between structure and function, and coordination of development, resource acquisition and environmental responses within and across cells, tissues and organs.
- CO2 Students will be acquainted with plant water relationship and basic requirements of nutrients to plants and animals.
- CO3 Using one or more model systems, students will be able to integrate the regulation of organ system functions in a whole animal using a conceptual model of feedback to explain homeostasis

### **Course (Paper) Name and No.: Paper-IV (Molecular Biology)**

- CO1 Students will be acquainted with major structure of biomolecules & nucleic acid.
- CO2 Students will be aware how replication takes place inside the cell & Distinguish between DNA template strand and new strand.
- CO3 Students will gain knowledge regarding mutation (genetic variation or change in DNA sequence), predict whether or not that change would result in a change of function for the resulting protein (phenotypic change)

### **Course (Paper) Name and No.: Paper-V (Tissue Culture and Good Laboratory Practices)**

- CO1 Students will learn basic technical aspects of plant tissue culture technique like media preparation, seed sterilization, callus culture and maintenance of aseptic conditions. The skill could be applied in agriculture and crop improvement.
- CO2 Students may develop their own PTC lab.
- CO3 Students will learn to demonstrate foundational knowledge of Cell culture techniques and competence in laboratory technique.
- CO4 Students will understand the highly specific requirements and intent of GLP regulation.
- CO5 Students will understand the requirements for resources in the laboratory - Personnel and Facility.
- CO6 Students will understand the importance of documentations such as results reporting, SOPs, Study Plans and Protocol.
- CO7 Gain understanding in audits and inspections

**Course (Paper) Name and No.: Paper-VI (Enzymology, Immunology and Biostatistics)**

- CO1 To impart the skills in Enzyme Kinetics, Immunological Techniques and Biostatistics.
- CO2 Classify enzymes and understand the kinetics of enzyme catalysed reactions.
- CO3 Differentiate between innate and acquired immunity.
- CO4 Understand the different functional units of immunity in the body.
- CO5 Differentiate between the mean, the median, and the mode of data.
- CO6 Determine the value of the mean, the median, and the mode of ungrouped data and grouped data.
- CO7 Identify the relationships among the three measures of central tendency for symmetrical and skewed distributions.
- CO8 State the advantages and disadvantages of the three measures

## **Class : S.Y.B. Sc. Biotechnology**

### **Semester III**

#### **Course (Paper) Name and No.: Paper- I (Biophysics)**

- CO1 The students will be able to relate principles of physics to applications & techniques in the field of biology such as spectroscopy, microscopy.
- CO2 Students will be gaining the idea regarding the application of biology with classical physics.
- CO3 Students will be able to learn the analytical techniques for analysis of biomolecules

#### **Course (Paper) Name and No.: Paper- II (Applied Chemistry –I)**

- CO1 Develop an understanding of the different aspects of organic and green chemistry
- CO2 Discuss role of organic compounds in biology and synthesis of organic compounds.
- CO3 Discuss role of green chemistry and its application in industry

#### **Course (Paper) Name and No.: Paper-III (Immunology)**

- CO1 To understand the role of different types of cells.
- CO2 To understand the role of effector molecules and effector mechanisms in Immunology.
- CO3 To learn the basic knowledge of immunological processes at a cellular and molecular level
- CO4 To understand the cellular and molecular aspects of lymphocyte activation, homeostasis, differentiation, and memory.
- CO5 To understand the principles underlying various immune- techniques.

### **Course (Paper) Name and No.: Paper-IV (Cell Biology and Cytogenetics)**

- CO1 The student will be able to develop an understanding of the Cytoskeleton
- CO2 Students will have an understanding of How the biochemical and biophysical properties of membranes constituents contribute to the structure and organization of membranes
- CO3 Students will get knowledge of Cell compartmentalisation and how solutes are transported across membrane
- CO4 The student will able to discuss the structure of Chromosomes and types of Chromosomal Aberrations.
- CO5 Students will have an understanding of the principles underlying Sex Determination, Linkage and Mapping.
- CO6 By understanding of basic concepts in inheritance students will able to solve simple genetic problems and recognize common misconceptions regarding human heredity

### **Course (Paper) Name and No.: Paper-V (Molecular Biology)**

- CO1 Know how DNA is used to make protein by using the process of transcription and translation.
- CO2 Discuss the mechanisms associated with Gene Expression at the level of Transcription and Translation.
- CO3 Discuss the mechanisms associated with Regulation of Gene Expression in Prokaryotes and Eukaryotes

### **Course (Paper) Name and No.: Paper-VI (Bioprocess Technology)**

- CO1 Students will be acquainted with the bioprocess for conversion of raw material to product. Upstream and downstream processing will be discussed it will also explain the processes and techniques used for extraction and purification of a product from culture medium.

- CO2 Students will be gaining the information regarding Bioavailability & Bioequivalence studies.
- CO3 Students will be studying different types of microorganisms for commercial production of products like enzymes, antibiotics, amino acids and its screening procedures

### **Course (Paper) Name and No.: Paper-VII (Research Methodology)**

- CO1 Preparation of a project proposal (to undertake a project).
- CO2 Identification of overall process of designing a research study from its inception to its report.
- CO3 Writing a research report and thesis

## **Semester IV**

### **Course (Paper) Name and No.: Paper-I (Biochemistry)**

- CO1 Students will learn the metabolic pathway, the energy yielding and energy requiring reactions in life.
- CO2 It will help the students to understand the diversity of metabolic regulation and how this is specifically achieved in different cells
- CO3 Help the students to understand interlinked metabolic reactions with specific control site and key junctions

### **Course (Paper) Name and No.: Paper-II (Applied Chemistry –II)**

- CO1 Develop an understanding of the different aspects of analytical chemistry
- CO2 Gain knowledge of natural product chemistry and related acquired skills.
- CO3 Gain an understanding of basic concepts in polymer chemistry and Nanomaterials

### **Course (Paper) Name and No.: Paper-III (Medical Microbiology)**

- CO1 The learner will be able to identify common infectious agents and the diseases that they cause.
- CO2 Learners will be able to understand the factors playing a role in causing a disease gain
- CO3 Learner will be able to describe the epidemiology of infectious agents including how infectious diseases are transmitted.
- CO4 Learners will be able to discuss the various aspects of systemic infections including causative agents, symptoms and prophylaxis

### **Course (Paper) Name and No.: Paper-IV (Environmental Biotechnology)**

- CO1 Students will understand different types, causes & control measures of different pollutions.
- CO2 Students can get some skills to recognise the ecological problems and critical evaluation of the human impacts on pollution, climate changes and as well as environmental protection.
- CO3 Students should be able to utilize the knowledge gained on the role and importance of microorganisms in the environment for remediation

### **Course (Paper) Name and No.: Paper-V (Bioinformatics and Biostatistics)**

- CO1 Students will be able to gain an understanding of the basic concept of bioinformatics.
- CO2 Students will be able to understand the tools used in bioinformatics.
- CO3 Students will be able to explain the major steps in pairwise & MSA, explain the principle for & execute pairwise alignment by dynamic programming.
- CO4 Students will able to define the principal concepts about biostatistics, collect data relating to variable/variables which will be examined and calculate descriptive statistics from these data, identify distribution form relating to the variable/variables and apply hypothesis testing via some of the statistical distributions.

### **Course (Paper) Name and No.: Paper-VI (Molecular Diagnostics)**

- CO1 Gain an understanding of the basic Principles used in Molecular Diagnosis.
- CO2 Gain critical thinking and analytical skills to understand new Diagnostic Methods.
- CO3 Apply the knowledge and skills gained in the course should be useful in developing new Diagnostic Kits

### **Course (Paper) Name and No.: Paper-VII (Entrepreneurship Development)**

- CO1 Develop and strengthen the Entrepreneurial quality, i.e. motivation or need for achievement.
- CO2 Appreciate the needed Entrepreneurial discipline.
- CO3 Encouragement for Self-employment tendencies

## **Class : T.Y.B. Sc. Biotechnology**

### **Semester V**

#### **Course (Paper) Name and No.: Paper-I (Cell Biology)**

- CO1 Students will learn signal transduction mechanisms, in particular the concepts of response specificity, signal amplitude and duration, signal integration and intracellular location
- CO2 Students will get knowledge of different types of extracellular signals and receptors, and explain their functional significance
- CO3 The students will be able to learn how genetics contributes to predisposition and progression of cancer.
- CO4 It will help the students to understand how immunotherapy is, and can be, used to treat human illness

#### **Course (Paper) Name and No.: Paper-II (Medical Microbiology & Instrumentation)**

- CO1 It will help the students to understand viral replication strategies; and compare and contrast replication mechanisms used by viruses relevant for human disease, knowledge of the pathogenesis of diseases, interventions for effective treatment, and mechanisms of health maintenance to prevent disease
- CO2 The ability to articulate a cogent, accurate assessment and plan, and problem list, using diagnostic clinical reasoning skills in all the major disciplines
- CO3 Students will learn basic technical aspects of handling different instrument in laboratory.
- CO4 They would be able to compare different separation techniques & use them in research work.
- CO5 Students will develop the analytical approach to use advanced instruments required during experimentation

### **Course (Paper) Name and No.: Paper-III (Genomics & Molecular Biology)**

- CO1 Students will be able to Understand the range of molecular laboratory techniques used routinely in human forensic analysis and population genetic analysis including sex typing, DNA profiling, Single Nucleotide Polymorphism (SNP) detection and DNA sequencing.
- CO2 The students will have knowledge of tools and strategies used in genetic engineering.
- CO3 Students can use and apply the knowledge of genetic engineering in problem solving and in practice.
- CO4 In conjunction with the practical in molecular biology & genetic engineering, the students will be able to take up biological research as well as placement in the relevant biotech industry.

### **Course (Paper) Name and No.: Paper-IV (Marine Biotechnology)**

- CO1 Students will learn methodological approaches that are currently being used for microbial bioprospecting, with emphasis in the marine environment.
- CO2 Students will get knowledge of various culturing techniques and culture independent approaches.
- CO3 Students may be able to provide or improve aquaculture procedures through recombinant technology to develop genetically modified organisms, which could be useful to overcome the global food demand by improving the quality of existing products.
- CO4 Students will learn basic technical aspects of marine derived molecules and their applications in industrial process like in pharmaceutical industry and cosmetic industry

### **Course (Paper) Name and No.: Paper-V (Biosafety-Applied Component)**

- CO1 Students will be acquainted with the biosafety regulation in Biotechnology.
- CO2 Students will be familiar with research in a GLP-complaint manner.

- CO3 Learners will understand how to detect potential contamination risks for product.
- CO4 Students will be able to demonstrate and assess the proper use of PPE, best practices, biological containment, and be prepared to safely conduct research

## **Semester VI**

### **Course (Paper) Name and No.: Paper- I Biochemistry**

- CO1 Describe the different levels of protein structure and their interdependence and explain how steric limitations determine secondary structure in polypeptides
- CO2 Describe, using examples, the relationship between protein structure and function and understand the significance of domains in protein function and how they have arisen
- CO3 Learn the significance of structural and storage polysaccharide units.
- CO4 Acquire knowledge of various metabolic pathways of carbohydrates.
- CO5 Understand basic universal principles of chemical signaling, and the nature of hormonal communication in simple and complex organisms
- CO6 Identify the relationship between diet and chronic diseases/illnesses (cardiovascular disease, diabetes, obesity, cancer, hypertension, osteoporosis, etc.) and what modifications can be made in the diet to reduce the risk for these diseases/illnesses

### **Course (Paper) Name and No.: Paper-II (Industrial Microbiology)**

- CO1 The production outline of various dairy products.
- CO2 Determine fermentation productivity and yields.
- CO3 Define different modes of fermentation and know their limitations
- CO4 Develop suitable medium and perform material balance
- CO5 Develop strategy for fermentation process development
- CO6 Understand the Standard operating procedures and techniques of drug development in QA and QC.

### **Course (Paper) Name and No.: Paper-III (Pharmacology and Neurochemistry)**

- CO1 Understand the mechanism of drug action and its dose–response relationship.
- CO2 Understand the mechanisms of drug delivery and action in the body.
- CO3 Get an understanding in the concepts of bioavailability and distribution.
- CO4 In depth knowledge on toxic substances and poisons
- CO5 Understand the properties of cells that make up the nervous system including the propagation of electrical signals used for cellular communication
- CO6 Relate the properties of individual cells to their function in organized neural circuits and systems

### **Course (Paper) Name and No.: Paper-IV (Environmental Biotechnology)**

- CO1 Recognise the various global and regional environmental concerns due to natural causes and/or human activities, and the impact of these on various forms of life including native biodiversity.
- CO2 Investigate some examples of different types of environmental pollution and their impacts
- CO3 Describe the applications of various fields including chemistry, biochemistry, molecular biology and/or microbiology, in understanding and addressing the above issues, as well as exploring environmental resources for new technologies.
- CO4 Demonstrate an awareness of emerging concerns such as climate change, waste management or reductions in fossil fuels, and new technologies for addressing these.
- CO5 Appreciate the scientific, ethical and/or social issues associated with certain applications of biotechnology for alleviating the environmental concerns.
- CO6 Exposed to the process which are currently associated and taking place in industry along with their consequences arise on generation of hazardous waste

## **Course (Paper) Name and No.: Paper-V (Agri Biotechnology)**

- CO1 Get the knowledge of technology and the techniques that can be used to improve the efficiency of agricultural operations by decreasing costs, increasing profits, and decreasing hazards to the environment.
- CO2 Use knowledge in plant pathogen interactions and genetics in breeding programmes for plant resistance to pest and diseases.
- CO3 Use knowledge in plant physiology and genetics in breeding programmes for plant resistance to abiotic stresses
- CO4 Gain the knowledge of different markers used in plant breeding techniques.
- CO5 Understand the vast reserves of available microbial biodiversity that provide abundant opportunities to harness the ability of micro -organisms and their chemical constituents, to sustainably minimize damage from pests or increase agricultural productivity and production.
- CO6 Gain the knowledge Symbiotic-Non symbiotic nitrogen fixation in leguminous plant assimilation of sulphur and phosphorus by plants

# Department of Computer Science

## Programme Specific Outcome

- PSO1 Challenging and varied subjects aligned with the current trend with the introduction of Machine Intelligence specific subjects.
- PSO2 Understand Data Management Skills.
- PSO3 Learn the skills of Image processing.
- PSO4 Introduction of physical world through Architecting of IoT and Wireless Sensor Networks and Mobile Communication.
- PSO5 Security domain is also evolved by the introduction of Ethical Hacking, Cyber Forensic and Information and Network Security.
- PSO6 Get the hands on experience Linux Server Administration and Web Services topics are included.

## Course Outcomes

### Class: F.Y.B. Sc. Computer Science

#### Semester I

#### Course (Paper) Name and No.: Computer Organization and Design (P I)

- CO1 To learn about how computer systems work and underlying principles
- CO2 To understand the basics of digital electronics needed for computers
- CO3 To understand the basics of instruction set architecture for reduced and complex instruction sets
- CO4 To understand the basics of processor structure and operation
- CO5 To understand how data is transferred between the processor and I/O devices

#### Course (Paper) Name and No.: Programming with Python-I (P-II)

- CO1 Students should be able to understand the concepts of programming before actually starting to write programs.
- CO2 Students should be able to develop logic for Problem solving with conditions, loops and functions
- CO3 Students should be able to apply the problem solving skills using syntactically simple language
- CO4 Students learned about object-oriented features and dictionary concepts.

#### Course (Paper) Name and No.: Programming with C (P –III)

- CO1 Implement programs involving decision structures, loops and functions.
- CO2 Implement pointers, arrays.
- CO3 Implement different data structures and create/update basic data files

### **Course (Paper) Name and No.: Free and Open Source System (P-IV)**

- CO1 Student gets to know how FOSS technologies work.
- CO2 Practical knowledge free and open source technologies allow student to get into FOSS community.
- CO3 By learning Open Source Ecosystem, it Increases engagement and social entrepreneurship in students

### **Course (Paper) Name and No.: Discrete Mathematics (P-V)**

- CO1 To provide overview of theory of discrete objects, starting with relations and partially ordered sets and study about recurrence relations, generating function and operations on them.
- CO2 Students be able to understand permutations, combinations and counting principles.
- CO3 Give an understanding of graphs and trees which are widely used in software

### **Course (Paper) Name and No.: Descriptive statistics and introduction to probability (P-VI)**

- CO1 Enable learners to know descriptive statistical concepts
- CO2 Enable to study Measures of skewness and Kurtosis and correlation and regression.
- CO3 Enable study of probability concept required for Computer learners

### **Course (Paper) Name and No.: Soft Skill Development (P VII)**

- CO1 To know about various aspects of soft skills and learn ways to develop personality
- CO2 Understand the importance and type of communication in personal and professional environment.
- CO3 To provide insight into much needed technical and non-technical qualities in career planning.
- CO4 Learn about Leadership, team building, decision making and stress management

## Semester II

### Course (Paper) Name and No.: Database System (P-I)

- CO1 Students learn to evaluate business information problem and find the requirements of a problem in terms of data.
- CO2 Students learn to design the database schema with the use of appropriate data types for storage of data in database.
- CO3 Students learn to create, manipulate, query and back up the databases

### Course (Paper) Name and No.: Programming with Python II (P-II)

- CO1 Students should be able to understand how to read/write to files using python.
- CO2 Students be able to catch their own errors that happen during execution of programs.
- CO3 Students should get an introduction to the concept of pattern matching.
- CO4 Students be familiar with the concepts of GUI controls & designing GUI applications.
- CO5 Students should connect to the database to move the data to/from the application.
- CO6 Students should know how to connect to computers read from URL and send email

### Course (Paper) Name and No.: Linux (P-III)

- CO1 Upon completion of this course, learners should have a good working knowledge of Linux, from both a graphical and command line perspective, allowing them to easily use any Linux distribution.
- CO2 This course shall help learner to learn advanced subjects in computer science practically.
- CO3 This course shall help learner to acquire knowledge of networking in Linux
- CO4 Student shall be able to progress as a Developer or Linux System Administrator using the acquired skill set.
- CO5 Students will be able to understand the basic commands of Linux operating system and can write shell scripts

### **Course (Paper) Name and No.: Data Structure (P-IV)**

- CO1 Learn about Data structures, its types and significance in computing
- CO2 Explore about Abstract Data types and its implementation
- CO3 Ability to program various applications using different data structure in Python

### **Course (Paper) Name and No.: Statistical Methods & Testing of Hypothesis (P-VI)**

- CO1 Enable learners to know descriptive statistical concepts
- CO2 Enable study of probability concept required for Computer learners
- CO3 Enable to study the concept of hypothesis testing.

