Syllabus Outcomes

Stream: Sciences

Chemistry

B.Sc. Sem. I

Organic chemistry include chapters structure and bonding, mechanism of organic, reaction, alkanes, alkenes, alkynes, alkyl halides and aryl halides, arens and aromaticity teaches the students about how the reactions work out in our system and environment because all organic reactions are backbone of industrial production (pharmaceutics, manure production, lather, textile, fabrication etc,) even in our biological system many reactions involve enzymatic reaction digestion respiration etc,

Inorganic chemistry including chapter's atomic structure, periodic properties, chemical bonding, ionic solids and weak interaction gives information about the natural abundant elements which play important role in daily life.

B.Sc. Sem. II

Inorganic- it describe the study of p-block elements (group13-18), p-Block element 2, transition metal complexes which are present in our earth's crust in the form of oxide Sulphides etc.

Physical chemistry-it describes the study of gaseous state, colloids, liquid crystals, solutions. the liquid crystals which are elements used in LCD screens ,computer, watch screens etc play important role in our daily routine appliances.

B.Sc. Sem. III

Organic chemistry -it describe the study of alcohol, phenol, aldehydes and Ketones and stereochemistry of elements.

Physical chemistry- it describe the study of first law of thermodynamics ,second law of thermodynamics, third law of Thermodynamics, thermo chemistry, chemical and phase equilibrium.

B.Sc. Sem. IV

Inorganic chemistry-it includes the study of coordination compound, non aqueous solvents, reduction and oxidation reactions, chemistry of lanthanides and actinides, bioinorganic chemistry. it gives the information of redox reaction which occurs in various phases in various fields and bioinorganic chemistry helps to understand the role of essential and trace elements in our body and also tells us about the consequences of loss and excess of these elements in our body.

Organic chemistry- it describes the study of carboxylic acid, carboxylic acid derivatives, ether and peroxide, heterocyclic compound, organomettalic compounds

B.Sc. Sem. V

Physical chemistry-it include the study of electrochemistry 1, electrochemistry 2, nuclear chemistry, spectroscopy, rotational, vibrational and electronic spectrum .electrochemistry deals with the study of electrochemical cells so it provide information about cell potential and voltage and play very important role in our daily life .

Inorganic chemistry- it describe the study of metal-ligand bonding in transition metals , magnetic properties of transition metals, thermodynamics and kinetic aspects of transition metals, organomettalic chemistry.

B.Sc. Sem. VI

Physical chemistry- it describes the study of quantum mechanics 1 and quantum mechanics 2, solid state ,photochemistry. Photochemistry involve the study of reactions which occurs in the presence of light so the reaction like photosynthesis by which plants prepare their food give vital information to students also it involve the study of black body radiations, solar plants ,solar panels etc

Organic chemistry- it deals with the study of UV spectroscopy, IR spectroscopy, NMR, carbohydrates, enolates, organosulphur compounds, amino acid and proteins. It gives information about the reactions carry in ultraviolet radiations, infra red radiations any many active intermediates in reactions.

Botany

B. Sc. Sem I
Subject- Diversity of microbes
 Diversity of microbes refers to various types of unicellular creatures, bacteria, fungi, algae and Protista etcetera. Micro-organisms serves as the mainstay of Tartary in chemistry and molecular diversity in nature, establishing the basis for ecological processes like biochemical cycles, food chains, and also maintaining essential relationship among themselves and with higher organisms. It also provide knowledge that how to maintain and conserve global genetic resources.

B. Sc. Sem I
 Subject- Diversity of cryptogams
 It describes the detailed study of bryophytes and Pteridophytes, classification of hepaticopsida, anthocerotopsida and bryopsida. Pteridophytes include first vascular plant classification of psilopsida, lycopsida, sphenopsida, Pteropsida, their structure and reproduction.

B. Sc. Sem II
Subject- Cell Biology

 Cell biology provide knowledge to understand the structure and physiological functions of individual cell, how they interact with environment and how large number of cells co-ordinate with each other to form tissues and organisms.

B. Sc. Sem II
Subject- Genetics

It defines the mechanism of transmission of characters, resemblances and differences from parental generation to their offspring through heredity, variation and environmental factors. It is divided into three areas- classical, molecular and evolutionary genetics. In classical genetics, we concerned with the Mendel's principal, sex determination, sex linkage and cytogenetic. Molecular genetics is a study of genetic material, its structure, replication and expression as well as the information revolution emanating from the discoveries of recombinant techniques. Evolutionary genetics is the study of mechanisms of evolutionary changes or changes in gene frequency in population (population genetics).

B. Sc. Sem III
Subject- Structure, Development and Reproduction in Flowering plants -I
It gives the basic body plan of flowering plants, diversity in plant forms according to their life span, growth pattern and architecture of their development. It describes shoot system including shoot meristem and its histological organization. It also provides description of different tissues and secondary growth. It gives general account of wood in relation to conduction, characteristics of growth rings, role of woody skeleton. It also give detail development arrangement and diversity in size and shape, internal structure of leaf in relation to photosynthesis, water loss, different adaptations to water stress, senescence and abscission.

B. Sc. Sem III
Subject- Structure, Development and Reproduction in Flowering plants -II
It describes about root system and its pattern of growth, differentiation of tissues, its structural modification for storage respiration, reproduction and for interaction with microbes. It also describe vegetative and sexual reproduction including different methods like budding and grafting. It also enlighten about detailed structure of flower, development varieties of flowers, the formation of fruit embryo development, endosperm, types of pollination, seed development, significance of seeds and dispersal strategies. It improves the knowledge of plants, its development and functioning and know the different methods to grow more plants in short time which are of more important characters.

B. Sc. Sem IV
Subject- Diversity of seed plants and their systematic-I
In this course, we study variations and relationships among seed plants that is Gymnosperms and Angiosperms. It describes their evolutionary habits and also includes their fossils and living diversity. It gives detailed study of morphology of vegetative and reproductive parts of plants, and also about reproduction and life cycle.

B. Sc. Sem IV
Subject- Diversity of seed plants and their systematic-II
This course describes about Angiosperm taxonomy, its history, aims and fundamental components, identification keys and taxonomic literature. It also includes botanical nomenclature, its taxonomic ranks. It also states about contribution of cytology and photochemistry and taximetrics of taxonomy. it also give classification by different botanists. It gives diversity of flowering plants by giving examples of different plants of their respective families. This subject spans a broad range of related areas including making cladistic and phenetic evolution, taxonomy, cytology and photochemistry.
B. Sc. Sem V

Subject- Biochemistry and Biotechnology

Biochemistry is the study of chemical substances and processes that occur in plants and of the changes they undergo during development and life. It is also an important tool for understanding diseases and developing new treatments. It is also used in the food industry to develop new products and improve the quality of food. Biotechnology provides knowledge to develop the process of micro propagation system, a new method of plant breeding for producing many plant species and new varieties with highly desirable characteristics.

B. Sc. Sem V

Subject- Plant Physiology

Plant physiology deals with different plant structures and their functioning. It also enables analyzing different processes in plants like photosynthesis, mineral nutrition, respiration, transportation, plant development, and growth which traits displayed by living organisms or entities. It is also important to understand the effects of environment change on local and large scale ecological health.

B. Sc. Sem VI

Subject- Ecology

Ecology provides knowledge of interdependence between living organisms including human and their physical environment which is vital for food production, maintaining different types of pollution free environment and sustaining biodiversity in a changing climate. It also provides information about the benefits of ecosystem and how we can use our planet's resources in ways that leave the environment healthy for future generations. This course also enables us to understand how to conserve the biodiversity.

B. Sc. Sem VI

Subject- Economic Botany

   It is the interaction of human beings with plants and also with other fields like agronomy, horticulture, medicines, nutrition and pharmacology. In this course, we also study how some plants are used as medicine instead of prescription medications. A botanist may study the different plants to learn how it propagates and where it grows naturally. Economic botany also helps botanists to find sustainable ways to use of plants, their effects on human beings and our dynamic planet.

Zoology Course outcomes

B. Sc. Sem I

Paper A: Cell Bio

It includes learning how cells work, how they interact with each other to play important physiological functions and what happens when they don't. It deals with all cytological aspects of cells i.e., their structure, cell cycle, cell growth and division and what important role they play individually as well as cumulatively. A single cell consists of numerous organelles like nucleus which is cell's main controlling unit and play important role in transfer of hereditary information and mitochondria which is power house of cell, ribosome

(protein factory of cells) and others like Golgi bodies, lysosomes cell membrane etc. Cells also deals with pathogens that enters human body to cause diseases and cells defend against them through immune system. And when cells get altered they cause dreadful disease like cancer.

B. Sc. Sem I & II

Subject Non-Chordates

Non-chordates are animals that do not have a notochord (backbone). Non-chordates respire through gills, trachea or body surfaces rather than lungs. They are ectothermic (cold blooded). They have a central nervous system but may or may not have a brain. Non-chordates do not have pharyngeal gill slits and they may or may not have a heart. Study of non-chordates helps us to have various economic benefits like: yielding honey from honey bees, production of silk from silk moth, formation of pearls from different molluscans, production of previous corals from cnidarians, sponges have been used for various purposes like bathing, washing and scrubbing floors from ancient times. Moreover, there are many medicinal uses of some non-chordates, for example, leeches are still widely used in blood-letting, honey bee venom is used for curing rheumatism and arthritis. "Allantoin" obtained from maggot larvae is said to be effective in treating deep wounds. Adding more, earthworms are said to be friends of farmers as they do soil rotation and their compost increase fertility of soil. Insects are helpful in pollination. However, some non-chordates are pathogen which cause harm to the host.