### **Course (Paper) Name and No.: Green Technology (P-VII)**

- CO1 Students should be able to understand the concept of green technology concept.
- CO2 Students should be able to understand green server, green data centre, green server farm.
- CO3 Aware good and dangerous activity to environment

## **Class: S.Y.B. Sc. Computer Science**

### **Semester III**

#### **Course (Paper) Name and No.: Theory of Computation (P-I)**

- CO1 Understand Automata theory and Languages
- CO2 Learn about Grammar and its application in Language design

#### **Course (Paper) Name and No.: Core Java (P-II)**

- CO1 Object oriented programming concepts using Java.
- CO2 Knowledge of input, its processing and getting suitable output.
- CO3 Understand, design, implement and evaluate classes and applets.
- CO4 Knowledge and implementation of AWT package

#### **Course (Paper) Name and No.: Operating System (P-III)**

- CO1 To provide a understanding of operating system, its structures and functioning
- CO2 Develop and master understanding of algorithms used by operating systems for various purposes.
- CO3 Describe and analyse the memory management and its allocation policies.

#### **Course (Paper) Name and No.: Database Management System (P-IV)**

- CO1 Master concepts of stored procedure and triggers and its use.
- CO2 Learn about using PL/SQL for data management.
- CO3 Understand concepts and implementations of transaction management and crash recovery

### **Course (Paper) Name and No.: Combinatorics and Graph Theory (P-V)**

- CO1 Appreciate beauty of combinatorics and how combinatorial problems naturally arise in many settings.
- CO2 Understanding the combinatorial features in real world situations and Computer Science applications.
- CO3 Apply combinatorial and graph theoretical concepts to understand computer science concepts and apply them to solve problems.

### **Course (Paper) Name and No.: Physical Computing and IOT Programming (P VI)**

- CO1 Enable learners to understand System On Chip Architectures
- CO2 Introduction and preparing Raspberry Pi with hardware and installation
- CO3 Learn physical interfaces and electronics of Raspberry Pi and program them using practical's
- CO4 Learn how to make consumer grade IoT safe and secure with proper use of protocols

### **Course (Paper) Name and No.: Web Programming (P-VII)**

- CO1 To design valid, well-formed, scalable, and meaningful pages using emerging technologies
- CO2 Understand the various platforms, devices, display resolutions, viewports, and browsers that render websites
- CO3 To develop and implement client-side and server-side scripting language programs.
- CO4 To develop and implement Database Driven Websites.
- CO5 Design and apply XML to create a mark-up language for data and document centric applications

## Semester IV

### Course (Paper) Name and No.: Fundamentals of Algorithm (P-I)

- CO1 Understand the concepts different algorithm techniques
- CO2 Implement the logic in the algorithm
- CO3 Implement Recursive and Non recursive type problems
- CO4 Understand the analysis and rate of growth of different problem statement

### Course (Paper) Name and No.: Advanced Java (P-II)

- CO1 Understand the concepts related to Java Technology
- CO2 Explore the use of Java Server Programming
- CO3 Understand the fundamentals of JSON

### Course (Paper) Name and No.: Computer Network (P III)

- CO1 Learner will be able to understand the concepts of networking, which are important for them to be known as a '*networking professionals*'
- CO2 Useful to proceed with industrial requirements and International vendor certifications
- CO3 Learners will be able to understand the services provided by each layer of network models

### Course (Paper) Name and No.: Software Engineering, Paper IV

- CO1 Understand the concepts of process model, metrics and how to apply in organization
- CO2 Implement the techniques like project scheduling, risk management in organization.
- CO3 Draw useful diagrams associated with the system

### **Course (Paper) Name and No.: Linear Algebra using Python (PV)**

- CO1 Appreciate the relevance of linear algebra in the field of computer science.
- CO2 Understand the concepts through program implementation.
- CO3 Install a computational thinking while learning linear algebra

### **Course (Paper) Name and No.: .NET Technologies (P-VI)**

- CO1 Understand the .NET framework
- CO2 Develop a proficiency in the C# programming language
- CO3 Proficiently develop ASP.NET web applications using C#
- CO4 Use ADO.NET for data persistence in a web application

### **Course (Paper) Name and No.: Android (PVII)**

- CO1 At the end of the course student will able to understand the requirements of Mobile programming environment.
- CO2 At the end of the course student Learn about basic methods, tools and techniques for developing Apps
- CO3 Explore and practice App development on Android Platform
- CO4 Develop working prototypes of working systems for various uses in daily lives.

## **Class: T.Y.B. Sc. Computer Science**

### **Semester V**

#### **Course (Paper) Name and No.: Artificial Intelligence (Elective-I-P-I)**

- CO1 Understanding the various search techniques, constraint satisfaction problem, game playing techniques
- CO2 Acquire knowledge of real world knowledge representation.
- CO3 Analyse and design real world problem for implementation and understanding the dynamic behaviour of system.

#### **Course (Paper) Name and No.: ST&QA (Elective-I-P-II)**

- CO1 Understand various software testing methods and strategies.
- CO2 Understand a variety of software metrics, and identify defects and managing those defects for improvement in quality for given software.
- CO3 Design SQA activities, SQA strategy, formal technical review report for software quality control and assurance

#### **Course (Paper) Name and No.: PIII Information & Network Security (Elective-II-P-I)**

- CO1 Understand the principles and practices of cryptographic techniques.
- CO2 Understand a variety of generic security threats and vulnerabilities, and identify & analyze particular security problems for a given application.
- CO3 Understand various protocols for network security to protect against the threats in a network

### **Course (Paper) Name and No.: Web Service (Elective-II-P-III)**

- CO1 Design SOAP based web services that associated with standards such as WSDL and UDDI
- CO2 Design Restful Web Services with JAX-WS and JAX-RS
- CO3 Design SOAP based / RESTful / WCF services also deal with Security and QoS issues of Web Services

### **Course (Paper) Name and No.: Game Programming (P-V)**

- CO1 1) Study Graphics and gaming concepts with present working style of developers where everything remains on internet
- CO2 2) Learners need to review Unity community
- CO3 3) Understand and be a part of Unity community

## **Semester VI**

### **Course (Paper) Name and No.: Cloud Computing (Elective-I P-I)**

- CO1 Learners get expose to areas of Cloud Computing, and encouragement for further study and research.
- CO2 Students learn to articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing using open source technology.
- CO3 Students get the ability to identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.
- CO4 Students learn to identify the core issues of cloud computing such as security, privacy, and interoperability

### **Course (Paper) Name and No.: Cyber Forensics (Elective-I P-III)**

- CO1 The student will be able to plan and prepare for all stages of an investigation - detection, initial response and management interaction.
- CO2 Investigate various media to collect evidence.
- CO3 Report various investigations in a way that would be acceptable in the court of law.

### **Course (Paper) Name and No.: Information Retrieval (Elective-II-P-I)**

- CO1 To understand the field of Information retrieval
- CO2 Understand to design information retrieval model
- CO3 Understand the concepts of Evaluation system

### **Course (Paper) Name and No.: Data Science (Elective-II-P-III)**

- CO1 After completion of this course, the learners should be able to understand & comprehend the problem.
- CO2 Learner should be able to define suitable statistical method to be adopted.
- CO3 Learner should be able to understand data management, data curation techniques

### **Course (Paper) Name and No.: Ethical Hacking (P-V)**

- CO1 To identify security vulnerabilities and weaknesses in the target applications
- CO2 Learn to test and exploit systems using various tools
- CO3 Understand the impact of hacking in real time machines

# Department of Information Technology

## Programme Specific Outcome

- PSO1 Learners are able to work effectively in IT industries in field of project management.
- PSO2 Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
  - Able to understand building blocks of Internet of Things and characteristics.
- PSO3 Learners are able to configure different types of servers on Linux Platform.
- PSO4 Learners are able to create application projects using different technologies such as enterprise java and .Net.
- PSO5 Learners are able to build and enhance business intelligence capabilities by adapting the appropriate technology and software solutions.

## Course Outcomes

### Class: F.Y.B. Sc. Information Technology

#### Semester I

#### Course (Paper) Name and No.: Introduction to C++ Programming (P-I)

- CO1 To understand the Basic concepts of C++ programming.
- CO2 To understand concept of Loops and manipulators.
- CO3 To learn the use of functions in C++ program.
- CO4 To understand various Data types.
- CO5 To gain expertise over concepts of string, vectors and structures.

#### Course (Paper) Name and No.: Digital Electronics (P-II)

- CO1 To understand number representation and conversion between different representation in digital electronic circuits.
- CO2 To analyse logic processes and implement logical operations using combinational logic circuits.
- CO3 To understand concepts of sequential circuits and to analyse sequential systems in terms of state machines.
- CO4 To design and analyse of electronic circuits using multiplexers, de-multiplexers, encoders, decoders and flip- flops.
- CO5 To understand the functioning of counters and shift registers with respect to its application in electronic display and sequence generator.

### **Course (Paper) Name and No.: Operating Systems (P-III)**

- CO1 To describe the importance of computer system, Process management policies and scheduling of processes by CPU.
- CO2 To describe and analyses the memory management and its allocation policies.
- CO3 To understand the File systems, its structure and operations.
- CO4 To evaluate the requirement for process synchronization and coordination handled by operating system.
- CO5 To identify the need to create the special purpose operating system.

### **Course (Paper) Name and No.: Discrete Mathematics (P-IV)**

- CO1 To learn the discrete theory, logic form, its equivalence, quantified statements.
- CO2 To solve the recurrence relations, generating function and operation on them.
- CO3 To solve the probability problems, combination and permutations as well as the mathematical induction.
- CO4 To learn the properties of graphs, tree, isomorphism of trees and finding the shortest path.
- CO5 To learn the direct proofs, divisibility, quotient-remainder theorem, contraposition and contradiction.

### **Course (Paper) Name and No.: Communication Skills (P-V)**

- CO1 To understand the basics of Business communication.
- CO2 To learn to write business messages appropriately.
- CO3 To learn how to talk in meetings or group discussion i.e. orally.
- CO4 To learn how to communicate in different fields or departments.
- CO5 To learn to make presentations and how to present one.

## Semester II

### Course (Paper) Name and No.: Object oriented Programming (P-I)

- CO1 To learn advanced features of C++ programming language as a continuation of the previous course, to learn the characteristics of an object oriented programming language.
- CO2 Learners are able to use classes, constructors and destructors.
- CO3 Learners are able to learn to use Polymorphism virtual, function.
- CO4 Learners are able to learn to use program development using inheritance, exception handling.
- CO5 Learners are able to working with template and files.

### Course (Paper) Name and No.: Microprocessor Architecture (P-II)

- CO1 To understand basics about Microprocessor.
- CO2 To learn concepts of microprocessor architecture, interface devices and Assembly Language.
- CO3 To learn additional programming techniques.
- CO4 To understand concepts of Stacks and subroutines and BCD arithmetic.
- CO5 To learn about Software development system.

### Course (Paper) Name and No.: Database Management System (P-III)

- CO1 To design the database schema with the use of appropriate data types for Storage of data in database.
- CO2 To design relational databases.
- CO3 To create, manipulate, query and back up the databases.
- CO4 To Manage the transaction of databases.
- CO5 To perform the advanced PL/SQL Programming.

### **Course (Paper) Name and No.: Numerical Methods (P-IV)**

- CO1 To solve the equations using bisection, newton raphson method and iterative methods.
- CO2 To learn newton's forward difference and newton' backward difference interpolation, lagrange and spline interpolation.
- CO3 To solve derivatives using the newton forward and backward difference interpolation.
- CO4 To solve the integrations using various numerical methods and solving the double integrals.
- CO5 To find the characteristics value using the power method and solutions to the equations using direct methods

### **Course (Paper) Name and No.: Web Programming (P-V)**

- CO1 To develop simple web pages and apply formatting to it.
- CO2 To design forms and incorporate audio and video on web pages.
- CO3 To handle user events through client side scripting.
- CO4 To develop dynamic web pages using server side scripting.
- CO5 To provide interaction between web pages and databases using server side scripting.

## **Class: S.Y.B. Sc. Information Technology**

### **Semester III**

#### **Course (Paper) Name and No.: Python Programming (P-I)**

- CO1 Learners will be able to understand basic features like Variables, Operators, Math functions, various Decision Making statements.
- CO2 Learners will be able to understand different Functions & Strings
- CO1 Learners will be able to understand and summarize Lists, Tuples, Dictionaries, Different File Handling& Error Handling operations.
- CO2 Learners will be able to understand Interpret Object Oriented Programming in Python.
- CO 5 Learners will be able to design GUI Application in Python & evaluate Database operations.

#### **Course (Paper) Name and No.: Data Structures (P-II)**

- CO1 Learners will be able to understand the basics of algorithm analysis.
- CO2 Learners will able to describe operations on linked list.
- CO3 Learners will be able to understand analysis of stack and queue operations.
- CO4 Learners will be able to understand different searching and sorting techniques tree and AVL tree structures.
- CO5 Learners will be able to analyze graphs and hashing techniques

#### **Course (Paper) Name and No.: Computer Networks (P-III)**

- CO1 Learners will get Knowledge about computer networking basics
- CO2 Learners will be able to understand different data transmission mediums.
- CO3 Learners will be able to understand different types of wired and wireless networking technologies.
- CO4 Learners will be able to understand Functionality of the Network layer.
- CO5 Learners will be able to understand various Transport layer protocols.

### **Course (Paper) Name and No.: Database Management System (P-IV)**

- CO1 Learners should be able to design the database schema with the use of appropriate data types for Storage of data in database
- CO2 Learners should be able to design relational databases
- CO3 Learners should be able to create, manipulate, query and back up the databases
- CO4 Learners should be able to Manage the transaction of databases.
- CO5 Learners should be able to perform the advanced PL/SQL Programming.

### **Course (Paper) Name and No.: Applied Mathematics (P-V)**

- CO1 Students will be able to gain expertise in solving matrices using different methods and polar, exponential form of complex as well as hyperbolic functions.
- CO2 Students will be able to solve the differential equation using various methods and differential equations with constant coefficients.
- CO3 Understand the properties and theorems of laplace and integrate the laplace transform and find the inverse laplace using differential equations.
- CO4 Able to find double and triple integrals in polar coordinates and area, volume using double and triple integrals.
- CO5 Able to understand the properties of beta, gamma functions and solve the error functions.

## **Semester IV**

### **Course (Paper) Name and No.: Core Java (P-I)**

- CO1 Students will be introduced with the basic concepts and terminologies of java programming
- CO2 Students will be able to develop java code using control structures, iteration
- CO3 Students will use the advance class features including inheritance, polymorphism and overloading, overriding, interfaces, abstract classes and develop efficient and reusable codes

- CO4 Learners will be made familiar with multithreading, IO File handling and exception handling techniques.
- CO5 Students will be able to design, develop and execute AWT application

### **Course (Paper) Name and No.: Introduction to Embedded System (P-II)**

- CO1 Learners will become familiar with classification, characteristics, core components of embedded system
- CO2 Learners will become familiar with memory, types of memory, registers
- CO3 Learners will acquire skills in 8051 programming in C
- CO4 Learners will acquire skills for selecting microcontroller and developing basic applications.
- CO5 Learners will be familiar with different types of operating system and its characteristics.

### **Course (Paper) Name and No.: Computer Oriented Statistical Techniques (P III)**

- CO1 Students will be able to calculate and apply measures of dispersion.
- CO2 Students will be able to apply discrete and continuous probability distribution to various problems.
- CO3 Students will be able to test the hypothesis as well as calculate confidence interval and the p-concept.
- CO4 Students will be able to learn non-parametric test such as the Chi-square test for independence as well as goodness of fit.
- CO5 Students will be able to compute and interpret the results of bivariate and multivariate regression and correlation analysis and to perform ANOVA.

### **Course (Paper) Name and No.: Software Engineering (P-IV)**

- CO1 Learners will be able to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment
- CO2 Learners will have an ability to work in one or more significant application domains
- CO3 Learners will be able to work as an individual and as part of a multidisciplinary team to develop and deliver quality software
- CO4 Learners will be able to understand and apply current theories, models, and techniques that provide a basis for the software lifecycle
- CO5 Learners will be able to use the techniques and tools necessary for engineering practice

### **Course (Paper) Name and No.: Computer Graphics and Animation (PV)**

- CO1 Learners will be able to understand computer graphics.
- CO2 Learners will be able to do 2D & 3D transformations.
- CO3 Learners will be able to create 3D objects using lines and color.
- CO4 Learners will be able to create different objects with different planes, curves.
- CO5 Learners will be able to do animation through programming.

## **Class: T.Y.B. Sc. Information Technology**

### **Semester V**

#### **Course (Paper) Name and No.: Software Project Management (P-I)**

- CO1 Learners are clear the idea about project planning.
- CO2 Learners are determine Success criteria for a project.
- CO3 Learners are reduce the some risk certain of appropriate prototype
- CO4 Learners are determine estimate the overall duration of project.
- CO5 Learners are Identify the resource requirements.

#### **Course (Paper) Name and No.: Internet of Things (P-II)**

- CO1 Learners are Able to Interpret the vision of IoT from a global context
- CO2 Learners are Become familiar with IoT hardware components
- CO3 Learners are acquire skills to design 3D modules
- CO4 Learners are determine the Market perspective of IoT
- CO5 Learners are acquire skills on developing their enterprise level technical strategies

#### **Course (Paper) Name and No.: Advanced Web Programming (P-III)**

- CO1 Students will be able to do programming with C# Language.
- CO2 Acquire skills to design web page incorporate with different server controls on web pages.
- CO3 Acquire skills to handle Error Handling, Logging, and Tracing , State Management
- CO4 Acquire skills to develop dynamic web pages using ADO.NET Fundamentals
- CO5 Provide interaction between web pages using ASP.NET AJAX.