B. Sc. Sem II

Subject- Ecology

Ecology is the study of organisms, the environment and how the organisms interact with each other and their environment. It is studied at various levels, such as organism, population, community, biosphere and ecosystem. The main aim of ecology is to understand the distribution of biotic and abiotic factors of living things in the environment. Students learn various fields of ecology such as landscape ecology- which deals with exchange of energy, materials, organisms and other products of ecosystem; community ecology-which deals with how community structure is modified by interactions among living organisms. Ecology community is made up of two or more populations of different species; population ecology-deals with factors that alter and impact the genetic composition and the size of the population of organisms. Study of ecology help us in various ways like- ecology helps us to understand how our actions affect the environment, knowledge of ecology helps us to conserve the environment, with the knowledge of ecology, we are able to know which resources are necessary for survival of different organisms. Overall, study of ecology help us to conserve habitat, sources development and conservation, niche construction, knowledge about evolutionary trends, adaptations by various animals, and conservation of renewable and non-renewable sources and to control pollution.

B. Sc. Sem III

Paper A: Evolution

It emphasize on all aspects that includes how life begins on earth and how they evolved. It starts from how life begins on earth and what conditions were prevailing on primitive

atmosphere of earth so that earth is only planet where life exists. Life started on earth from primitive unicellular organisms and they get evolved in different geological time spans from unicellular to multicellular organisms, from non-chordates to chordates and in higher vertebrata from pieces to amphibians to reptiles, aves and mammals. And even some of them got mass extinction for example dinosaurs. It shows evolutionary trends on how organisms got advanced even in their own evolutionary tree also, for example evolution of human from their apes like ancestors to different lineage like *ramapathicus* which is its early ancestor to *Homo sapiens sapiens* which is today's modern man.

B. Sc. Sem III

Paper B: Chordates

Chordate is phylum of animal kingdom; it includes a large no. of animal species that bear notochord i.e. back bone. Chordates are mainly essential for an ecosystem as these vertebrates and invertebrates are the carnivores or herbivores or omnivores which help sustain said ecosystem. It includes study of different sub phyla like Urochordata, cephalochordata and Vertebrata. Among them, Vertebrata subphyla include different classes of higher chordates that include pieces, amphibians, reptiles, aves (birds) and mammals. It deals with study of all these classes with their detail morphological characters, their geographical distribution, habitat, physiological function and detail study of their internal systems i.e., digestive, respiratory, excretory, circulatory, nervous and reproductive system, and how there are some similarities and differences in the structures of different organs in these classes in the course of evolutionary development.

B. Sc. Sem IV
Paper A: Biochemistry

Biochemistry is a vast branch of science that includes combination of biology and chemistry, focusing on the life processes of living organisms at both biological and chemical level. The topic holds a lot of significance in day to day life of every living thing. In simple terms biochemistry can be called the chemistry of everyday life. It deals with structure and function of biomolecules such as proteins, lipids, carbohydrates etc. Biochemistry is essential to understand how in, digestion when different simple biomolecules are formed from breakdown of complex food and then metabolism of these biomolecules occurs through different pathways through which ultimately energy currency of cell, that is ATP is formed, then ATP is utilized by cells for their own functioning.

B. Sc. Sem IV
Subject- Animal physiology

Animal physiology is the scientific study of life-supporting properties, functions and processes of animals and their parts. In our course, we will explore the basic physiological principles common to animals, relating structure to function. Its study enlighten the knowledge of fundamental processes of digestion, respiration, blood circulation, blood cells, heart and kidney functioning, muscle and neural integration, hormones and their functions and human behavior. Knowledge of all these concepts would be beneficial to assess the impact of various physiological disorders and develop effective treatments.

B. Sc. Sem V
Subject- Genetics and Molecular biology

Genetics is the study of genes, genetic variations, and heredity in organisms. It is an important branch in biology because heredity is vital to organisms' evolution. Genetics has given rise to a number of sub fields, including molecular genetics, epigenetic and population genetics. Genetic processes work in combination with an organism's environment and to experience to influence development and behavior. Understanding genetic factors and genetic disorders is important in learning more about promoting health and preventing disease. Some genetic changes have been associated with an increased risk of having a child with a birth defect/defects or developmental disability or developing diseases such as cancer or heart disease. Chromosomal abnormalities are also assessed with the study of genetics. While discussing more about genetics, the study of DNA, RNA, transcription and translation, are studied under the branch of molecular biology, so overall molecular biology plays a critical role in the understanding of structures, functions and internal controls with individual cells, all of which can be used to efficiently target new drugs, diagnose disease and better understand cell physiology.

B. Sc. Sem V
Subject- Developmental Biology

Developmental biology is the field of biology that studies the processes by which multicellular organisms grow and develop, controlled by their genes. Majorly program areas for the branch include early embryonic development and differentiation, biomechanics of development, developmental neurobiology and neural crest differentiation, organogenesis, regeneration and regenerative medicine. While discussing the importance of this subject, let us know that one of the key issues related to our life and sustention of species, the control of fertility and infertility. The understanding of estrous cycle and development of sexual organs and gametes help us control conception and increase fertility. The development of in-vitro fertilization technology is another good example of the field. Since the development of IVF and other assisted reproductive technologies, many couples regain their hope to have biological babies. The study and knowledge of stem cells helped us to create regenerative medicines or to correct various other disorders where cells or tissues go damage.