### **Course (Paper) Name and No.: Linux System Administration (P-IV)**

- CO1 Acquire skills to manage system level processes and handle software management on linux platforms.
- CO2 Able to handle user accounts and manage storage space on systems.
- CO3 Learners will be able to configure firewall and provide security to data on linux machines through cryptography
- CO4 Acquire skills to configure different types of servers.
- CO5 Learners will be able to do shell level programming in Linux

### **Course (Paper) Name and No.: Enterprise Java (P-V)**

- CO1 Students will be able to create servlet and develop java applications with database connectivity
- CO2 Students will study the fundamentals and core concepts of cookies, session, file uploading, file downloading and request dispatcher
- CO3 Students will use the advance class features including inheritance, polymorphism and overloading, overriding, Students will gain knowledge and experience required to develop and deploy JSP application using JSTL.
- CO4 Students will be able to develop and deploy EJB application with concepts of Interceptors, JNDI.
- CO5 To make students familiar with the development of application using concept of Persistence, Object/Relational Mapping, JPA and Hibernate.

## Semester VI

### Course (Paper) Name and No.: Software Quality Assurance (P-I)

- CO1 Learners will be able to analyse the quality of software product
- CO2 Learners will be able to understand different testing methodology
- CO3 Learners will be able to analyse the difference between black box and white box testing
- CO4 Learners will be able to understand verification and validation techniques
- CO5 Learners will be able to understand special types of testing and levels of testing

### Course (Paper) Name and No.: Security in Computing (P-II)

- CO1 Introduction to basics of information security with risk analysis and design
- CO2 Identify some of the factors driving the need for Database and storage security
- CO3 Identify some of the factors driving the need for Network security
- CO4 Information about multiple attacks, vulnerabilities and how to detect & prevent them.
- CO5 Information about cloud storage, virtualization and how to secure them

### Course (Paper) Name and No.: Business Intelligence (P-III)

- CO1 Identify the major frameworks of computerized decision support: decision support systems (DSS), data analytics and business intelligence.
- CO2 Analyse data, choose relevant models and algorithms for respective applications
- CO3 Become familiar with classification methods, clustering methods.
- CO4 Design application using Business Intelligence techniques.
- CO5 Ability to design and develop the AI applications in real world scenario

## **Course (Paper) Name and No.: Principles of Geographic Information Systems (P-IV)**

- CO1 Introduction about basic GIS data types and technologies
- CO2 Knowledge various GIS data management and processing techniques.
- CO3 Learning Spatial data processing techniques and positioning.
- CO4 Learning various functions in GIS.
- CO5 Creating various maps in GIS

## **Course (Paper) Name and No.: IT Service Management (P-V)**

- CO1 Learners should be able to gain understanding of scope, purpose, and objective of Service Management.
- CO2 Learners should be able to understand Service Design, Service Design Principles and its Strategies.
- CO3 Learners should be able to understand implementation of services through Service Transition Phase.
- CO4 Learners should be able to understand Service Operation Phase and activities for operating services.
- CO5 Learners should be able to understand Process of Continual Service Improvement and its challenges delivering the service.

# Department of Zoology

## Course Outcomes

### Class: F.Y.B. Sc. Zoology

#### Semester I

#### **Course (Paper) Name and No.: Kingdom Animalia, Wonders of Animal World, Biodiversity and its Conservation**

- CO1 Curiosity will be ignited in the mind of learners, to know more about the fascinating world of animals which would enhance their interest and love for the subject of Zoology.
- CO2 Learner would come to know about basic of systematic and the hierarchy in invertebrates. Learner would have knowledge about different phyla with their respective examples.
- CO3 Learners would appreciate treasure of Biodiversity, its importance and hence would contribute their best for its conservation

#### **Course (Paper) Name and No.: Laboratory safety units and measurement, Instrumentation and Animal biotechnology**

- CO1 Learners would work safely in the laboratory and avoid occurrence of accidents (mishaps) which will boost their scholastic performance and understanding of economy in use of materials/chemicals during practical sessions.
- CO2 Learner would be able to select and operate suitable instruments for the studies of different components of Zoology. Further learner would be skilled in the area of research.
- CO3 Learner would understand the recent advances in the subject, its applications for the betterment of mankind; and that the young minds would be tuned to think out of the box

## Semester II

### **Course (Paper) Name and No.: Laboratory safety units and measurement, Instrumentation and Animal biotechnology**

- CO1 This lesson explores the classification system used to identify animals. This unit is specifically designed to move quickly beyond the knowledge level to high-level thinking.
- CO2 Learners will grasp the concept of interdependence and interaction of physical, chemical and biological factors in the environment and will lead to better understanding about implications of loss of fauna specifically on human being.
- CO3 Learners would be inspired to choose career options in the field of wild life conservation, research, photography and ecotourism.

### **Course (Paper) Name and No.: Laboratory safety units and measurement, Instrumentation and Animal biotechnology**

- CO1 Healthy dietary habits would be inculcated in the life style of learners in order to prevent risk of developing health hazards in younger generation due to faulty eating habits.
- CO2 Learners will be able to promptly recognize stress related problems at initial stages and would be able to adopt relevant solutions which would lead to psychologically strong mind set promoting positive attitude important for academics and would be able to acquire knowledge of cause, symptoms and precautions of infectious diseases

## **Class: S.Y.B. Sc. Zoology**

### **Semester III**

#### **Course (Paper) Name and No.: Fundamentals of Genetics, Chromosomes and Heredity, Nucleic acids**

- CO1 Learner shall comprehend and apply the principles of inheritance to study heredity. Learner will understand the concept of multiple alleles, linkage and crossing over
- CO2 Learner will comprehend the structure of chromosomes and its types. Learner shall understand the mechanisms of sex determination. Learner would be able to correlate the disorders linked to a particular sex chromosome.
- CO3 Learner will understand the importance of nucleic acids as genetic material. The learner shall comprehend and appreciate the regulation of gene expressions.

#### **Course (Paper) Name and No.: Study of Nutrition and Excretion, Respiration and circulation, Control and coordination, Locomotion and Reproduction**

- CO1 Learner would understand the increasing complexity of nutritional, excretory and osmoregulatory physiology in evolutionary hierarchy.
- CO2 Learner would be able to
- CO3 Learner would understand the increasing complexity of respiratory and
- CO4 Learner would be able to correlate the habit
- CO5 Learner would understand the process of control and coordination by nervous and endocrine regulation.
- CO6 Learner would be fascinated by various locomotory structures found in the animal kingdom.
- CO7 Learner would be acquainted with various reproductive strategies present in animals.

## **Course (Paper) Name and No.: Ethology, Parasitology, Economic Zoology**

- CO1 Learners would gain an insight into different types of animal behavior and their role in biological adaptations. Learners would be sensitized to the feelings instrumental in social behavior.
- CO2 Learners would understand the general epidemiological aspects of parasites that affect humans and apply simple preventive measures for the same. Learners would comprehend the life cycle of specific parasites, the symptoms of the disease and its treatment
- CO3 Learners would gain knowledge on animals useful to mankind and the means to make the most of it. Learners would learn the modern techniques in animal husbandry. Learners would be pursuing entrepreneurship as careers

## **Semester IV**

## **Course (Paper) Name and No.: Origin and Evolution of Life, Population and Evolutionary Genetics, Scientific Attitude, Methodology, Scientific Writing and Ethics in Scientific Research**

- CO1 Learner will gain insight about origin of life. Learner will ponder and critically view the different theories of evolution.
- CO2 Learner would understand the forces that cause evolutionary changes in natural populations. Learner would comprehend the mechanisms of speciation. Learner will be able to distinguish between microevolution, macroevolution and megaevolution.
- CO3 The learner shall develop qualities such as critical thinking and analysis.
- CO4 The learner will imbibe the skills of scientific communication and he/she will understand the ethical aspects of research.

**Course (Paper) Name and No.: Cell biology, endomembrane system and biomolecule**

- CO1 Learner would acquire insight of transport mechanisms for the maintenance and composition of cell.
- CO2 Learner would appreciate the intricacy of endomembrane system. Learner would understand the interlinking of endomembrane system for functioning of cell
- CO3 The learner will realize the importance of biomolecules and their clinical significance

**Course (Paper) Name and No.: Comparative Embryology, Aspects of Human Reproduction, Pollution and its effect on organisms**

- CO1 Learner will be able to understand and compare the different pre- embryonic stages
- CO2 Learner will be able to appreciate the functional aspects of extra embryonic membranes and classify the different types of placentae.
- CO3 Learners will able to understand human reproductive physiology.
- CO4 Learners will become familiar with advances in ART and related ethical issues
- CO5 The learners will be sensitized about the adverse effects of pollution and measures to control it

# Department of Botany

## Course Outcomes

Class: F.Y.B. Sc. Botany

### Semester I

#### Course (Paper) Name and No.: Plant Diversity I

- CO1 Identify and differentiate between the different plant groups.
- CO2 Understand the ecological and economic importance of each of the different plant groups.
- CO3 Describe general characteristics of Class Cyanophyceae and Chlorophyceae and write down lifecycle of *Nostoc* and *Spirogyra*
- CO4 Describe general characteristics of Class Phycomycetae and write down lifecycle of *Saprolegnia* and *Rhizopus*.
- CO5 Describe general characteristics of Class Hepaticae and write down lifecycle of *Riccia*

#### Course (Paper) Name and No.: Form and Function I

- CO1 Describe eukaryotic plant cell.
- CO2 Describe the ultrastructure of cell wall, cell membrane, mitochondria, chloroplast and endoplasmic reticulum.
- CO3 Understand the concept of ecosystem, food chain, food web, and energy flow.
- CO4 Identify and study the characteristics of different terrestrial and aquatic ecosystems
- CO5 Understand concepts in Mendelian genetics.
- CO6 Understand concepts in non-mendelian genetics, epistasis and multiple allelism.

## Semester II

### Course (Paper) Name and No.: Plant Diversity I

- CO1 Identify and differentiate between the different plant groups.
- CO2 Understand the ecological and economic importance of each of the different plant groups.
- CO3 Describe stelar evolution; write down general characteristics of Pteridophytes and lifecycle of *Nephrolepis*.
- CO4 Identify general characteristics of Class Cycadophyta and write down lifecycle of *Cycas*.
- CO5 Describe inflorescence morphology and write down general characteristics, leaf morphology, diagnostic features and economic importance of angiospermic families Cruciferae, Apocynaceae, Euphorbiaceae and Amaryllidaceae.

### Course (Paper) Name and No.: Form and Function I

- CO1 Describe the simple permanent tissues.
- CO2 Describe the epidermal tissue system, epidermal appendages and primary structure of dicot and monocot root, stem and leaf.
- CO3 Understand the concept of water potential, solute potential, matric potential and pressure potential.
- CO4 Understand enzyme inhibition, kinetics and mechanism of enzyme action and write down classification of enzymes.
- CO5 Understand concepts of primary and secondary metabolites.
- CO6 Write down the sources, parts used, active constituents and medicinal uses of adulsa, tulsi, ginger, turmeric, sandalwood and aloe.

## Class: S.Y.B. Sc. Botany

### Semester III

#### Course (Paper) Name and No.: Plant Diversity II

- CO1 Describe the general characters of division Phaeophyta and write down the life cycle of *Sargassum*
- CO2 Describe the general characters of Class Anthocerotae and Class Musci and write down the systematic position and life cycle of Anthoceros and Funaria.
- CO3 Understand the relation between Taxonomy and Anatomy, Palynology, Embryology, Ecology, Cytology and Phytochemical constituents and write down the objectives of plant systematics and nomenclature.
- CO4 Describe the morphological and diagnostic characteristics and economic importance of Families Leguminosae, Asteraceae, Amaranthaceae and Palmae.
- CO5 Understand concepts of modern techniques of studying plant diversity such as wet and dry preservation and light and electron microscopy.
- CO6 Understand the concepts of paper and thin-layer chromatography and electrophoresis

#### Course (Paper) Name and No.: Form and Function II

- CO1 Describe the ultrastructure and functions of Mitochondria, Microbodies and Ribosomes.
- CO2 Understand cell division, its significance and the types and structure of nucleic acids.
- CO3 Describe chromosomal aberrations and different methods of sex determination, sex linked, sex influences and sex limited traits.
- CO4 Understand the concept of extra-chromosomal inheritance.
- CO5 Describe DNA replication in prokaryotes and eukaryotes.
- CO6 Describe transcription of RNA and post transcriptional processing

## Course (Paper) Name and No.: Current Trends in Plant Sciences I

- CO1 Describe Indian Pharmacopoeia, Indian herbal Pharmacopoeia, Ayurvedic pharmacopoeia of India and monographs.
- CO2 Understand the different secondary metabolites, seasonal and regional variations and adulterants.
- CO3 Describe outline of forest types in India, agroforestry, organic farming, urban forestry and Silviculture.
- CO4 Understand the sources, types and uses of fibres and spices and condiments.
- CO5 Describe aromatherapy and nutraceuticals.
- CO6 Describe plant enzyme based industry and biofuels.

## Semester IV

### Course (Paper) Name and No.: Plant Diversity II

- CO1 Describe general characters of class Ascomycetae and write down life cycle of *Xylaria* and *Erysiphe* and causal organism, symptoms, disease cycle and control measures of powdery mildew and late blight of potato.
- CO2 Understand the classification, structure, reproduction and ecological and economic importance of lichens.
- CO3 Describe general characters of division Psilophyta and Lepidophyta and understand the life cycle of *Selaginella*.
- CO4 Understand the concept of Palaeobotany with respect to geological time scale, types of fossils and structure of *Rhynia*.
- CO5 Describe the salient features, classification upto orders and economic importance of Coniferophyta; and write down the systematic position and lifecycle of *Pinus*.
- CO6 Describe the structure and systematic position of form genus *Cordaites*

## **Course (Paper) Name and No.: Form and Function II**

- CO1 Describe normal secondary growth in dicot root and stem and mechanical tissue system.
- CO2 Understand different types of vascular bundles.
- CO3 Understand respiration and photorespiration.
- CO4 Understand the concept of photoperiodism and vernalization.
- CO5 Describe carbon, nitrogen and water cycles
- CO6 Describe soil as an edaphic factor and qualitative and quantitative characters of community.

## **Course (Paper) Name and No.: Current Trends in Plant Sciences I**

- CO1 Describe the different garden features.
- CO2 Understand the concept of different types of gardens, formal and informal.
- CO3 Describe plant tissue culture with reference to organogenesis, totipotency, embryo, root, meristem and anther culture.
- CO4 Understand the concept of gene cloning with reference to enzymes and vectors used in gene cloning
- CO5 Describe Chi square test and coefficient of correlation.
- CO6 Describe the concept of Bioinformatics.

# Department of Mathematics

## Course Outcomes

### Class: F.Y.B. Sc. Mathematics

#### Semester I

#### Course (Paper) Name and No.: Calculus & Paper I

- CO1 Define real number system, properties of real numbers and Arithmetic Mean-Geometric Mean, applications of Hausdroff & Archimedean property
- CO2 Define different types of sequence and subsequence.
- CO3 Define differential equation, order and degree, ordinary differential equation.
- CO4 Verify the conditions of existence and uniqueness theorem.
- CO5 Identify different types of differential equation and solve them using appropriate methods.
- CO6 Define homogeneous and non-homogeneous differential equations.

#### Course (Paper) Name and No.: Algebra & Paper I

- CO1 Explain statements and logic and various methods of proof.
- CO2 Define a set and explain the basic concept of set theory such as union, intersection and complement.
- CO3 Define relations, equivalence relations and determine if a relation is an equivalence relation and find the corresponding equivalence class.
- CO4 Well-ordering property, Induction theorems, Binomial theorem, prime numbers, divisibility, properties of integers
- CO5 Define congruence modulo relation, its properties and applications

## Semester II

### Course (Paper) Name and No.: Calculus & Paper I

- CO1 Define continuity and sequential continuity and limits of real valued functions, discontinuous functions and removable discontinuity.
- CO2 Algebra of limits, continuous functions and differentiability, properties of continuous functions
- CO3 Define differentiation at a point and an open set, chain rule to find derivative of composite functions
- CO4 Apply chain rule to find derivative of composite functions.
- CO5 Determine local maxima, local minima, stationary points using second derivative test.
- CO6 Define higher order derivatives and various methods to find derivatives.

### Course (Paper) Name and No.: Algebra & Paper I

- CO1 Solving linear systems using matrices and different methods like Gaussian elimination, Gauss Seidal, finding parametric equations
- CO2 Finding symmetries and permutations
- CO3 Finding roots of the polynomials by using different method and applications of polynomial

## **Class: S.Y.B. Sc. Mathematics**

### **Semester III**

#### **Course (Paper) Name and No.: Calculus-III & Paper I**

- CO1 Define Functions of several variables, limits and continuity.
- CO2 Define Differentiability of a scalar field at a point
- CO3 Applications of Functions of several variables

#### **Course (Paper) Name and No.: Algebra-III & Paper II**

- CO1 Define Linear Transformations & Matrices and the relation between them
- CO2 Finding determinant by using different form of definitions and applications
- CO3 Inner Product Spaces and properties

#### **Course (Paper) Name and No.: Discrete Mathematics & Paper III**

- CO1 Define permutation, combination, recurrence relation and solving problems by using different methods
- CO2 Define finite, countable, uncountable sets and preliminary counting
- CO3 Binomial and multinomial theorem, circular permutations
- CO4 Principle of inclusion, exclusion and its applications, derangements and its applications

### **Semester IV**

#### **Course (Paper) Name and No.: Calculus-IV & Paper I**

- CO1 Define Upper/Lower Riemann sums and properties, Upper/Lower integrals, Definition of Riemann integral on a closed and bounded interval, Criterion of Riemann integrability,
- CO2 Define Indefinite and improper integrals
- CO3 Applications of Riemann and definite integrals

### **Course (Paper) Name and No.: Algebra-IV & Paper II**

- CO1 Define group, abelian group, order of a group, subgroups, finite and infinite groups
- CO2 Define Cyclic groups and cyclic subgroups
- CO3 Applications of Lagrange's Theorem and Group homomorphism

### **Course (Paper) Name and No.: Ordinary Differential Equation & Paper III**

- CO1 Solving first order First degree Differential equations
- CO2 Solving second order Linear Differential equations
- CO3 Solving linear System of Ordinary Differential equations

# Department of Physics

## Course Outcomes

Class: F.Y.B. Sc. Physics

### Semester I

#### Course (Paper) Name and No.: Classical Physics, Basic Electrodynamics, Thermodynamics

- CO1 Understand Newton's laws and apply them in calculations of the motion of simple systems.
- CO2 Use the free body diagrams to analyse the forces on the object.
- CO3 Understand the basic mathematical concepts and applications of them in physical situations
- CO4 Apply the laws of thermodynamics to formulate the relations necessary to analyze a thermodynamic process

#### Course (Paper) Name and No.: Physics-2

- CO1 At the end of the course learners will understand various aspects of nuclear physics and the importance of nuclear energy as an alternative source of energy.
- CO2 Learners will also learn about the application of AC circuits and bridges in various electronic circuits

## Semester II

### Course (Paper) Name and No.: Optics, Mathematical physics, Wave Motion

- CO1 Able to explain natural physical processes related to light waves
- CO2 Use of understanding application of basic differential equation in various circuits
- CO3 Able to differentiate the transverse and spherical waves
- CO4 Able to apply superposition principle for various harmonic oscillations

### Course (Paper) Name and No.: Physics-2

- CO1 After the completion of the course learners will get knowledge about Quantum Physics, Geophysics, and Electrodynamics.
- CO2 This course will also develop the skills among the learners to handle D.C. circuits and Digital Circuits.

## **Class: S.Y.B. Sc. Physics**

### **Semester III**

#### **Course (Paper) Name and No.: Physics-1**

- CO1 Learners will have a detailed theoretical and mathematical understanding of different kinds of oscillatory motions and their applications.
- CO2 Learners will understand all the laws of thermodynamics and their applications.
- CO3 Learners will have detailed knowledge about the construction, working and the efficiency of different heat engines.
- CO4 Learners will be able to understand thermodynamical phenomenon at low temperatures.

#### **Course (Paper) Name and No.: Vector Calculus, Analog Electronics**

- CO1 Understand learners the basic concepts of Mathematical physics and their applications in physical situations
- CO2 Understand the basics of transistor biasing, Op-Amp and their applications
- CO3 Understand different types of oscillator and find its frequency.

#### **Course (Paper) Name and No.: Physics-3**

- CO1 After the completion of the course learners will understand the Factors affecting Acoustics and use of fibre in optical communication.
- CO2 learners will also understand the different types of crystal structures

## Semester IV

### Course (Paper) Name and No.: Physics-1

- CO1 Learners will understand various natural phenomenons related to light.
- CO2 Learners will understand how binary data is stored and transferred using data storage and data transfer devices

### Course (Paper) Name and No.: Quantum Mechanics, Physics-2

- CO1 Able to understand the postulate of Quantum Mechanics
- CO2 Use of Quantum Mechanics , its relevance in explaining significant phenomena in Physics

### Course (Paper) Name and No.: Physics-3

- CO1 After the completion of the course learners will understand the internal structure of the earth in detail.
- CO2 After the completion of the course learners will develop the skill of programming using microprocessor 8085 and learners will also understand the various modulation techniques used in the communication system

## Programme- M.Sc.

### Department of Chemistry

#### Programme Outcome

- PSO1 Knowledge: develop knowledge, understanding and expertise in their chosen field of chemical science.
- PO2 Green Approach: awareness about usage of environmental methodologies
- PO3 Analytical Approach: develop critical thinking and problem solving ability with accuracy and valid reasoning
- PO4 Effective communication: develop ability to analyse, interpret and communicate effectively the ideas, knowledge and information orally, written, electronically and through media
- PO5 Social responsibility: understanding of socially relevant aspects of the subjects, application of knowledge for sustainable development, awareness about environmental and health safety
- PO6 Ethics: understand the different values and moral dimensions associated with knowledge, decisions and related responsibility
- PO7 Personality development: build the personality of an individual as a responsible citizen, scientist, academician, industrialist, team leader, team member, social personality

## Course Outcomes

### Class: M.Sc. I Chemistry

### Semester I

#### Course (Paper) Name and No.: Physical Chemistry

- CO1 Memorize concept Maxwell equations, Maxwell thermodynamic Relations; it's significance
- CO2 Understand Joule Thomson coefficient in terms of van der Waals constants.
- CO3 Apply Third law of Thermodynamics to find out absolute entropy
- CO4 Know Classical Mechanics, failure of classical mechanics: Need for Quantum Mechanics
- CO5 Understand Schrödinger wave equation as the eigen value equation of the Hamiltonian operator
- CO6 Apply of quantum mechanics for Particle in a one, two- and three-dimensional box
- CO7 Define and understand basic terms of Chemical Dynamics i.e. rate constant, order of reaction, molecularity of reaction.
- CO8 Compare Composite Reactions and Polymerization reactions
- CO9 Explain Reaction in Gas Phase i.e. Unimolecular Reactions: Lindeman-Hinshelwood theory, Rice-Ramsperger-Kassel (RRK) theory.
- CO10 Understand basics terms involved of electrochemistry
- CO11 Derive Debye-Hückel limiting law and its extension to higher concentration
- CO12 Explain the Validity of this equation for aqueous and non- aqueous solution
- CO13 Know the working of Batteries: Alkaline fuel cells, Phosphoric acid fuel cells, High temperature fuel cells [Solid –Oxide Fuel Cells (SOFC) and Molten Carbonate Fuel Cells]

#### Practical's

- CO1 Handle and Understand principles of different instruments like Potentiometry, Conductometry, pH Metry.

- CO2 Determine the heat of solution of sparingly soluble acid.
- CO3 Determine thermodynamic solubility product and solubility product of Calcium Sulphate and calcium Hydroxide respectively
- CO4 From graphical representation identify functions are acceptable or non- acceptable

### **Course (Paper) Name and No.: Organic Chemistry**

- CO1 Students will able to learn Thermodynamic and kinetic requirements of a reaction rate and equilibrium constants, reaction coordinate diagram, transition state (activated complex), nature of activated complex,
- CO2 Hammond postulate, Reactivity vs selectivity, Curtin-Hammett Principle, Microscopic reversibility,
- CO3 Kinetic vs thermodynamic control of organic reactions.
- CO4 Students will able to understand different methods used for detection of mechanism of reaction.
- CO5 Product analysis, kinetic studies, use of isotopes (Kinetic isotope effect – primary and secondary kinetic isotope effect).
- CO6 Detection and trapping of intermediates, crossover experiments and stereo chemical evidence.
- CO7 Student can able to learn Factors affecting acidity and basicity: Electronegativity and inductive effect, resonance, bond strength, electrostatic effects, hybridization, aromaticity and solvation.
- CO8 Comparative study of acidity and basicity of organic compounds on the basis of pKa values, Leveling effect and non-aqueous solvents.
- CO9 Acid and base catalysis – general and specific catalysis with examples
- CO10 Knowledge of  $SN^1$  and  $SN^2$  reaction with mechanism
- CO11 Understands factors affecting reaction substrate
- CO12 Gains Knowledge of Hard- Soft interaction
- CO13 Understand Ambient nucleophiles

- CO14 Understand benzyne mechanism
- CO15 Understand  $S_NAr$  and  $S_NAr^1$
- CO16 understand Tele and vicarious substitution
- CO17 Understands mechanism of acid and base catalysed ester hydrolysis with suitable example
- CO18 Discuss NMR characteristics of aromatic systems
- CO19 Understanding of Delocalization and aromaticity
- CO20 Give thermochemical and magnetic criteria for aromaticity.
- CO21 Understand the Chirality and Recognition of symmetry elements.
- CO22 Explain Molecules with tri- and tetra-coordinate centers: Compounds with carbon, silicon, nitrogen, phosphorous and sulphur chiral centers, relative configurational stabilities
- CO23 Discuss Molecules with two or more chiral centers
- CO24 Explain  
Constitutionally unsymmetrical molecules: erythro-threo and syn-anti systems of nomenclature
- CO25 Discuss Interconversion of Fischer, Sawhorse, Newman and Flying wedge projections
- CO26 Appreciate important of: Constitutionally symmetrical molecules with odd and even number of chiral centers: enantiomeric and meso forms, concept of stereogenic, chirotopic, and pseudoasymmetric centres.
- CO27 Discuss . R-S nomenclature for chiral centres in acyclic and cyclic compounds.
- CO28 Understand Axial and planar chirality: Principles of axial and planar chirality
- CO29 Appreciate configurational descriptors (R,S) of compounds: allenes, alkylidene cycloalkanes, spirans, biaryls (buttressing effect) (including BINOLs and BINAPs), ansa compounds, cyclophanes, trans-cyclooctenes.
- CO30 Describe . Prochirality: Chiral and prochiral centres; prochiral axis and prochiral plane
- CO31 Understand Homotopic, heterotopic ligands and faces. Identification using substitution and symmetry criteria. Nomenclature of stereoheterotopic ligands and faces

- CO32 Explain i) one or more prochiral centres ii) a chiral as well as a prochiral centre, iii) a prochiral axis iv) a prochiral plane v) pro-pseudoasymmetric centre. Symbols for enantiotopic and diastereotopic faces.
- CO33 Define oxidation and reduction.
- CO34 Explain dehydrogenation of C-C bond
- CO35 Write down mechanism and selectivity of oxidation reactions
- CO36 Understand oxidation of alcohol to aldehyde and ketones
- CO37 Explain oxidation of aldehyde using peroxide.
- CO38 Explain selectivity and mechanism of birch reduction.
- CO39 Understand reduction by using metals.
- CO40 Explain mechanism of wolf kishner reduction and Clemensens Reduction.

#### **Practical's**

- CO1 Understand practical aspect of preparation of organic compounds.
- CO2 Able to do planning of organic synthesis.
- CO3 Can write down reactions.
- CO4 Understand purification of organic compound by recrystallization, sublimation etc.
- CO5 Perform thin layer chromatography for checking Purity of product.
- CO6 Able to take melting point of the product.

#### **Course (Paper) Name and No.: Analytical Chemistry**

- CO1 Student will get an idea about basics of Analytical chemistry, quality management system, safety in laboratories, accreditation processes and GLP
- CO2 Student will understand the concept of chemical calculations, which used in estimation concentration, pH, solubility constant of various solution
- CO3 Student will understand the principle, instrumentation and applications of various types of spectroscopic techniques
- CO4 Student will learn the principle of different thermal analytical method (i.e. TGA, DTA and DSC).

### **Practical's**

- CO1 Student will learn non-instrumental methods of quantitative estimation
- CO2 Students will get practical knowledge for determination of various parameters related to ion exchange chromatography
- CO3 Students will learn treatment and interpretation of analytical data

## **Semester II**

### **Course (Paper) Name and No.: Physical Chemistry**

- CO1 Understand Fugacity of real gases, Determination of fugacity of real gases
- CO2 Explain Real solutions: Chemical potential in non-ideal solutions excess functions of non-ideal solutions
- CO3 Write note on Hydrolysis of ATP, synthesis of ATP from ADP.
- CO4 Know Rigid rotor, spherical coordinates Schrödinger wave equation in different terms
- CO5 Derive expressions for the total wave function for 1s, 2s, 2p and 3d orbitals of hydrogen.
- CO6 Write Hückel Molecular Orbitals theory for ethylene, 1,3-butadiene and benzene.
- CO7 Know enzyme action on rate of reaction.
- CO8 Explain Inhibition of Enzyme action: Competitive, Non-competitive and Uncompetitive Inhibition. Effect of pH, Enzyme activation by metal ions, Regulatory enzymes
- CO9 Explain Reaction in Gas Phase i.e. Unimolecular Reactions: Lindeman-Hinshelwood theory, Rice-Ramsperger-Kassel (RRK) theory.
- CO10 Explain Gibbs Phase rule, Two component system, Three component system
- CO11 Apply types of Defects and Stoichiometry in Research

### **Practical's**

- CO1 Handle and Understand principles of different instruments like Potentiometry, Conductometry, pH Metry and colorimeter
- CO2 Study Phase diagram of three component system.
- CO3 With the help of Dilatometer determine rate constant of decomposition reaction of diacetone alcohol.

CO4 From graphical representation identify Shape of Orbitals.

### **Course (Paper) Name and No.: Organic Chemistry**

- CO1 Understands regioselectivity in enolate formation
- CO2 Gain knowledge of alkylation of enolates
- CO3 Understands alkylation of aldehyde, ketone, esters, amide, nitrile, enamines and imines.
- CO4 Understand Michael reaction.
- CO5 Give mechanism for acid and base catalysed aldol condensation
- CO6 Understand mixed aldol condensation with aromatic aldehyde
- CO7 understand mannich reaction
- CO8 understand Knoevenagel reaction
- CO9 Understand the mechanism of different name reactions like Mc Murry coupling, Baylis- Hilman reaction, Nef Reactions etc.
- CO10 Explain cationic rearrangements like pummerer rearrangements, rupe rearrangements etc.
- CO11 Describe the stereochemistry of hofmann and pyne rearrangement.
- CO12 Write down applications of wittig reactions.
- CO13 Explain Tiffeneu- Demjanov rearrangement.
- CO14 Students can able to draw of  $\pi$  MOs of ethylene, butadiene, 1, 3, 5-hexatriene, allyl cation, anion and radical. Concept of nodal planes and energies of  $\pi$ -MOs.
- CO15 Students can able to identify hard and soft reactive sites on the basis of MOs.
- CO16 Students can able to understands Applications of FMO concepts in (a) SN2 reaction, (b) Lewis acid base adducts (BF<sub>3</sub>-NH<sub>3</sub> complex), (c) ethylene dimerization to butadiene, (d) Diels-Alder cycloaddition, (e) regioselective reaction of allyl cation with allyl anion (f) addition of hydride to formaldehyde.
- CO17 Students will learn about the Principle and applications of ultraviolet spectroscopy.
- CO18 To understand the infra-red spectroscopy in organic structure determination

- CO19 Students can able to learn Factors affecting the position and intensity of UV bands – effect of conjugation, steric factor, pH, and solvent polarity.
- CO20 Calculation of absorption maxima for above classes of compounds by Woodward-Fieser rules (using Woodward-Fieser tables for values for substituents).
- CO21 To learn about the Principle and applications of Infrared spectroscopy.
- CO22 Factors affecting vibrational frequency (atomic weight, conjugation, ring size, solvent and hydrogen bonding).
- CO23 Students can able to read IR spectra.
- CO24 Characteristic vibrational frequencies for alkanes, alkenes, alkynes, aromatics, alcohols, ethers, phenols, amines, nitriles and nitro compounds.
- CO25 Detailed study of vibrational frequencies of carbonyl compounds, aldehydes, ketones, esters, amides, acids, acid halides, anhydrides, lactones, lactams and conjugated carbonyl compounds

#### **Practical's**

- CO1 Able to identify chemical type of component present in binary mixture.
- CO2 Able to separate components from binary mixture.
- CO3 Can perform fractional distillation.
- CO4 Can purify organic compounds by recrystallization method.
- CO5 Can identify the functional group of organic compound.
- CO6 Able to take melting point of separated components.

#### **Course (Paper) Name and No.: Analytical Chemistry**

- CO1 Student will get conversant with advanced separation techniques and theoretical aspects involved
- CO2 Student will learn advanced spectroscopic techniques (i.e. X-ray spectroscopy, mass spectrometry etc.)
- CO3 Student will study of detail principle, instrumentation and applications of surface techniques of analysis
- CO4 Student will understand the concept of various types of electro-analytical techniques

### **Practical's**

CO1 Students will perform various instrument based analysis

CO2 Students will learn different methods of spectrophotometric determination

CO3 Students will learn graphical interpretation of data

# Programme – M.Sc. II Analytical Chemistry

## Programme Specific Outcome:

- PSO1 Students will have a strong foundation in the fundamentals and application of various theoretical concepts in Analytical, Inorganic, Organic and Physical Chemistry
- PSO2 Students will learn advanced characterization techniques by gaining the knowledge of spectroscopy, chromatography, electroanalytical methods, hyphenated techniques and chemistry of synthetic and natural products
- PSO3 Student will learn the usage of analytical instruments, select, and apply appropriate techniques and resources for the analysis
- PSO4 Students will demonstrate their laboratory skills in qualitative, quantitative, separation and advanced instrumental methods
- PSO5 Students will identify the need of IPR by integrating the knowledge of total quality management, GLP and GMP
- PSO6 Research ability will be developed as the students get skilled to problem solving, critical thinking and analytical reasoning as applied to scientific problems
- PSO7 The ability to communicate scientific information in written, oral and electronic formats will be developed among students
- PSO8 Students will be able to learn application of various softwares for interpretation and representation of results

## Course Outcomes

### Class: M.Sc. II Analytical Chemistry

#### Semester III

#### Course (Paper) Name and No.: Analytical Chemistry I

- CO1 Students will understand theoretical aspects of sampling, pre-treatment and method validation
- CO2 Student will get knowledge of how to measure uncertainty in measurements, dealing with signal to noise ratio and legislator aspects of pharmaceutical industries
- CO3 Students will learn the principle of different separation techniques and their applications in various fields

#### Practical's

- CO1 Students will learn the instrument based analysis of various types of samples
- CO2 Students will learn graphical representation of the data

#### Course (Paper) Name and No.: Analytical Chemistry II

- CO1 Student will help to understand the theoretical concepts of surface analytical techniques
- CO2 Student will understand advanced spectroscopic techniques used for characterization of matter
- CO3 Students will get detailed insights of advanced electroanalytical techniques
- CO4 Student will find applications of chemiluminescence, ORD-CD, Photoacoustic spectroscopy in analytical chemistry

#### Practical's

- CO1 Students will learn the various analytical techniques for pharmaceutical analysis
- CO2 Students will get acquainted with the analysis of biological samples

### **Course (Paper) Name and No.: Analytical Chemistry III**

- CO1 Student will learn bioanalytical techniques of analysis
- CO2 Student will understand the immunological methods & theoretical basic of methods.
- CO3 Student will get general idea about food processing, food preservation and determination of food contaminant etc
- CO4 Student will understand technique use in food packaging and food analysis

#### **Practical's**

- CO1 Students will perform practical's based upon food analysis
- CO2 Students will understand data acquisition and analysis

### **Course (Paper) Name and No.: Analytical Chemistry IV**

- CO1 Student will learn different aspects of analysis of air pollutants
- CO2 Student will understand the quality and requirement of potable water of bore well and bottle mineral water
- CO3 Student will study the details of sources and hazardous of soil pollutant, noise pollutant, thermal pollutant, radioactive pollutant etc
- CO4 Student will do the detail study of insecticides, pesticides, soaps, detergents and petrochemical products and their effects on environment
- CO5 Student will get general idea regarding the pharmaceutical analysis and quality control methods of pharmaceutical industry
- CO6 Student will know the details of drug analysis on the basis of functional groups and other factors
- CO7 Student will understand the applications of analytical chemistry in forensic science
- CO8 Student will learn the various aspects of cosmetic industry and analysis of different type cosmetics.