B. Sc. Sem VI

Paper A: Medical zoology (Option-1)

It includes introduction to parasitology, study of different diseases in humans caused by parasites that are mainly bacteria, viruses and other protozoans, flat worms and round worms that are parasites on humans. Study of parasites emphasizes on parasites with their geographical distribution, morphology, life history, mode of infection, pathogenicity and their preventive measures. Many of them were scourge on mankind as these were dreadful diseases for mankind like smallpox, cholera, plague. Diseases like malaria, dengue, dengue haemorrhagic fever, chikengunia etc. are diseases carried by arthropod vectors i.e., female mosquitoes (Culex, Aedes, Anopheles etc.), so this provides vital information for prevention of these diseases by taking offensive, defensive measures against these arthropod vectors

(mosquito). Medical Zoology deals with all aspects of human diseases and their prevention for better life.

B. Sc. Sem VI
Paper B: Medical Lab Technology (Option-1)

Medical Lab Technology is emerging field of biology as it is diagnostic tool for diagnosis of various health related conditions and diseases, by performing qualitative and quantitative screening test procedures so that appropriate treatments can be provided to patients for their better survival. In this various samples of patients are tested for diagnosis like blood, sputum, CSF, urine etc. so that screening of present condition of disease can be determined i.e., disease is at beginning stage or at which stage. As appropriate diagnosis favors appropriate treatment and misdiagnose can lead to failed treatment. In recent times, the increased demand on laboratory has led to the introduction of more specialized and sophisticated procedures including automation and computerization.

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PHYSICS

SEMESTER–I

PAPER–A: MECHANICS

Cartesian and spherical polar co–ordinate systems, area, volume, velocity and Acceleration in
these systems. Solid angle, Relationship of conservation laws and symmetries of space and
time

Various forces in Nature (Brief introduction) centre of mass, equivalent one body problem,
central forces, equation of motion under central force, equation of orbit and turning points.
Kepler Laws .Concept of Ether and Michel son–Morley experiment.

Inertial frame of reference .Galilean transformation and Invariance. Non Inertial frames, coriolis force and its applications. Variation of acceleration due to gravity with latitude. Focault pendulum

Elastic collision in Lab and C.M. system, velocities, angles and energies, crosss section of elastic scattering, Rutherford scattering.Rigid Body motion; Rotational motion, principal moments and Axes. Euler's equations, precession and elementary gyroscope.

SEMESTER–II

PAPER–A: RELATIVITY AND ELECTROMAGNETISM

Postulates of special theory of relatively. Lorentz transformations, observer and viewer in relativity. Relativity of simultaneity, Length, Time, velocities. Relativistic Dopper effect. Variation of mass with velocity, mass–energy equivalence, rest mass in an inelastic collision, relativistic momentum & energy, their transformation, concepts of Minkowski space, four vector

Invariance of charge, E in different frames of references. Fiels of a point charge moving with constant velocity, Lorentz's force, Definition of B. Biot Savart's Law and its application to long straight wire, circular current loop and solenoid. Ampere's Circuital law and its application. Divergence and curl of B. Hall effect, derivation of Hall co–efficient. Vector potential, current– density and its applications. Transformation equation of E and B from one frame to another.

Faraday's Law of EM induction, Displacement current, Mutual inductance and reciprocity theorem. Self inductance, L for solenoid, Coupling of Electrical circuits. Analysis of LCR series and parallel resonant circuits, Q–factor, Power consumed, power factor.

Maxwell's equations their derivation and characterizations, E.M. waves and wave equation in a medium having finite permeability and permitivity but with conductivity σ). Poynting vector, Impedance of a dielectric to EM waves. EM waves in a conducting medium and Skin depth. EMwave velocity in a conductor and anomalous dispersion. Response of a conducting medium to EMwaves. Reflection and transmission of EM waves at a boundary of two dielectric media for normal and oblique incidence

SEMESTER–III

STATISTICAL PHYSICS & THERMODYNAMICS

Basic ideas of Statistical Physics, Scope of Statistical Physics, Basic ideas about probability, Distribution of four distinguishable particles into compartments of equal size. Concept of macrostates, microstates, Thermodynamic Probability, Effects of constraints on the system. Distribution of particles in two compartments. Deviation from the state of maximum probability. Equilibrium state of dynamic system. Distribution of distinguishable n particles in k compartments of unequal sizes.

Phase space and division into elementary cells. Three kinds of statistics. The basic approach in three statistics. Maxwell Boltzman (MB) statistics applied to an ideal gas in equilibrium. Experimental verification of law of distribution of molecular speeds. Need for Quantum

Statistics – B.E. Statement of planck's law of Radiation Wien's Displacement and Stefan's law. Fermi Dirac (FD) statistics. Comparison of M.B, B.E and F.D statistics.