#### **Practical's**

- CO1 Students will perform the metallurgical analysis
- CO2 Students will deal with the experiments related with environmental pollution

## Semester IV

### Course (Paper) Name and No.: Analytical Chemistry I

- CO1 Student will learn details of various separation processes
- CO2 Student will study the separation, analysis and standardization of herbal based products
- CO3 Student will get conversant with the principle, advantages and challenges of green chemistry
- CO4 Student will understand the concept of electrophoresis in analysis and basics of nanotechnology

#### Practical's

- CO1 Student will understand the use of instrumental methods for the analysis of metallurgical samples as well as other samples

### Course (Paper) Name and No.: Analytical Chemistry II

- CO1 Student will do the detail study of principle, instrumentation and applications of NMR spectroscopy
- CO2 Student will understand the detail concept of mass spectroscopy and Raman spectroscopy
- CO3 Student will learn principle and interfacing of radio analytical techniques and hyphenated thermal methods
- CO4 Student will know the detail concept of hyphenated techniques including GC-MS, GC-IR, LC-MS, HPLC-MS etc

#### Practical's

- CO1 Student will learn the quantitative estimation of pharmaceutical products
- CO2 Students will get knowledge of quality control methods and understand the importance of accuracy

### **Course (Paper) Name and No.: Analytical Chemistry III**

- CO1 Student will learn the different aspects of effluent treatment
- CO2 Student will understand steps involved in solid waste management
- CO3 Student will get an idea about classifications and applications of plastics, polymer, paints and pigments and their environmental impact
- CO4 Student will study metallurgical analysis

#### **Practical's**

- CO1 Students will learn quantitative estimation of various types of food samples

### **Course (Paper) Name and No.: Analytical Chemistry IV**

- CO1 Student will learn about details intellectual property
- CO2 Student will get knowledge of intellectual property rights (IPR).
- CO3 Student will understand concepts in cheminformatics
- CO4 Student will learn the drug designing and traits in it
- CO5 Student will learn every aspect of publication of research paper such as terms associated with journals, referencing and library resources
- CO6 Student will get conversant with the methods of data analysis and various softwares employed for it
- CO7 Student will get knowledge of actual writing scientific papers
- CO8 Student will get information of the safety and ethical handling of chemicals

#### **Practical's**

- CO1 Student will actually get involved in research work
- CO2 Student will understand the analysis of data generated by their research work
- CO3 Student will learn how to present research work

# Programme – M.Sc. II Organic Chemistry

## Programme Specific Outcome

- PSO1 PSO1: Develop analytical thinking and apply the same for understanding principles, proposing mechanism and logical conclusions.
- PSO2 PSO2: Comprehensive understanding of the interdisciplinary nature of Chemistry and emerging trends in Chemistry.
- PSO3 PSO3: Enormous employment opportunities at Research and Development as well as synthetic division of chemical, pharmaceutical, dyestuff and food industries.
- PSO4 PSO4: Competency in design and planning of synthesis and carry out with Good Laboratory Practices.
- PSO5 PSO5: Access, search and use of chemical literature and acquiring necessary skills to succeed in research and advance studies.
- PSO6 PSO6: Research opportunities to pursue Ph.D. programme.
- PSO7 PSO7: Competency in handling instruments and interpretation of spectral data for structure determination of organic compounds

## Course Outcomes

### Class: M.Sc. II Organic Chemistry

#### Semester III

#### Course (Paper) Name and No.: Organic Chemistry I

- CO1 Describe organic reactive intermediates.
- CO2 Explain neighbouring group participation.
- CO3 Understand hard and soft electrophiles and nucleophiles.
- CO4 Explain pericyclic reactions.
- CO5 Understand Woodward- Hoffmann rules.
- CO6 Understand Huckel and Mobius Method.
- CO7 Can draw molecular orbital diagram for ethylene, 1, 3- butadiene etc.
- CO8 Describe correlation diagrams.
- CO9 Define pericyclic reactions.
- CO10 Explain supra and antra facial interactions.
- CO11 Understand cheletropic reactions.
- CO12 Explain Cycloaddition reaction.
- CO13 Describe sigmatropic rearrangements
- CO14 Understand the Classification of point groups based on symmetry elements with eg.
- CO15 Explain Conformational analysis of medium rings: Eight to ten membered rings and their unusual properties, I-strain, transannular reactions.
- CO16 Discuss Stereochemistry of fused ring and bridged ring compounds: decalins, hydrindanes, perhydroanthracenes, steroids, and Bredt's rule.
- CO17 Explain Anancomeric systems, Effect of conformation on reactivity of cyclohexane derivatives in the following reactions (including mechanism): electrophilic addition, elimination, molecular rearrangements
- CO18 Appreciate importants of: reduction of cyclohexanones (with  $\text{LiAlH}_4$ , selectride and MPV reduction) and oxidation of cyclohexanols.

- CO19 Explain principle of photochemistry.
- CO20 Describe photochemistry of carbonyl compounds.
- CO21 Write mechanism of Norrish-I, Norrish-II, Paterno-Buchi reaction, Barton reaction.
- CO22 Understand photochemistry of olefins.
- CO23 Explain photochemistry of arenes

#### **Practical's**

- CO1 Will able to identify chemical type of component present in ternary mixture.
- CO2 Will able to separate components from ternary mixture.
- CO3 Can perform fractional distillation.
- CO4 Can purify organic compounds by recrystallization method.
- CO5 Can identify the functional group of organic compound.
- CO6 Will able to take melting point of separated components.

#### **Course (Paper) Name and No.: Organic Chemistry II**

- CO1 Identify the name of reaction.
- CO2 Predict the mechanism of given reaction.
- CO3 Classify the reactions into different types.
- CO4 Predict the product of given reaction.
- CO5 Compare the different name reactions.
- CO6 Explain the reaction with mechanism.
- CO7 List the applications of reaction.
- CO8 Plan and use the chemical reactions for the synthesis of different compound.
- CO9 Define radicals and radical reactions.
- CO10 Define hyper conjugation and recognize its influence on radical stabilities and the relative ease of radical formation
- CO11 Recognize the interrelationships between the three stages of radical chain reaction mechanisms: initiation, propagation, and termination

- CO12 Predict results of alkane halogenation reactions on the basis of concepts of reactivity and selectivity.
- CO13 Analyze reactions for practical and synthetic utility.
- CO14 Explain generation and application in organic synthesis with mechanistic pathway of enamines.
- CO15 Understand the comparison between enamines and enolates.
- CO16 Explain preparation application along with their stereochemical aspects for phosphorus, sulphur and nitrogen ylides.
- CO17 Write mechanism of Wittig reaction, Horner-Wadsworth-Emmons reaction, Barton-Kellogg olefination.
- CO18 Describe  $\alpha$ -CH functionalization by nitro, Sulfoxide, sulfone and phosphonate group.
- CO19 Explain Bamford-Stevens reaction, Julia olefination and its modification
- CO20 Explain regiochemistry of oxymercuration and demercuration of alkene.
- CO21 Explain mechanism of hydroboration of alkene using hydroborating agent.
- CO22 Write down preparation of alkyl silanes, aryl silane and allyl silanes.
- CO23 Write down applications of silyl enol ethers.
- CO24 Explain application of organotin compounds in replacement of halogen by hydrogen.
- CO25 Write down preparation of selenols

### **Practical's**

- CO1 Will understand practical aspect of preparation of organic compounds.
- CO2 Will be able to do planning of organic synthesis.
- CO3 Can write down reactions.
- CO4 Will understand principle of steam distillation.
- CO5 Can perform steam distillation
- CO6 Will understand principle of vacuum distillation.
- CO7 Can perform vacuum distillation.
- CO8 Will understand principle chromatography.
- CO9 Can perform column chromatography and thin layer chromatography

## Course (Paper) Name and No.: Organic Chemistry III

- CO1 Classification of carbohydrates and types of naturally occurring sugars.
- CO2 Write down structure elucidation of lactose.
- CO3 Explain structural features of cellulose, chitin, starch and heparin.
- CO4 Write down general structural features and occurrence of carotenoids, quinones, flavones and porphyrins.
- CO5 Write down structure elucidation of  $\beta$ -carotene.
- CO6 Classify the insect pheromones.
- CO7 Write synthesis of bombykol from acetylene.
- CO8 Define alkaloids and structural features and importance of alkaloids
- CO9 Write down structure elucidation of coniine.
- CO10 Write down multistep synthesis of natural products like reserpine, longifoline etc.
- CO11 Understand structure elucidation of prostaglandins.
- CO12 Draw structure of  $JH_2$  and  $JH_3$ .
- CO13 Write down the synthesis of triacontanol.
- CO14 Describe lipids classifications.
- CO15 Write structural features of arylacetic acid and gibberellic acid.
- CO16 Understand proton NMR spectroscopy.
- CO17 Explain long range coupling.
- CO18 Describe nuclear magnetic double resonance.
- CO19 Understand  $^{13}C$ -NMR spectroscopy.
- CO20 Can solve problems based on UV, IR,  $^1H$ NMR and  $^{13}C$ -NMR.
- CO21 Explain DEPT experiment.
- CO22 Understand NOE & NOESY techniques.
- CO23 Understand two dimensional spectroscopic techniques.

## Course (Paper) Name and No.: Organic Chemistry IV

- CO1 Understand the basic terms used in medicinal chemistry.
- CO2 Describe pharmacokinetics.
- CO3 Explain physical and chemical parameter of drug.
- CO4 Write down drug discovery without lead.
- CO5 Explain modifications of lead compound.
- CO6 Understand drug structure – activity relationship.
- CO7 Describe QSAR parameter.
- CO8 Explain Hansch analysis.
- CO9 Explain computer added molecular graphics based drug design.
- CO10 What is reversible and irreversible enzyme based inhibition.
- CO11 Describe design, types and functional group of prodrug.
- CO12 Explain concept and property of soft drug.
- CO13 Give advantages of prodrug use.
- CO14 Synthesis and application of drugs
- CO15 learn about primary and secondary metabolites and the building blocks.
- CO16 Understands the general pathway of amino acids biosynthesis.
- CO17 Synthesize the malonyl CoA, saturated fatty acids, prostaglandins and aromatic polyketides by acetate pathway.
- CO18 Understands, how to do synthesis of shikimic acid, aromatic amino acids by shikimic acid pathway.
- CO19 learn about biosynthesis and mechanism of cinnamic acid and its derivatives, lignin and lignans, benzoic acid and its derivatives, flavonoids and isoflavonoids through shikimic acid or shikimic acid pathway.
- CO20 Explain the synthesis and mechanism of mevalonic acid, monoterpenes – geranyl cation and its derivatives by mevalonate pathway.
- CO21 learn and explain the synthesis and mechanism sesquiterpenes – farnesyl cation and its derivatives by mevalonate pathway.
- CO22 Explain synthesis and mechanism of diterpenes by mevalonate pathway.

- CO23 Understand the basic aspect of green chemistry.
- CO24 Explain preparation of organic compounds by use of green reagents, green catalyst and green solvent.
- CO25 Understand solid state reactions.
- CO26 Describe the use of nanocatalyst in green synthesis.

## **Semester IV**

### **Course (Paper) Name and No.: Organic Chemistry I**

- CO1 Explain linear free energy relationship for determination of organic reaction mechanism.
- CO2 Write Hammett equation and Yukawa-Tsuno equation.
- CO3 Explain taft model.
- CO4 Write Okamoto-Brown equation and Swain-Scott equation
- CO5 Define supramolecular chemistry.
- CO6 Explain host-guest interactions.
- CO7 Describe structure and properties of crown ether.
- CO8 Write down applications of calixarenes.
- CO9 Describe molecular self-assembly
- CO10 Define racemization.
- CO11 Explain methods of resolution of racemic mixture.
- CO12 Explain molecular dissymmetry and chiroptical properties.
- CO13 Explain correlative methods for configurational assignment.
- CO14 Explain methods for determination of enantiomer and diastereomer composition.\
- CO15 Explain principle of asymmetric synthesis.
- CO16 Describe method of asymmetric synthesis.
- CO17 Explain synthesis of L-DOPA.
- CO18 Give cram's rule.
- CO19 Explain Felkin- Anh model.

- CO20 Describe sharpless enantioselective epoxidation.
- CO21 Describe hydroxylation and aminohydroxylation.
- CO22 Explain reduction of prochiral carbonyl compounds and olefins.
- CO23 Explain use of chiral auxiliaries in diastereoselective reductions.
- CO24 Give use of chiral BINOLs, BINAPs.

#### **Practical's**

- CO1 Will understand practical aspect of preparation of organic compounds by two steps.
- CO2 Will able to do planning of organic synthesis.
- CO3 Can write down reactions.
- CO4 Will understand purification of organic compound by recrystallization, sublimation etc.
- CO5 Can perform thin layer chromatography for checking Purity of product.
- CO6 Will able to take melting point of the product.

#### **Course (Paper) Name and No.: Organic Chemistry II**

- CO1 Understand the concept of protection and deprotection in organic synthesis.
- CO2 Explain umpolung i.e. reversal of polarity.
- CO3 Able to do planning of synthesis.
- CO4 Understand the term of retrosynthesis.
- CO5 Explain C-C disconnection of alcohols and alkenes.
- CO6 Write down C-C disconnection of difunctionalized compound, diels-alder reactions and robinson annelation
- CO7 Understand the basics of electro-chemistry.
- CO8 Explain cathodic reduction of aldehyde and ketone.
- CO9 Explain anodic oxidation of alkyl benzene.
- CO10 Write down mechanism of Kolbe reaction.
- CO11 Explain negishi coupling
- CO12 Describe 18 electron rule.
- CO13 Explain role of Palladium in organic synthesis.

- CO14 Write mechanism of olefin metathesis using Grabb's catalyst.
- CO15 Explain application of Ni, Co, Fe, Rh and Cr carbonyls in organic synthesis.
- CO16 Describe application of samarium iodide in reduction of organic halide, aldehyde and ketones,  $\alpha$ -functionalized carbonyl and nitro compounds.
- CO17 Understand the application/role of Ce (IV) in synthesis of heterocyclic quinoxaline derivatives

#### **Practical's**

- CO1 Student will able to interpret spectral data for organic compounds.
- CO2 Student will able to determine the molecular formula of organic compound from 13-rule or by percentage of elements present.
- CO3 Student will able to predict the functional group peaks from IR spectrum.
- CO4 Student can calculate molar absorptivity of compound from U.V spectrum.
- CO5 Student can interpret CMR , PMR and Mass spectrum

### **Course (Paper) Name and No.: Organic Chemistry III**

- CO1 Define steroids.
- CO2 Discuss Structural and stereochemical features of different kinds of steroids.
- CO3 Explain Biological role of steroids.
- CO4 Write synthesis 16-DPA from cholesterol and plant sapogenin.
- CO5 Write synthesis of steroids like androsterone, testosterone etc. from 16-DPA.
- CO6 Write synthesis cinerole, jasmolone, allethrolone, exaltone and muscone.
- CO7 Understand biological importance of vitamins.
- CO8 Write down synthesis of vitamins.
- CO9 Write down structural elucidation of penicillin-G
- CO10 Write synthesis of pyrethrin-I.
- CO11 Understand Classification of terpenoids
- CO12 Student will able to do nomenclature of heterocyclic compounds.
- CO13 Student will understand structure, reactivity and synthesis of important heterocyclic compounds.

- CO14 Students will be able to do naming of fused heterocyclic compounds.
- CO15 Students will understand nucleophilic ring opening reactions of 3 and 4 membered heterocyclic compounds

### **Course (Paper) Name and No.: Organic Chemistry**

- CO1 Student will learn every aspect of publication of research paper such as terms associated with journal, referencing and library resources.
- CO2 Student will get conversant with the methods of data analysis and various softwares employed for it.
- CO3 Students will get knowledge of actual writing scientific papers.
- CO4 Students will get information of the safety and ethical handling of chemicals

### **Project Evaluation**

- CO1 Student will actually get involved in research work.
- CO2 Student will understand the analysis of data generated by their research work.
- CO3 Student will learn how to present research work.

# Department of Microbiology

## Programme Specific Outcome:

- PSO1 The program is aimed at equipping the students with basic knowledge in various branches of Microbiology such as Microbial Genetics, Molecular Biology, Virology, Medical Microbiology, Immunology, Microbial Biochemistry, Environmental Microbiology, Advances in Biotechnology and Industrial (food, pharmaceutical) Microbiology. Additionally, it also makes students aware of interdisciplinary sciences such as Bioinformatics and Bioinstrumentation
- PSO2 At the end, student will have employability in food industry, pharmaceutical industry, Agricultural industry and fishery. Students will work as microbiologist in Research, QC, QA and production departments
- PSO3 Students will develop basic understanding of the subject and will have developed life skills to solve environmental and hygiene related problems

## Course Outcomes

### Class: M. Sc. I Microbiology

#### Semester I

#### Course (Paper) Name and No.: Cell Biology and Virology

- CO1 Understand the structure of cell membrane, transport system, intracellular compartments and related trafficking
- CO2 Get more details about mitochondria, chloroplast and cytoskeleton: Structure and function
- CO3 Able to study cells with different microscopic techniques
- CO4 Recognize the characteristics of different types of viruses.
- CO5 Comprehend the complex interaction between viruses and host cells.
- CO6 Theoretical knowledge on techniques employed for culturing and detection of plant viruses.

#### Course (Paper) Name and No.: Microbial Genetics

- CO1 The process of gene expression and its regulation
- CO2 The insights of mechanism of DNA duplication in bacteria, mitochondria and chloroplast
- CO3 Inheritance, evolution and gene rearrangements in mitochondrial and chloroplast
- CO4 The molecular tools for studying genetic diseases and the population genetics
- CO5 And apply the skills in research areas involved in microbial genetics

### **Course (Paper) Name and No.: Microbial Biochemistry I**

- CO1 Solve problems related to concentrations and preparation of different solutions.
- CO2 Understand the mechanisms involved in protein folding
- CO3 Learners will understand the biochemical mechanism of metabolism of one carbon compound.
- CO4 Use this in-depth knowledge in the research

### **Course (Paper) Name and No.: Medical Microbiology & Immunology**

- CO1 The learners will be able to understand the mechanism, treatment and prevention of disease caused by various newly discovered organisms.
- CO2 The learners will understand the role, importance and Methodology of Epidemiology with respect to infectious diseases.
- CO3 The learners will understand the function of immune response and immune system.
- CO4 The learners will understand the process of inflammation and phagocytosis

## **Semester II**

### **Course (Paper) Name and No.: Cell Biology and Virology**

- CO1 Understand the mechanisms of cell cycle, decision, programmed cell death, cell junction and development of multicellular organisms
- CO2 Acquire knowledge of processes such as fertilization, meiosis, sex determination, cell signaling and its components
- CO3 Understand the pathogenesis of viral infection with respect to human health.
- CO4 Understand the basic concept of virological diseases and diagnosis.
- CO5 Understand the role of evolution in new re-emerging viral infection and adaptation.

### **Course (Paper) Name and No.: Microbial Genetics-II**

- CO1 Learners will understand the viral classification, replication and transcription which can be useful for the development of Novel vaccine.
- CO2 Learners will learn how microorganisms exchange the genetic material among itself as well as in interspecies.
- CO3 Learners will understand the how bacteria acquire the resistance against antibiotics, drugs as well as Hydrocarbons
- CO4 Learners will know about the emerging Stem cell therapy used as a immunodrug, side effects and development as well as safety precaution used during its handling.
- CO5 Learners will know about the molecular markers used in diagnosis of disease, trans genesis of animal as well as plants.

### **Course (Paper) Name and No.: Microbial Biochemistry II**

- CO1 Extraction, purification and analysis of biomolecules
- CO2 Kinetics, regulation and mechanism of enzyme action
- CO3 Mechanism of signaling and response to the stress by bacteria.
- CO4 The biochemical mechanism of pollutant degradation in the environment.
- CO5 Application of this knowledge in the field of enzymatic production and biochemical remediation.

### **Course (Paper) Name and No.: Medical Microbiology & Immunology**

- CO1 The learners will acquire knowledge regarding the mechanism of disease transmission and pathogenesis of emerging infections.
- CO2 The learners will understand the application and role of clinical data management
- CO3 The learners can apply diagnostic skills in identification and diagnosis of pathogen.
- CO4 The learners will understand the importance, mechanism and role of vaccines in disease prevention

## **Class: M. Sc. II Microbiology**

### **Semester III**

#### **Course (Paper) Name and No.: Research Methodology**

- CO1 Define a research problem
- CO2 Write research hypothesis
- CO3 Design method of data collection
- CO4 Write scientific report

#### **Course (Paper) Name and No.: Food Microbiology**

- CO1 Interactions between microorganisms and food environment, factors influencing on their growth and survival.
- CO2 Significance and activities of microorganisms in food.
- CO3 The beneficial role of microorganisms in fermented food and food processing.
- CO4 Importance of microbiological quality control programmes in food production.
- CO5 The rationale for use of standard & procedures for microbiological analysis of food.
- CO6 Identify the different methods used to detect microorganisms, their products in food.

#### **Course (Paper) Name and No.: Advances in Biotechnology**

- CO1 The gene transfer techniques involved in recombinant DNA technology and its application in plant and animal sciences
- CO2 The use of various polymers in synthesizing nanomaterials and its applications in various fields
- CO3 The modern techniques in medical fields such as gene therapy, tissue engineering, pharmacogenomics etc
- CO4 And apply the skills for advancement in biotechnology in plant, animal and medical fields

### **Course (Paper) Name and No.: Applied & Environment Microbiology**

- CO1 The learners will gain knowledge of microbial diversity in extreme environment
- CO2 The learners will gain knowledge of significance and importance of organisms in food, food pathogens and develop skills to detect microbial food pathogens.
- CO3 The learners will understand the diversity of microbial ecology and the techniques used for detection of microorganism.
- CO4 The learners will understand the diversity of microorganisms in soil and water

## **Semester IV**

### **Course (Paper) Name and No.: Tools and Techniques: Bio-molecular Analysis**

- CO1 Spectrophotometric technique
- CO2 Chromatographic technique
- CO3 Molecular biology techniques
- CO4 Nanotechnology Techniques

### **Course (Paper) Name and No.: Pharmaceutical Microbiology**

- CO1 Gain in-depth knowledge about GMP, quality management and regulatory aspects.
- CO2 Understand analytical aspects of industrial products
- CO3 Gain knowledge about various methods used for drug discovery.
- CO4 Be able to use this knowledge to enhance his employability

### **Course (Paper) Name and No.: Advances in Biotechnology**

- CO1 Biopharmaceuticals with respect to structure large scale production and its application
- CO2 The details of intellectual property rights, its need and forms as well as bioethical issues
- CO3 Extreme environmental condition in ocean and microbial diversity as well as marine bio prospecting

CO4 Methods of synthesis, manipulation and expression of genes

CO5 Protein engineering and synthetic biology

**Course (Paper) Name and No.: Applied &Environment Monitoring & Management**

CO1 The learners will be able to understand the process of bioremediation, biodegradation and waste management which a need of today's society.

CO2 The learners will acquire the knowledge of biofilm formation and its control.

CO3 The learners will understand the cause of pollution and develop skills to detect various pollutants.

CO4 The learners will understand the concept of biosafety and solid waste management

# Department of Biotechnology

## Programme Specific Outcome

- PSO1 Study of Biochemistry & Cell biology will develop a deep understanding of concepts like glycosylation, folding and degradation of proteins, regulation of metabolic pathways, cell structure, cell division & molecular basis of various cellular processes.
- PSO2 An education in Immunology, molecular Diagnostics and developmental biology will provide idea of defence mechanism and diagnosis of infectious diseases with essential concepts of differentiation and growth in animals.
- PSO3 Students will be able to acquire knowledge and understanding of fundamentals of genomics, proteomics, transcriptomics and metabolomics with their applications in various applied areas of biology.
- PSO4 Biostatistics & Computational Biology will enrich the students how to utilize various tools of biostatics in interpretation of biological data, different sampling methods including probability, correlation and regression.
- PSO5 Bioinformatics, students will be able to analyse, interpret and study biological data (sequence, structure, etc.) stored in various databases available on internet.
- PSO6 Recognition of importance of Bioethics, IPR, entrepreneurship, scientific writing Communication, management skills to usher next generation of Indian industrialist.
- PSO7 The courses like clinical research and drug development will provide a theoretical base of clinical trials, types and its relevance to mankind with handling of clinical research data using biostatistical tools and procedures involved in formulation and manufacturing of drugs with designing of novel drugs.
- PSO8 Students will be able to learn about the background of Nanoscience, synthesis of nanomaterials and their application and they can apply their learned knowledge to develop Nanomaterial's.
- PSO9 Industrial biotechnology and bioprocess technology will give an account of design & operations of various fermenters, relevance of microorganisms from industrial context & important microbial/enzymatic industrial processes in food & fuel industry

## Course Outcomes

### Class: M.Sc. I Biotechnology

#### Semester I

##### Course (Paper) Name and No.: Biochemistry Paper-I

- CO1 Gain fundamental knowledge in biochemistry.
- CO2 Understand the molecular basis of various pathological conditions from the perspective of biochemical reactions.
- CO3 Develop a deep understanding of concepts like glycosylation, folding and degradation of proteins, regulation of metabolic pathways, cell structure, cell division and molecular basis of various cellular processes
- CO4 Students will learn chemistry of nucleic acids with regulation of metabolic pathways

##### Course (Paper) Name and No.: Immunology Paper-II

- CO1 Gain education in Immunology, molecular Diagnostics and developmental biology
- CO2 Get an idea of defence mechanism and diagnosis of infectious diseases with essential concepts of differentiation and growth in animals.
- CO3 Evaluate usefulness of immunology in different pharmaceutical company.
- CO4 Identify proper research lab working in area of their interests

##### Course (Paper) Name and No.: Cell Biology Paper-III

- CO1 Students will learn signal transduction mechanisms, in particular the concepts of response specificity, signal amplitude and duration, signal integration and intracellular location
- CO2 Students will get knowledge of different types of extracellular signals and receptors, and explain their functional significance
- CO3 The students will be able to learn how genetics contributes to predisposition and progression of cancer.

CO4 It will help the students to understand how immunotherapy is, and can be, used to treat human illness.

### **Course (Paper) Name and No.: Genomics and Emerging Technologies - Paper-IV**

CO1 Students will be able to acquire knowledge and understanding of fundamentals of genomics, proteomics, transcriptomics and metabolomics with their applications in various applied areas of biology.

CO2 Students will be able to learn history, theoretical basis, and basic understanding of latest technologies in area of biotechnology.

CO3 They will also be able to learn about various applications of emerging techniques used in genomics, proteomics and molecular cytogenetics

## **Semester II**

### **Course (Paper) Name and No.: Bioinformatics and Biostatistics**

CO1 Students will be acquainted to organization of various databases.

CO2 Students will be able to analyse, interpret and study biological data (sequence, structure, etc.) stored in various databases available on internet.

CO3 Biostatistics & Computational Biology will enrich the students how to utilize various tools of biostatics in interpretation of biological data, different sampling methods including probability, correlation and regression.

CO4 To Gain broad understanding in statistics and approach to problem solving, on a diverse variety of disciplines. To Gain working knowledge of these computational tools and methods

### **Course (Paper) Name and No.: Plant and Animal Biotechnology –Paper II**

- CO1 Gain basic skills in plant and animal biotechnology.
- CO2 Learn basic technical aspects of plant tissue culture technique like media preparation, seed sterilization, callus culture and maintenance of aseptic conditions. The skill could be applied in agriculture and crop improvement.
- CO3 Learn to demonstrate foundational knowledge of Cell culture techniques and competence in laboratory technique

### **Course (Paper) Name and No.: Bioprocess Engineering and Technology- Paper III**

- CO1 Appreciate relevance of microorganisms from industrial context.
- CO2 Give an account of design and operations of various fermenters.
- CO3 Give an account of important microbial/enzymatic industrial processes in food and fuel industry

### **Course (Paper) Name and No.: Intellectual Property Rights & Bioethics–Paper IV**

- CO1 Understand the rationale for and against IPR and especially patents;
- CO2 Understand why India has adopted an IPR Policy and be familiar with broad outline of patent regulations;
- CO3 Gain knowledge of biosafety and risk assessment of products derived from recombinant DNA research and environmental release of genetically modified organisms, national and international regulations

## **Class: M.Sc. II Biotechnology**

### **Semester III**

#### **Course (Paper) Name and No.: PTC and ATC**

- CO1 Students will learn basic technical aspects of plant tissue culture technique like media preparation, seed sterilization, callus culture and maintenance of aseptic conditions. The skill could be applied in agriculture and crop improvement.
- CO2 Students may develop their own PTC lab.
- CO3 Students will gain knowledge about secondary metabolites, it's in vitro culturing, industrial production and application
- CO4 Students will become aware of criteria and risks involved in culture techniques
- CO5 Students will become aware about the development, propagation, immortalization of cell line

#### **Course (Paper) Name and No.: Medical Microbiology**

- CO1 The student will be able to recognize, describe and discuss in detail the different aspects of chromosomal structure, number, and behaviour, and their effects at the organismal, population and species levels.
- CO2 The student can apply these cytogenetics techniques to problems in human genetics, such as diagnosis, determining prognosis, family studies and mutation analysis; and used to determination test results, interpretation and reporting findings.
- CO3 Students at the end of course will get to know the characteristics of biofilms formed due to different infectious agents

### **Course (Paper) Name and No.: Clinical Studies**

- CO1 Students will be able to identify and classify different types of clinical trial designs as well as clinical data analysis and reporting.
- CO2 Students will be able to characterise the toxic effects with respect to target organs, dose dependence and relationship to exposure and potential reversibility studies.
- CO3 The course will develop an understanding of the process of drug discovery and drug design to the students.
- CO4 Students will develop the skill of writing medical articles and acquire the knowledge of software used in clinical data management.

### **Course (Paper) Name and No.: Developmental Biology**

- CO1 The students will be acquainted with the Developmental Biology of animal development special emphasis on mammalian and human development.
- CO2 Students will understand the processes that lead from the fertilisation of an egg cell (or equivalent) to the formation of a well-structured and functional multicellular organism.
- CO3 Students will gain basic conceptual knowledge of the principal cellular mechanisms of development and identify the genetic and molecular elements that are involved.
- CO4 Students will be aware of various reproductive vaccines and ethical issues related to embryo research

## Semester IV

### Course (Paper) Name and No.: Nanotechnology

- CO1 Explain the fundamental principles of nanotechnology and their application to biomedical engineering.
- CO2 Apply engineering and physics concepts to the nano-scale and non-continuum domain.
- CO3 Apply and transfer interdisciplinary systems, engineering approach to the field of biology and nanotechnology project.
- CO4 To understand the classification of nano structured material
- CO5 Theoretical and practical knowledge related to modern materials chemistry, materials physics, energy physics and nanotechnology.
- CO6 Students will gain the knowledge about tools for properties of nanostructures.
- CO7 Students will understand the applications of nanomaterials and implication of health and safety related to nanomaterials

### Course (Paper) Name and No.: GMO and Environment

- CO1 By the end of the lessons, the students will be able to:
- CO2 Understand the meaning of genetic engineering and its usages in various aspects like agriculture and food industry, medicine, research, and entertainment etc.
- CO3 ➤ Evaluate the impacts of genetic engineering on our daily life.
- CO4 Analyze the moral issues raised in the development of genetic engineering.
- CO5 Apply different ethical theories to make moral judgment on genetic engineering.
- CO6 Characterise the waste generated from different industries
- CO7 Understand primary, secondary and tertiary treatment strategies

### **Course (Paper) Name and No.: Paper-IV (Bioinformatics)**

- CO1 The students will be able to describe the contents and properties of the most important bioinformatics databases, perform text- and sequence-based searches, and analyze and discuss the results in light of molecular biological knowledge
- CO2 The students will be able to explain the major steps in pairwise and multiple sequence alignment, explain the principle for, and execute pairwise sequence alignment by dynamic programming
- CO3 The students will be able to predict the secondary and tertiary structures of protein sequences.
- CO4 Students will be acquainted with knowledge of the analysis of the human genome, identification of targets for drug discovery, development of new algorithms and analysis methods, the study of structural and functional relationships, and molecular evolution.

### **Course (Paper) Name and No.: Biostatistics**

- CO1 Determine the value of the mean, the median, and the mode of ungrouped data and grouped data
- CO2 Calculate confidence interval for a population parameter for single sample and two sample cases
- CO3 Draw normal distribution curves and calculate the standard score (z score)
- CO4 Compare and contrast parametric and nonparametric tests
- CO5 Making a decision using p-value and draw an appropriate conclusion
- CO6 Use appropriate language when interpreting the results of a hypothesis test
- CO7 Compute and interpret the results of Bivariate and Multivariate Regression
- CO8 Computation and interpretation the Pearson and Rank correlation coefficient and test for significance.
- CO9 Perform ANOVA and F-test to perform an equality of variance

# Department of Computer Science

## Programme Specific Outcome

- PSO1 Learners will able to communicate computer science concepts, designs, and solutions effectively and professionally.
- PSO2 Able to Identify, analyse and synthesize scholarly literature relating to the field of computer science.
- PSO3 Gain knowledge of computing to produce effective designs and solutions for specific problems.

## Course Outcomes

**Class: M.Sc. I (Computer Science)**

### Semester I

#### **Course (Paper) Name and No.: P-I, Analysis of Algorithms and Researching Computing**

- CO1 Understand the concepts different algorithm techniques
- CO2 Implement the Graph, Tree representation.
- CO3 Implement elementary number notations and overview of research process.