Statistical definition of entropy, Change of entropy of system, additive naturwe of entropy, Law of increase of entropy, Reversible and irreversible processes, and their examples, work done in reversible process, examples of increase in entropy in natural processes, entropy and disorder, Brief review of Terms, Laws of Thermodynamics, Carnot Cycle, Entropy changes in carnot cycle, Applications of thermodynamics to thermoelectric effect, change of entropy along reversible path in P-V diagram. Heat death of universe

Derivation of Maxwell Thermodynamics relations, Cooling produced by adiabatic stretching, Adiabatic Compression, change of internal energy with volume, Specific heat and constant pressure and constant volume. Expression for CP- Cv, Change of state and Claypron equation

SEMESTER–IV

ATOMIC AND MOLECULAR SPECTRA

Introduction to Atomic Spectra: Observation of spectra, Types of spectra, Light sources, Spectral analysis, Units in spectroscopy, Bohr's Theory, Spectral series, Representation of spectral lines by terms, Energy level Diagram, Bohr's correspondence Principle, Ritz combination Rule, Continuum at series limit, Evidences in favour of Bohr's Theory, Experimental confirmation of Bohr's theory, Frank-Hertz Experiment.

One Electrom Atomic Spectra: Spectrum of Hydrogen atom, Line structure, Normal Zeeman effect, electron spin, Stern Gerlach experiment, spin orbit coupling, electron magnetic moment, total angular momentum, Hyperfine structure, examples of one electron systems, anomalous Zeeman effect, Lande g factor (Sodium D-Lines).

Many Electron System Spectra:Exchange symmetry of wave function, exclusion principle, shells, subshells in atoms, atomic spectra (Helium), spectra of alkaline earth atoms, LS coupling, selection rules, Regularities in atomic spectra.

Interaction energy ideas, X-ray spectra, Mosley law, Absorption spectra, Auger effect, Molecular bonding, Molecular spectra, selection rules, symmetric structure, Rotational Vibrational, electronic level and spectra of molecules, Raman spectra. Introduction to Raman spectra.

SEMESTER–V

ELECTRONICS

Concepts of current and voltage sources, p-n junction, Biasing of diode, V-I characteristics, Rectification: half wave, full wave rectifiers and bridge rectifiers, Efficiency, Ripple factor, Qualitative ideas of filter circuits (LC and π filters), Zener diode and voltage regulation, Introduction to Photonic devices (solar cell, photodiode and LED). Basic concepts of Boolean algebra, AND OR NOT and NAND Gates.

Junction transistor : Structure and working relation between different currents in transistors, Sign conventions, Amplifying action, Different configurations of a transistor and their comparison, CB and CE characteristics, Structure and characteristics of JEFT, Transistor biasing and stabilization of operating point, Voltage divider biasing circuit.

Working of CE amplifier, Amplifier analysis using h-parameters, Equivalent circuits, Determination of current gain, Power gain, Input impedance, FET amplifier and its voltage gain, Feed back in amplifiers, Different types, Voltage gain, Advantage of negative feed back, Emitter follower as negative feed back circui

Barkausen criterion of sustained oscillations, LC oscillator (tuned collector, tuned base Hartley), RC oscillators, phase shift and Wein bridge.

SEMESTER–VI

PAPER–A: RADIATION AND PARTICLE PHYSICS

Interaction of Radiation and Charged Particles With Matter: Energy loss of electrons and positrons, Positrons annihilation in condensed media, Sopping power and range of heavier charged, derivation of Bethe-Bloch formula, interaction of gamma rays with matter

Nuclear Radiation Detection: Gas-filled detectors, proportional and Geiger-Mueller counters, Scintillation detectors, semiconductor detectors, Cherenkov effect, solid state nuclear track detectors, bubble chambers, nuclear emulsions.

Accelerators: Accelerators, linear accelerators, cyclic accelerators: cyclotron, synchrocyclotron, betatron, electron and proton synchrotron, phase stability, colliding beam machines: introduction to Large Hadron Collider and Fermilab Tevatron

Elementary Particles: Historical introduction, fermions and bosons, particles and antiparticles, Classification of particles, types of interactions, electromagnetic, weak, strong interactions, gravitational interactions, Quantum numbers and conservation laws, isospin, charge conjugation, Introduction to quarks and qualitative discussion of the quark model, high energy physics units

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ECONOMICS

SEMESTER I

Core Course : Micro Economics

CO 1-Understand how demand and supply interact in various market structures to determine price and quantity of a good produced.

CO 2- Understand the links between household behaviour and the economic models of demand.

CO 3- Understand the links between production costs and the economic models of supply.

CO 4-Apply economic reasoning to individual and firm behaviour.

SEMESTER II

Core Course: Macro Economics

CO 1-Know how to define various elements of Macro Economics.

CO 2-Understand and explain the basic concepts associated with Macro Economics. Students will be able to understand National Income, investments, consumption functions and their significance.

CO 3- Students will also be made to understand the meanings of inflation and business cycles and their effects on the economy.

CO 4-Think critically about the different theories of Macro Economics, Draw diagrams to show relations between different variables, Analyze the inflation rates, national income of the country etc. .

SEMESTER III

Core Course: Indian Economy

CO 1- Will know the structure and state of Indian economy, emerging challenges for economy, different

sectors and sectoral growth. Students will get the knowledge of reasons for slow growth, problems of the sectors and different solution strategies.