#### **Course (Paper) Name and No.: P-II, Advanced Networking Concepts**

- CO1 1) Learner will be able to understand the concepts of Advanced networking, which are important for them to be known as a '*networking professionals*'
- CO2 2) Useful to proceed with industrial requirements and International vendor certifications
- CO3 3) Learner will be able to understand the concepts of wireless networks and Adhoc networks

#### **Course (Paper) Name and No.: P III, Advanced Database Systems**

- CO1 Understood the architecture, design, features of distributed systems.
- CO2 Understood how transactions processing occurs in distributed and parallel systems.
- CO3 Understood object oriented, temporal, spatial databases in detail.
- CO4 Understood concepts of deductive, active, multimedia, XML dB in detail

### **Course (Paper) Name and No.: P-IV, Robotics and Artificial Intelligence**

- CO1 Apply and evaluate concepts of gear, sensors and motors
- CO2 Apply and evaluate the concepts of vision, feedback control and trajectory planning
- CO3 Plan, design and implement robotics system and algorithms.
- CO4 Analyse and formalize the problem as a state space, graph and select amongst different search

## **Semester II**

### **Course (Paper) Name and No.: P-I, Advanced Operating system**

- CO1 Students demonstrate an ability to analyse a problem and identify and define the computing requirements appropriate to its solution.
- CO2 Students demonstrate an ability to design, implement process and components for distributing systems.
- CO3 Students demonstrate an ability to evaluate a computer-based system or program to meet desired needs

### **Course (Paper) Name and No.: P-II Design and Implementation of Modern Compiler**

- CO1 Students demonstrate an ability to analyse phases of compilation processes.
- CO2 Students demonstrate an ability to implement a compiler for a small programming language.
- CO3 Learns the optimization techniques

### **Course (Paper) Name and No.: Elective I - Track A Cloud Computing-I**

- CO1 To develop application using cloud computing environments
- CO2 To present a survey on cloud building blocks and technologies
- CO3 To perform cloud computing admin and programming using open source tools

### **Course (Paper) Name and No.: Elective I-Track B: Cyber and Information Security (Network and Communication Security)**

- CO1 Contrast the various approaches to security training and formulate a simple training agenda;
- CO2 Appraise the current structure of cyber security roles across the DOD enterprise, including the roles and responsibilities of the relevant organizations;
- CO3 Assess the strengths and weaknesses of the certification and accreditation approach to cyber security;
- CO4 Evaluate the trends and patterns that will determine the future state of cyber security

### **Course (Paper) Name and No.: Elective II - Track C: Business Intelligence and Big Data Analytics (Business Intelligence)**

- CO1 Create Data cubes in Sql Server .
- CO2 Apply star schema, snowflake schema, parent child schema in the application.
- CO3 Perform operations like drill down, roll up on the data cube.
- CO4 Apply association rule in real life examples

### **Course (Paper) Name and No.: Elective II- Track D: Machine Intelligence**

- CO1 Gain knowledge about basic concepts of Machine Learning
- CO2 Identify machine learning techniques suitable for a given problem
- CO3 Generate optimized models using various machine learning techniques
- CO4 Apply Dimensionality reduction techniques for attribute reduction

## **Class: M.Sc. II (Computer Science)**

### **Semester III**

#### **Course (Paper) Name and No.: P-I, Ubiquitous Computing**

- CO1 Describe the characteristics of pervasive computing applications including the basic
- CO2 Computing application problems, performance objectives and quality of services, major system components and architectures of the systems.
- CO3 Analyze the strengths, problems and limitations of the current tools, devices and
- CO4 Communications for pervasive computing systems.
- CO5 Recognize the different ways that humans will interact with systems in a ubiquitous environment and account for these accordingly.
- CO6 List and exemplify the key technologies involved in the development Ubicomp systems.

#### **Course (Paper) Name and No.: P-II, Social Network Analysis**

- CO1 Analyze the area of social network concepts, relationship analysis and relationships using algorithm.
- CO2 Apprehend how network analysis can contribute to increasing knowledge about diverse aspects of society using local and global centrality, Approaches and google page rank algorithm.
- CO3 Use a relational algorithm like Dijkstra's algorithm using top-down and bottom up approaches.
- CO4 Analyze social network data using various software packages and similarity and structural equivalences.
- CO5 Ascertaining mode networks, Bi-partite data structure and SVD analysis.
- CO6 Compare different Similarity and dissimilarity distance measuring approaches

### **Course (Paper) Name and No.: Elective I- Track A: Cloud Computing -II**

- CO1 Learners will be able to define Cloud Computing and memorize the different Cloud service and deployment models. Learners can analyse and describe importance of virtualization along with their technologies.
- CO2 Learners will be able to identify different cloud computing platforms.
- CO3 Learners will get sound knowledge of cloud technologies and how to use them.
- CO4 Learners will learn the variety of Software Architecture models for cloud computing and develop working experience in several of them.

### **Course (Paper) Name and No.: Elective I- Track B: Cyber and Information Security II**

- CO1 Understand the definition of computer forensics fundamentals.
- CO2 Describe the types of computer forensic technology.
- CO3 Analyze various computer forensics system.
- CO4 Illustrate the methods for data recovery, evidence collection and data seizure
- CO5 Summarize duplication and preservation of digital evidence

### **Course (Paper) Name and No.: Elective II- Track C: Business Intelligence and Big Data Analytics –II (Mining Massive Data sets)**

- CO1 To optimize business decisions and create competitive advantage with Big Data analytics
- CO2 To learn to use various algorithms of map reduce.
- CO3 To understand the various search methods and visualization techniques, Methods for high degrees of similarity.
- CO4 To learn data mining streams and its architecture.

### **Course (Paper) Name and No.: Elective II - Track D, Machine Learning –II**

- CO1 Gain knowledge about advance concepts of Machine Learning
- CO2 Identify probability distribution techniques suitable for a given problem
- CO3 Design of applications using various graphical models.

## **Semester IV**

### **Course (Paper) Name and No.: P-I, Simulation and Modelling**

- CO1 Students should be able to understand the concepts related to simulation and conceptual modelling.
- CO2 Students should be able to understand conceptual and simulation models verification and validation.
- CO3 Students can understand different methods for simulation modelling.
- CO4 Students can understand how designing of models is done and how models behave in different external environments

### **Course (Paper) Name and No.: Elective I Track B: Cyber and Information Security-II (Cryptography and Crypt Analysis)**

- CO1 Understand the significance of cryptography to the modern world and the internet.
- CO2 Solve elementary problems in number theory relating to cryptography.
- CO3 Build on number theoretic basics to further their knowledge of advanced methods of cryptography.
- CO4 Integrate cryptographic algorithms into software projects.

**Course (Paper) Name and No.: Elective II Track C: Business Intelligence and Big Data Analytics-III (Intelligent Data Analysis)**

- CO1 To implement clustering algorithms like k-means, partitioning algorithm.
- CO2 Implement Bayesian classification, Document classification, Bayesian Networks on real data.
- CO3 Implement Principal Component Analysis and decomposition techniques.
- CO4 To do the Collaborative Filtering, Dimensionality Reduction, link analysis

# Department of Information Technology

## Programme Specific Outcome

- PSO1 Learners are able to enter new problem areas that require an analytic and innovative approach.
- PSO2 Learners are able to is able to gather, assess, and make use of new information.
- PSO3 Learners are able to combine and use knowledge from several topics.
- PSO4 Learners are able to apply advanced theoretical and practical methods gained from various subjects.
- PSO5 Learners are able to develop and renew Information Technology competence.

## Course Outcomes

### Class: M.Sc. I Information Technology

#### Semester I

##### Course (Paper) Name and No.: P-I, Data Mining

- CO1 Identify the major framework of data mining and knowledge representation
- CO2 Become familiar with various data mining tools
- CO3 Become familiar with classification methods.
- CO4 Become familiar with classification methods, clustering methods.
- CO5 Ability to apply various data mining tools.

##### Course (Paper) Name and No.: P-II, Distributed System

- CO1 To get the basic principles, design issues and architectural aspects of distributed systems.
- CO2 Enhancement in networking and different communication channels
- CO3 To learn how to design web services. Analyze the different techniques used for Communication in distributed system.
- CO4 Develop the solutions for Clock synchronization, Mutual exclusion in distributed system.
- CO5 Gain knowledge on Distributed File System and design issues of Distributed Shared Memory.

##### Course (Paper) Name and No.: P III, Data Analysis Tools

- CO1 To implement C language concepts and sql queries.
- CO2 To implement matrix , vector concepts as well as graphics commands.
- CO3 To develop understanding about different distribution models.
- CO4 To gain expertise in modelling methods and hypothesis testing.
- CO5 To learn different likelihood estimation methods and manto carlo methods.

### **Course (Paper) Name and No.: P-IV, Software Testing**

- CO1 To implement various test processes for quality improvement.
- CO2 Design test planning & manage the test process
- CO3 Apply modern software testing processes in relation to software development and project management.
- CO4 Create test strategies and plans, design test cases, prioritize and execute them
- CO5 To gain expertise in designing, implementation and development of computer based systems and IT processes.

## **Semester II**

### **Course (Paper) Name and No.: P-I, Mobile Computing**

- CO1 Introduction to the principles and theories of mobile computing technologies
- CO2 Describe infrastructures and technologies of telecom and satellite.
- CO3 Information about broadcast systems and wireless lan
- CO4 Possible future of mobile computing technologies and applications.
- CO5 Information about MTL and support.

### **Course (Paper) Name and No.: P-II Advanced Computer Networks**

- CO1 To illustrate the reference models with layers, protocols and interfaces and to compare it with different versions
- CO2 To its emphasis on the design, deployment, management, maintenance and security of wired and wireless networks
- CO3 To follow the industry-recognised CISCO Certified Network Professional (CCNP) Routing and Switching, Routing algorithms: Routing and Addressing and Provide the mathematical background of routing protocols
- CO4 To understand optimum design consideration for layer 3 and advanced WAN services.
- CO5 To analyse the design consideration of IPsec, SSL VPN, enterprise data centre and SAN.

### **Course (Paper) Name and No.: P-III Cloud Computing and Ubiquitous System**

- CO1 Understanding the key dimensions of the challenge of Cloud Computing
- CO2 Assessment of own organizations' needs for capacity building and training in cloud computing-related IT areas
- CO3 Learn the different cloud platforms to provide web services.
- CO4 Understanding the Languages to design the web services.
- CO5 Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.

### **Course (Paper) Name and No.: P-IV Advanced Database Systems**

- CO1 To gain expertise over ER model and Object model concepts.
- CO2 To understand concepts of Object oriented databases.
- CO3 To gain expertise over object relational and extended relational databases concepts.
- CO4 To develop skills for parallel and distributed DB.
- CO5 To develop skills for databases on web .
- CO6 To gain expertise over advanced databases such as temporal , spatial, multimedia DB.

## **Class: M.Sc. II Information Technology**

### **Semester III**

#### **Course (Paper) Name and No.: P-I, Embedded system**

- CO1 Able to design, describe, validate and optimize embedded electronic systems in different industrial application areas.
- CO2 Able to define hardware and software communication and control requirements.
- CO3 To acquire knowledge of and be able to use tools for the development and debugging of programs implemented on microcontrollers and DSPs.
- CO4 To design electronic circuits for the processing of information in communications and control systems.
- CO5 To acquire knowledge of sensor properties and apply these in the design of Electronic systems which integrate measurement and actuation in different industrial production contexts.

#### **Course (Paper) Name and No.: P-II, Information Security Management**

- CO1 Risk management will make the students able to identify potential problems before they occur so that risk-handling activities may be planned and invoked as needed across life of product or project to mitigate adverse impacts on achieving objectives.
- CO2 Students will be able to provide a basic level of security, independent of external requirements so they can maintain the uninterrupted operation of the IT organisation.
- CO3 It will make learners aware of key management which is the process of administering or managing cryptographic keys for a cryptosystem.
- CO4 It will make learners aware of the risks or threats to the success of the plan and test the controls in place to determine whether or not those risks are acceptable.
- CO5 Students will know the basic process of identifying, preserving, analyzing and presenting the digital evidence in such a manner that the evidences are legally acceptable

### **Course (Paper) Name and No.: P-III, Virtualization**

- CO1 Introduction to virtualization types.
- CO2 Learners will understand Virtual machines and Implementation of virtual machines
- CO3 Learners will understand virtualization and various ways of using virtualization.
- CO4 Learners would be able to understand Implementation of private cloud platform using virtualization.
- CO5 Learners would be able to understand Blade servers.

### **Course (Paper) Name and No.: P-IV, Ethical Hacking**

- CO1 Students will able to learn about basics of ethical hacking and its phases.
- CO2 Learn how to hack systems & protect systems from Trojans, Backdoors, Virus & worms
- CO3 Students will able to understand about methods of hacking.
- CO4 Learn how to hack web applications, wireless networks mobile platforms ethically and techniques like SQL injection
- CO5 Student will able to understand about firewalls, Encryption & Decryption methods.

## **Semester IV**

### **Course (Paper) Name and No.: P-I, Artificial Intelligence**

- CO1 Students will able to Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents.
- CO2 Students will able to demonstrate the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.
- CO3 Formulate and solve problems with uncertain information using Bayesian approaches.
- CO4 Students will able to attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning. Students will able to understand basics in Prolog Programming.

### **Course (Paper) Name and No.: P-II, IT Infrastructure Management**

- CO1 Students will gain knowledge on development of service concepts in preparation for the selection of services to be provided.
- CO2 Students will be able to design profitable services that provides high level of quality to satisfy the business needs.
- CO3 Students will be able to identify any potential risk and provide measures to overcome its impact on other services and business.
- CO4 Students will become familiar with IT service operations used to ensure that the required IT services are delivered efficiently and effectively as per the service level agreements to the business users and customers.
- CO5 Students will learn about continuously improving the service quality after the service the service have been put into operation.

### **Course (Paper) Name and No.: P-III, Computer Forensics**

- CO1 Learn Basics about Computer Forensics
- CO2 Learn about processing crimes and how to use latest technology
- CO3 Learn about Macintosh OS and other forensic analysis techniques.
- CO4 Learn about Virtual Machines and network forensics
- CO5 Learn how to write report and give expert testimony

### **Course (Paper) Name and No.: P-IV, Cloud Management**

- CO1 Learners would be able to understand virtualized data centers.
- CO2 Learners would be able to understand storage network designs.
- CO3 Learners would be able to understand system centre 2012.
- CO4 Learners would be able to understand different components of system centre 2012.
- CO5 Learners should be able to understand different cloud management platforms.

# Foundation Course

# Department of Foundation Course

## Course Outcomes

**Class: F.Y. B.A./B.Com./B.Sc./ B.Com. (A&F)/ BMS/Biotechnology**

### Semester I

#### **Course (Paper) Name and No.: Foundation Course- I**

- CO1 To know about duties & responsibilities towards society
- CO2 To aware about the socio-economic problems and diversified issues of society.
- CO3 To impart knowledge of Globalization and make students aware about the problems in society.
- CO4 To create awareness about the fundamental rights according to Indian Constitution
- CO5 To study key Aspect of political Process

### Semester II

#### **Course (Paper) Name and No.: Foundation Course- II**

- CO1 The learners would be acquainted with the sectors of the Indian Economy and its basic facets.
- CO2 To help learners grasp the idea of Fundamental Rights and Duties according to Indian Constitution.
- CO3 This will inspire learners to understand and take care of our Mother Earth.
- CO4 This will aid to identify the problems within humans in the contemporary society and ways to deal with it.
- CO5 The learners will learn how to cope up with stress and deal with conflicts.

## **Class: S.Y. B.A./ B.Com./ B.Sc.**

### **Semester III**

#### **Course (Paper) Name and No.: Foundation Course- III**

- CO1 Student will able to understand about Right of SC, ST, Women, children,& people with disabilities.
- CO2 Learners will able to understand about Environmental disaster
- CO3 To understand about various Science & technology and their uses
- CO4 Student will able to understand about verbal & non verbal communication, presentation skills.

### **Semester IV**

#### **Course (Paper) Name and No.: Foundation Course- IV**

- CO1 Student will able to understand consumer rights, right to information , protection of citizens and public service guarantee Act.
- CO2 Learners will understand importance of ecology and various sustainable principle, poultry principle pay principle.
- CO3 To understand application of various modern technologies.
- CO4 Students will understand financial basic information on competitive examination, its pattern, eligibility criteria and local centres and soft skill required for such exam.

# Department of Foundation Course in NCC Studies

## Course Outcomes

**Class: F.Y. B.A./ B.Com./ B.Sc.**

### Semester I

#### **Course (Paper) Name and No.: Foundation Course in NCC Studies- I**

- CO1 The students will display sense of patriotism, secular values and shall be transformed into motivated youth who will contribute towards nation building through national unity and social cohesion.
- CO2 The students will demonstrate the sense of discipline, improve bearing, smartness, turn out, develop the quality of immediate and implicit obedience of orders, with good reflexes
- CO3 The student will be aware of the conservation of natural resources and protection of environment.
- CO4 The student will develop an all-round personality with adequate leadership traits to deal / contribute effectively in life.
- CO5 The training shall instill patriotism, commitment and passion to serve the nation motivating the youth to join the defence forces

### Semester II

#### **Course (Paper) Name and No.: Foundation Course in NCC Studies - II**

- CO1 The learners shall gain basic information about civil defence organisation and shall assist them in various types of emergencies during Natural calamities.
- CO2 The learners have an understanding about social needs and participate in community action programmes.
- CO3 The learners will overcome fear; inculcate within them the sense of adventure.

- CO4 The learners will be disciplined, smart and develop obedience.
- CO5 It will develop skill of handling weapons and will benefit them to pursue defence carrier.
- CO6 The learners shall instill patriotism, commitment, and passion to join defence forces.

## **Class: S.Y. B.A./ B.Com./ B.Sc.**

### **Semester III**

#### **Course (Paper) Name and No.: Foundation Course in NCC Studies - III**

- CO1 The students will display Sense of patriotism, secular values and shall be transformed into motivated youth who will contribute towards nation
- CO2 The students will overcome fear to inculcate within them a sense of adventure sportsmanship courage ,determination, diligence
- CO3 The students will demonstrate sense of discipline, smartness, improve bearing with good reflexes

### **Semester IV**

#### **Course (Paper) Name and No.: Foundation Course in NCC Studies - IV**

- CO1 The learners will gain basic information about civil defence organisation
- CO2 The learners will have understanding of social aspects and will voluntarily participate in social activities
- CO3 The learners will be aware of personal health and hygiene
- CO4 The students will have basic knowledge of weapon training and handling rifles

# Department of Foundation Course in NSS Studies

## Course Outcomes

**Class: F.Y. B.A./ B.Com./ B.Sc./ B.Com. (A&F)/ BMS**

### Semester I

#### **Course (Paper) Name and No.: Foundation Course in NSS- I**

- CO1 It will enable students to get acquainted completely about the organisation.
- CO2 It will aid in cultivating sense of responsibility.
- CO3 This will facilitate to question the roots of the contemporary problems and search for its solution.
- CO4 This will aid in connecting the dots between justice and development and our constitution.