CO 2- Will identify the situation of Indian Economy, better evaluate and understand the data and problems related to different indicators of growth of economy. Students will intellectually search solutions for different types of problem of whole economy.

CO 3 – Will deal with different types of data and problems of economy, students will become aware of state problems. They can be evaluated the solutions, paths for development of the economy.

CO 4 - Will able to analysis the data and economy and can apply any quantitative research technique to

evaluate economy growth, different sector contribution and role of different sectors in the growth of any other economy.

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SEMESTER IV

Core Course: International Economics and Public Finance

CO 1- Know how to define various elements of international trade.

CO 2-Understand and explain the basic concepts associated with international trade and public finance like tariffs and non-tariffs barriers, reciprocal demand, terms of trade, to distinguish between fixed and flexible exchange rates and reasons of fluctuation in these rates, taxes, public expenditure etc.

CO 3- Understand the effect of different policies made by government on international trade and revenue and expenditure of country.

CO 4- Think critically about the different theories of international trade.

SEMESTER V

Core Course: Development Economics

CO 1- Develop the ability to explain core economic terms, concepts and theories related to development of an economy.

CO 2- Demonstrate the ability to employ different policies to realize the growth objectives.

CO 3- Have knowledge of conceptual models of Economic Development.

CO 4- Have knowledge to policy determinants in the development of an economy.

CO 5- Have deeper understanding of economic situation of an economy on different parameters and variables, and have the opportunity to identify the relationship between the different economic variables for further use and policy making.

SEMESTER VI

Core Course: Quantitative Methods for Economists

CO 1- Knowledge and understanding: - Students will understand the scope and categories of the subjects.

CO 2- Students will able to understand and apply the methods to test the validity of economic theories. They can further use the techniques for research purpose.

CO 3-It enabled the students to use these methods as a tool in government, private business firms and research agencies. These statistical methods are used in forecasting, controlling and exploring data.

CO 4- Practical Skills: - Students will be familiar with Quantitative methods and their application on

Economic variables and economic theory.

CO 5- Transferable Skills: -Students will able to analysis the data of economy and can apply any quantitative research technique. They will be able to use statistical and mathematical techniques for economic variables for evaluation, to test validity of economic theory and forecast future values.

COMPUTER

Semester-I

Definition of Computer , Components of a Computer System , Generations of Computers. 2. Input Devices: Keyboard , Mouse , Source Data Automation (MICR, OCR, OMR) , Vision Input Systems , Scanners, Screen Assisted Data Entry. 3. Output Devices: Monitors , Printers , Plotters , Voice Response Units. 4. Data Storage Devices: Primary Memory , Secondary Memory , Removable Data Storage Devices. MS–Word : Introduction to Word, Introduction to Parts of Word Window (Title Bar, Menu Bar, Tool Bar, The Ruler, Status Area), Page Setup, Creating New Documents, Saving Documents, Opening an Existing documents, Insert a second document into an open document, Editing and Formatting in document, Headers and Footers, Spell Checking, Printing document, Creating a Table , Using the Table Menu and Table formatting, Borders and Shading, Templates and Wizards, Mail Merge. MS-Power

Point : Introduction to MS Power point, Power point elements, Templates, Wizards, Views, Exploring Power Point Menu, Working with Dialog Boxes, Adding Text, Adding Title, Moving Text Area, Resizing Text Boxes, Adding Art, Starting a New Slide, Starting Slide Show, Saving presentation; Printing Slides, Views (View slide sorter view, notes view, outlines view) Formatting and Enhancing text formatting, Creating Graphs (Displaying slide show and adding multi–media) MS-Excel : Introduction to Worksheet/Spreads, Features of Excel , Describe the Excel Window, Different Functions on different data in Excel, Creation of Graphs, Editing it and Formatting, Changing chart type to 2d chart or 3d chart, Creation of Worksheet, Adding, Deleting, Moving the text in Worksheet. Linking different sheets, Sorting the data, Querying the data, Filtering the data (auto and advance filters), What-if analysis, Printing a Worksheet.

Outcomes: students learn about the basics of computers and the practical implementation of creating documents, PPT, spread sheets.

Semester II

Data Representation, Introduction to Number Systems and Character Codes, Flow Charts, Problem Analysis, decision tables, pseudo codes and, algorithms. Programming Languages C: Basics of C: Introduction to C, Applications and Advantages of C, Tokens, Types of Errors Data Types: Basic & Derived Data Types, User Defined Data Types, Declaring and initializing variables. Operators and Expressions: Types of operators (Unary, Binary, Ternary), Precedence and Associativity Data I/O Functions: Types of I/O function, Formatted & Unformatted console I/O Functions. Control Statements: Jumping, Branching and Looping–Entry controlled and exit controlled, Advantages/Disadvantages of loops, difference between for, while and do–while. Arrays: Types of Arrays, One Dimensional and Two Dimensional Arrays. Strings: Introduction to Strings and String functions, array of strings. Functions: User Defined & Library Function, Function (Prototype, Declaration, Definition), Methods of passing arguments, local and global functions, Recursion. Storage Classes: Introduction to various storage classes, scope and lifetime of a variable, Storage class specifiers (auto, register, static, extern), advantages and disadvantages. Structure and Union: Introduction to structure and union, pointers with structure.

Outcomes: Students will learn the basic semantics and constructs of programming language.

Semester III

Numerical methods, Numerical methods versus numerical analysis, Errors and Measures of Errors. Non-linear Equations, Iterative Solutions, Multiple roots and other difficulties, Interpolation methods, Methods of bisection, False position Method, Newton Raphson-method. Simultaneous Solution of Equations, Gauss Elimination Method Gauss Jordan method. Gauss Siedel Method, Matrix Inversion Method. Interpolation and Curve Fitting, Lagrangian Polynomials, Newton's Methods: Forward Difference Method, Backward Difference Method Divided Difference Method. Numerical Integration and Different Tryaperzoidal Rule, Simpson's 1/3 Rule Simpson's 3/8 Rule. Numerical differentiation by Polynomial Fit Statistical Techniques Measure of Central Tendency, Preparing frequency distribution table, Mean Arithmetic, Mean geometric, Mean harmonic, Mean median Mode. Measure of dispersion, Skewness and Kurtosis Range, Mean deviation, Standard deviation, co- efficient of variation, Moments Skewness Kurtosis.Correlation Bivariate Distribution

Multivariate distribution. Regression B.C., Linear Regression, Multiple Regression. Trend Analysis least square fit linear trend, Non-linear trend.

Outcome: Students use computer programming to solve the typical mathematical problems and find their solutions with easy way. This thing will also settle a link between two different subjects.

Semester IV

Data Structure: Introduction to elementary Data Organization, Common Operation on Data Structures, Algorithm Complexity, Big O Notation, Time-Space Trade off between Algorithm. Arrays: Array Defined, Representing Arrays in memory, Various operations on Linear arrays, Multi Dimensional arrays. Linked Lists: Types of Linked Lists, representing linked list in memory, advantages of using linked lists over arrays, Various operations of linked lists. Stacks: Description of STACK structure, Implementation of stack, using arryas and linked lists, application of stack-converting Arithmetic expression from infix notational to polish and their subsequent evaluation, quick sort technique to sort an array. Queues: Description of queue structure, Implementation of queue using arrays and linked lists, description or priorities of queues, deques. Sorting and Searching : Sorting Algorithms, bubble sort, selection sort, insertion sort, quick sort, merge sort, heap sort, searching Algorithms, linear search and binary search. Object Oriented Programming: Objects & Classes, Constructor & Destructor, Operator Overloading, Overloading uniary operators, Overloading binary operators, Data conversion, Pitfalls of operator overloading and conversion, Inheritance, Derived class and pase, Derived class constructor. Overloading member functions, Inheritance in the English distance class, class hierarchies, Public & Private inheritance, Level of inheritance, Polymorphism, problems with single inheritance, multiple inheritance.

Outcomes: This subject teaches the students about how data is organised in the memory using both the algorithms and programming language. Algorithmic approach is used to help students to learn the things in simplified manner. C++ teaches students to implement real world problems .

Semester V

Introduction to Data, Field, Record, File, Database, Database management system., DBMS Environment, DBA, responsibilities of DBA, Structure of database system, Advantage and disadvantage, levels of database system, Data Independence, Structure and Components of DBMS, E–R diagram, different keys used in a relational system Relational model, hierarchical model, network model, comparison of these models, Relational form like INF, 2NF, 3NF, BCNF, 4th NF, 5th NF, DBTG SQL: Introduction to SQL–DDL, DML, DCL, Join methods & sub query, Union Intersection, Minus, Built in Functions Concurrency control and its management, protection, security, recovery of database. Big Data: Introduction to Big Data and Analytics, Introduction to NoSQL.

Outcomes: Students learn the basics of database and how the database is implemented and used in our real life.

Semester VI:

Internet: Introduction to Internet and its application, services offered by internet, Evolution of internet Intranet and Extranets, Internet Architectures, Internet Applications, , internet service provider (ISP), windows environment for dial up networking (connecting to internet), internet addressing (DNS) and IP addresses). WWW: Introduction, working of WWW, Web browsing (opening, viewing, saving and printing a web page and bookmark), web designing using HTML, DHTML with programming techniques. Introduction to HTML: Introduction to websites, Static vs dynamic websites, server side and client side scripting HTML 5 : Introduction , Structure of a web page , HTML Elements, HTML attributes, Basic Text Formatting tags, Comments, Links, Lists, Image, Style, Forms. Media, Classes, iframes, working with Tables : Page Design & Layout with Links CSS:Introduction to CSS and understanding CSS syntax, Adding Rules to a Style Sheet, managing style sheets (creating, Importing and embedding) Controlling page layout, Understanding grouping and nesting Styling text, Modifying background and foreground elements , Understanding tables, columns and lists ,Using global styles Understanding CSS box model, Working with images, Creating navigation bars using CSS Html Website using CSS.