### Semester II

#### **Course (Paper) Name and No.: Foundation Course in NSS - II**

- CO1 It will help the students to understand their role and built up qualities for planning.
- CO2 It will aid in cultivating the skills for taking survey and comprehend the organisation in planning process.
- CO3 This will facilitate students to understand the nature of camping.
- CO4 This will help in developing the sense of appreciation of the working and nitty-gritty of the GOs, NGOs and VOs.

**Class: S.Y. B.A./ B.Com./ B.Sc.**

### **Semester III**

**Course (Paper) Name and No.: Foundation Course in NSS - III**

- CO1 It will help the students to understand various facets of core Values, Gender and Empowerment.
- CO2 It will aid in cultivating the skills for Disaster preparedness
- CO3 This will facilitate students to understand and work on their and community's Health and Hygiene.
- CO4 This will help in developing the sense of responsibility towards Environment and its conservation

### **Semester IV**

**Course (Paper) Name and No.: Foundation Course in NSS - IV**

- CO1 It will enable students to get acquainted completely about the skills required for self-employment.
- CO2 It will aid in cultivating sense of responsibility towards Khadi and its allied sectors.
- CO3 This will help students to grasp and look upon the inspiration of ideal villages.
- CO4 This will inspire to think and know earnestly about the NGOs and GOs.

# **Skill Development**

# Programme- Fashion Designing

## Programme Outcomes

- PO1 To provide in-depth knowledge of scientific and technological aspects
- PO2 To familiarize with current and recent development in fashion
- PO3 To enrich knowledge through programmes such as industrial visits, projects etc
- PO4 To train students in skill related to fashion for academic and industrial requirement
- PO5 To develop analytical abilities for independent thinking
- PO6 To help students build-up a progressive and successful career in fashion

## Course Outcomes

### Class: First Year Diploma in Fashion Designing

#### Course (Paper) Name and No.: Apparel study –Designing Paper 1

- CO1 Students have different ideas of fashion , they understand fashion is around them
- CO2 Students understands Basic elements and basic principles of fashion.
- CO3 Learning variations of details like sleeve, collars, skirts n other things make them aware of the different methods
- CO4 Basic knowledge tells them or makes them aware of how our Indian as well as international fashion designers work for a theme.
- CO5 Designers make us feel that the elements or the things they have used in their collection are from different feel, in reality they have the same base which we learn.
- CO6 How to master your skills and use your ideas effectively in your collection. Tells us how much you have known or studied the subject

#### Course (Paper) Name and No.: Pattern Making & Garment Construction Paper 2

- CO1 Students can able to stitch different types of stitches can sell and do exhibition
- CO2 Students learn to stitch also trained to do freelance work
- CO3 Students trained to work in industry and make them independent to earn

#### Course (Paper) Name and No.: Art Foundation- Paper 3

- CO1 Can do new creation eg. ,can express their ideas in pictorial forms, create different pattern design at boutique or for freelancing for client
- CO2 Students understand the colour combination in fashion collection for better outcome
- CO3 Student understand the development process With the different elements like line shape and colour and apply in their costume designing
- CO4 Understand and apply elements of design in their fashion costume

### **Course (Paper) Name and No.: Surface ornamentation (Textile study) -Paper IV**

- CO1 To understand the importance of textile and application in fashion industry
- CO2 Students practice prints eg. bandhani batik, madhubani, kalamkari. And can earn by freelancing
- CO3 Student understand the learn basic study of yarn and can use it in their design collection
- CO4 To get knowledge of Fabric fall, fabric quality, to improve selection designing skills

### **Course (Paper) Name and No.: Art appreciation- Indian Art and Costume- Paper V**

- CO1 Students learn about the ancient era, and learn to see it from the fashion point of view.
- CO2 To understand How each era changed the clothing, draping style among every individual
- CO3 Students understand the Clothing changed not only for royal families but also for normal people living there
- CO4 Student get knowledge of History in Mughal n British time totally changed the idea of fashion still people follow the same fashion in traditional and western fashion.
- CO5 New era based on the olden period and the evolution or the changes we do are also shown in todays film industry

## **Class: Second Year Diploma in Fashion Designing**

### **Course (Paper) Name and No.: Apparel Study –Designing- Paper 1**

- CO1 Students understand about all different ways of designing including inspiration and non wearable.
- CO2 Most of the study about field and all the functions taken care . At the work place been taught to them
- CO3 Students learn to give presentation on the topic given to them.
- CO4 Learning history all around the world and also the international designers with trend ,brands and collections bring great inspiration in students creativity
- CO5 Fashion show makes them ready for the field to work independently. Also learn designing and how to handle a client which is the most imp aspect in fashion.

### **Course (Paper) Name and No.: Apparel Study – Merchandising- Paper 1**

- CO1 Students understand about how bulk production is to b taken stating with s sampling
- CO2 Most of the study about field and all the functions taken care . At the work place been taught to them
- CO3 To understand how to Make everything ready for the collection, new theme, new season collection
- CO4 Preparing purchase order, fabric consumption, fabric saving during bulk production
- CO5 To understand Making collection giving full displaying the product according to the theme

## **Course (Paper) Name and No.: Pattern Making & Garment Construction-Paper 2**

- CO1 Students understand Students can design and stitch different types of collections and earn with freelance work
- CO2 To Understand the impact of professional fashion solution in societal and environmental contexts and demonstrate the knowledge of ,and need for
- CO3 Students understand to choose theme and do market research for fabric and accessories, make n patterns design and stitch accordingly

## **Course (Paper) Name and No.: Fashion Illustration- Paper 3**

- CO1 Students get knowledge and draw fashion croqui
- CO2 Get practice of human body drawing and colouring
- CO3 Students understand to do Mood board according to design collection, team work effectively as an individual and a member or leader in diverse teams .
- CO4 Get knowledge and colouring and illustration

## **Course (Paper) Name and No.: surface ornamentation- Paper 4**

- CO1 Student practice study of Indian embroidery styles that vary by region and clothing styles.
- CO2 Student get knowledge of fabric painting and can earn by freelancing

## **Course (Paper) Name and No.: Design collection / Portfolio Development**

- CO1 Student learn to organise fashion show and display design collection .learn styling ,accessories, time management skill, backstage management
- CO2 Student do portfolio Display the academic work to get job in fashion industry

# Programme- Diploma in Interior Designing (Autonomous)

## Programme Outcomes

- PO1 Global demand and supply of building material such as Timber , Metals, Paint, Glass Etc. and come to know how to preserve and utilize of each part of materials.
- PO2 The construction techniques and principles will also help to formulate practical ideas while designing.
- PO3 Drawing parallel and angular perspective with different position of picture plan of bed rm./ living rm.
- PO4 Will improve presentation skills among students.
- PO5 Develop skills of planning of Residential spaces with clear understanding and application of functionality.
- PO6 Gain knowledge of advance interior designing services like acoustic, ventilation, Water supply, Water proofing, electrical systems Etc.
- PO7 Professional practice subject develop skills to face wide range of challenges that they may encounter as professional planners.
- PO8 Working Drawing subject provides technical base for execution of designer's Ideas.

## Course Outcomes

### Class: First Year Diploma in Interior Designing

#### Semester I

##### Course (Paper) Name and No.: Theory of Materials I

- CO1 Explain classification , Properties, good qualities of stone. Methods of dressing, Application and uses in interior projects.
- CO2 Explain types of clay products, & of bricks. Define good quality of clay products, & bricks.
- CO3 Define manufacturing process of clay products & bricks with sketches.
- CO4 List out properties and uses of clay products, & of bricks.
- CO5 Define Properties, application and uses, methods of preserving of all civil construction material – Lime, Cement, plaster, mortar, concrete.

##### Course (Paper) Name and No.: Construction I

- CO1 Sign and symbols of different construction materials for drawing purpose.
- CO2 Sizes and types of bricks with freehand sketches. Different types of brick bonds –draw plan, elevation, and isometric view.
- CO3 Show types of arches with terminology.
- CO4 Draw different types of carpentry joinery with their dimensions.
- CO5 Draw different types of panel doors with the terminology.

### **Course (Paper) Name and No.: Interior Graphics**

- CO1 Learn to draw gradation of lines with different medium . (freehand ,with t, set squares.
- CO2 Study of metric scales.
- CO3 Draw orthographic projection of cube, cylinder, pyramid and other shapes.
- CO4 Draw orthographic projection of different furniture.
- CO5 Draw 3 dimension views and finish with textures, colors, sciography.
- CO6 Learn to apply poster, pencil, Fuji colors.
- CO7 Make colour wheel with different combinations.

### **Course (Paper) Name and No.: Design I**

- CO1 Learn basic elements and principals of design through sketching and theory.
- CO2 Learn to take the measurement the structure on site and drafting on paper the same .
- CO3 Define anthropometry data with standard furniture sizes.
- CO4 Drawing of living room- plan, elevations , and views.
- CO5 Planning of Master bed room with attached toilet - plan, elevations, and views.

## **Semester II**

### **Course (Paper) Name and No.: Theory of Materials II**

- CO1 Explain classification, Properties, good qualities of Timber. Methods of preservation, Application and uses in interior projects. List out market and industrial form of wood product.
- CO2 Explain types of metals, & Define good quality, uses of all types of metals.
- CO3 Define manufacturing process and market forms of glass with properties and uses.
- CO4 List out properties and uses of acrylic and plastic.
- CO5 Define types, Properties, application and uses, methods of preserving of paint and

### **Course (Paper) Name and No.: Construction II**

- CO1 Draw different types of windows plan, sections with dimensions and terminology.
- CO2 Sizes and types of structures with freehand sketches.
- CO3 Draw Different types of staircases – plan, elevation, and detail joinery with terminology.
- CO4 Draw different types of Mezzanine floors with their plan, sections, dimensions and isometric view.

### **Course (Paper) Name and No.: Perspective**

- CO1 Learn the different techniques sciography.
- CO2 Drawing of plants plan, elevation, with window and door treatments.
- CO3 Draw parallel perspective with different position of picture plan of bed rm., living rm.
- CO4 Draw angular perspective with different position of picture plan of bed rm., living rm.
- CO5 Learn to render plan and elevations and views.
- CO6 Workshops on mural and stained glass design.

### **Course (Paper) Name and No.: Design II**

- CO1 Learn to take the measurement of structure on site and drafting on paper the same.
- CO2 Learn to draw existing structure and then space planning with standard furniture sizes.
- CO3 Planning of Full flat - plan, elevations, and views with client profile and concept sheet.
- CO4 Planning of Bungalow- plan, elevations, and views.

## **Class: Second Year Diploma in Interior Designing**

### **Semester III**

#### **Course (Paper) Name and No.: Building Services I**

- CO1 Explain various types and principles of ventilation.
- CO2 What are the different types and the principles of air conditioning systems?
- CO3 What are the components of a window ac ,explain with sketches.
- CO4 Explain various types and principles of light. How useful in interiors.
- CO5 Draw a simple electrical layout for a residence.
- CO6 Explain single and three phase supply, ELCB, different types of wiring systems.
- CO7 What is sound insulation and the significance of sound absorbent materials. Explain in details.
- CO8 List the defects of sound.
- CO9 What is the principles and general methods of thermal insulation

#### **Course (Paper) Name and No.: Professional Practice I**

- CO1 Explain the role of interior designer in the society and highlight responsibilities, liabilities in profession.
- CO2 Explain basic principles of management and application to interior designing projects.
- CO3 Explain briefly the comprehensive services rendered by an interior designer.
- CO4 Explain the procedure of executing the interior project.
- CO5 As an interior designer how would you contribute to the betterment of the society?
- CO6 Draft a B.O.Q. for a kitchen measuring 100 sq.ft. with L shape platform and overhead .
- CO7 Enlist types and the factors to be considered during preparation of a detailed Estimate.

### **Course (Paper) Name and No.: Working Drawing I**

- CO1 Draw wardrobe details—sectional plan, elevation, and drawer detail with nomenclature.
- CO2 Draw Double Bed details—sectional plan, elevation, and trolley detail with nomenclature.
- CO3 Show details of double skin paneling which is finished with laminate.
- CO4 Draw 180 cm.x210 cm partition with all details.

### **Course (Paper) Name and No.: Design I**

- CO1 Designing small area commercial project—Topics—Fast food centre/Beauty parlor/Coffee café/Mobile shop/ Clinic/Coaching classes/Estate agent office.
- CO2 Alternates of space planning. Final furniture layout with concept sheet.
- CO3 Flooring layout / False ceiling layout/Electrical plan/a. c. layout
- CO4 Sectional elevations.
- CO5 All internal as well as external perspective views.
- CO6 Detail drawing of any furniture item.

## **Semester IV**

### **Course (Paper) Name and No.: Building Services II**

- CO1 Explain various principles of water supply and drainage.
- CO2 What are the different types of methods for waterproofing systems?
- CO3 What are the types of water closets, explain with sketches.
- CO4 Explain various types of plants and principles of landscaping. How useful in interiors.
- CO5 Draw a neat layout of a toilet and explain its drainage system.
- CO6 Explain with sketch waterproofing system of Terrace garden.
- CO7 What are the causes and effects of fire? Write short note on fire retardants.
- CO8 List the chemicals used for waterproofing .How is they applied.

### **Course (Paper) Name and No.: Professional Practice II**

- CO1 Define term contract and different types of contract.
- CO2 Write about legal implication of contract,.
- CO3 List out different types of Tenders and explain them.
- CO4 Explain the point to be borne in mind while calling for Tenders.
- CO5 Define Tender what does it contains.
- CO6 Short notes on—Tender notice /Interim certificate/Rate analysis.

### **Course (Paper) Name and No.: Working Drawing II**

- CO1 Draw Bank counter details—sectional plan, elevation, and drawer detail with nomenclature.
- CO2 Draw Reception counter details—sectional plan, elevation, and trolley detail with nomenclature.
- CO3 Show details of Executive table which is finished with veneer, glass and corian.
- CO4 Draw 300 cm.x210 cm area cover by gypsum ceiling with all details.
- CO5 Draw details of sofa chair with its upholstery details.

### **Course (Paper) Name and No.: Design II**

- CO1 Designing large area commercial project Topics—Builders office/Bank/ Restaurant/ Boutique etc.
- CO2 Alternates of space planning. Final furniture layout with concept sheet.
- CO3 Flooring layout / False ceiling layout/Electrical plan/a. c. layout
- CO4 Sectional elevations.
- CO5 All internal as well as external perspective views.
- CO6 Detail drawing of any furniture item.

**Course (Paper) Name and No.: AUTOCAD**

- CO1 Learn various applications of various types of rendering of the plans, Sections, Elevations, Perspectives using different media.
- CO2 2 D drawings with basic tools application and presentation.
- CO3 Training of 3 D drawings with rendering, naming.
- CO4 Large area project presentation fully with the help of auto cad

# Programme- Diploma in Interior Designing (SNDT)

## Programme Outcomes

- PO1 Global demand and supply of building material such as Timber , Metals, Paint, Glass Etc. and come to know how to preserve and utilize of each part of materials.
- PO2 The construction techniques and principles will also help to formulate practical ideas while designing.
- PO3 Drawing parallel and angular perspective with different position of picture plan of bed rm./ living rm.
- PO4 Will improve presentation skills among students.
- PO5 Develop skills of planning of Residential spaces with clear understanding and application of functionality.
- PO6 Gain knowledge of advance interior designing services like acoustic, ventilation, Water supply, Water proofing, electrical systems Etc.
- PO7 Professional practice subject develop skills to face wide range of challenges that they may encounter as professional planners.
- PO8 Working Drawing subject provides technical base for execution of designer's Ideas.

## Course Outcomes

### Class: First Year Diploma in Interior Designing

#### Course (Paper) Name and No.: Theory of Materials

- CO1 Explain classification , Properties, good qualities of stone. Methods of dressing, Application and uses in interior projects.
- CO2 Explain types of clay products, & of bricks. Define good quality of clay products,& bricks.
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- CO4 Explain classification , Properties, good qualities of Timber. Methods of preservation, Application and uses in interior projects. List out market and industrial form of wood product.
- CO5 Define Properties, application and uses, methods of preserving of all civil construction material – Lime, Cement, plaster, mortar, concrete.
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#### Course (Paper) Name and No.: Construction

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- CO2 Sizes and types of bricks with freehand sketches. Different types of brick bonds –draw plan, elevation, and isometric view.
- CO3 Show types of arches /carpentry joinery with their dimensions and terminology.
- CO4 Draw different types of panel doors/Windows with the terminology.
- CO5 Draw Different types of staircases – plan, elevation, and detail joinery with terminology.
- CO6 Draw different types of Mezzanine floors with their plan, sections, dimensions and isometric view.

### **Course (Paper) Name and No.: Perspective**

- CO1 Learn to draw gradation of lines with different medium. (freehand with t, set squares.
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- CO3 Define anthropometry data with standard furniture sizes.
- CO4 Drawing of living room/Master Bed room with attached toilet-plan, elevations & views
- CO5 Planning of Full flat - plan, elevations, and views with client profile and concept sheet.

## **Class: Second Year Diploma in Interior Designing**

### **Course (Paper) Name and No.: Building Services**

- CO1 Explain various types and principles of ventilation/ water supply and drainage.
- CO2 What are the different types and the principles of air conditioning systems or different types of methods for waterproofing systems?
- CO3 What are the components of a window ac, explain with sketches.
- CO4 Explain various types and principles of light. How useful in interiors.
- CO5 Draw a simple electrical layout for a residence.
- CO6 Explain single and three phase supply, ELCB, different types of wiring systems.
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- CO8 List the defects of sound.8) What is the principles and general methods of thermal insulation.
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- CO6 Draft a B.O.Q. for a kitchen measuring 100 sq.ft. with L shape platform and overhead .
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