Outcomes: Students learn about the basics of network types, topologies, protocols, internet uses, webpage css.

Mathematics

Semester I:

student studied the expansion of the Matrices which they have studied in higher secondary level. As in higher secondary classes student studied the Matrices and determinants but in this they studied about linear independence of row and column vectors. Their row rank, column rank. Equivalence of column and row ranks, Nullity of matrix, Applications of matrices to a system of linear (both homogeneous and non–homogeneous) equations. Cayley Hamilton theorem and its use in finding inverse of a matrix. Quadratic Forms, quadratic form as a product of matrices .Congruence of quadratic forms and matrices. Definite, semi–definite and

indefinite real quadratic forms etc. this paper also introduce the students with extended equations with higher degrees and introduce them with relations between the roots and coefficients of general polynomial equation in one variable. student studied the Descarte's rule of signs, Newton's Method of divisors, Solution of cubic equations by Cardan method, Solution of biquadratic equations by Descarte's and Ferrari's Methods.

Paper B

this paper introduce the student with extended topics of calculus as real number system and its properties, lub, glb of sets of real numbers, Basic properties of limits and Continuous functions and classification of discontinuities, Uniform continuity. also it provide information of about higher order differentiation with help of Leibnitz theorem, and derivative of hyperbolic functions Taylor's and Maclaurin's theorem with various forms of remainders,

in this paper also introduce the student with topics of complex mathematics like De–Moivre's Theorem and its applications, circular and hyperbolic functions and their inverses etc.

Semester II

Paper A

this paper will introduce the student with Asymptotes, concavity and convexity, Points of inflexion, Multiple Points, Curvature, Tracing of Curves. student studied the higher order of integration and Reduction formulae. Definite integrals. Fundamental theorem of integral calculus. Quadrature, rectification and also learn about of hyperbolic functions. Exact differential equations. First order and higher degree equations solvable for x,y,p. Clairaut's form and singular solutions. Geometrical meaning of a differential equation. Orthogonal trajectories Linear differential equations with constant and variable coefficients. Variation of Parameters method, reduction method, series solutions of differential equations. Power series method, Bessel and Legendre equations (only series solution) teached to students.

Paper B

this paper help the student to learn about Limit and Continuity of functions of two variables, Partial differentiation, Change of variables, Partial derivatives and differentiability of real–valued functions of two variables, Schwartz's and Young's Theorem, Statements of Inverse and implicit function theorems and applications. Euler's theorem on homogeneous functions, Taylor's theorem for functions of two variables, Jacobians, Envelopes. Evolutes, Maxima, Minima and saddle points of functions of two variables and do the maximum and minima with Lagrange's undetermined multiplier method. higher order of integrations like double integrals or triple integrals.

Semester III

Paper A

this paper of advance analysis of topic as sequence and series. we have studied the theorems on limits of sequences. Bounded and monotonic sequences. Cauchy's convergence criterion. Series of non-negative terms. Comparison tests. Cauchy's integral test. Ratio test. Cauchy's root test. Logarithmic test. Cauchy condensation test, Gauss test, Alternating series. Leibnitz's test. Absolute and conditional convergence. also studied the Riemann integration and improper integral, Upper and lower sums. Upper and lower integrals, Riemann

inerrability. Conditions of existence of Riemann integrability of continuous functions and of monotone functions. Algebra of integrable functions. Improper integrals and statements of their conditions of existence. Test of the convergence of improper integral, Beta and Gamma functions.

Paper B

In this paper student studied the two dimensional geometry as transformation of axes, shifting of origin, Rotation of axes in two dimension and three dimension, The invariants, Joint equation of pair of straight lines, equations of bisectors SECTION–B Parabola and its properties. Tangents and normals, Pole and polar, pair of tangents at a point, Chord of contact, equation of the chord in terms of mid point and diameter of conic. Ellipse and hyperbola with their properties, Tangents and normals, Pole and polar, pair of tangents at a point, Chord of contact, Identifications of curves represented by second degree equation (including pair of lines). In three dimensional geometry students learns about the intersection of three planes, condition for three planes to intersect in a point or along a line or to form a prism, Sphere: Section of a sphere by a plane, spheres of a given circle. Intersection of a line and a sphere. Tangent line, tangent plane, power of a point w.r.t. a sphere, radical planes.

Semester IV

Paper A

In the paper A of fourth semester and paper A of fifth semester students studied about the Mechanics which divvied in to two papers one as Statics and other as Dynamics. In statistic student studied the Composition and resolution of forces (parallelogram law, triangle law, polygon law, Lami's Theorem, (λ-μ) theorem, Resultant of a number of coplanar forces, parallel forces. Moments, Varignon's theorem of moments, Couples, Resultant of two Coplanar Couples, Equilibrium of two coplanar couples, Resultant of a force and a couple. Equilibrium of coplanar forces. Friction, Laws of friction, Equilibrium of a particle on a rough plane and Centre of Gravity. Also student learn about the topic of vector analysis as vector differentiation, Gradient, divergence and curl operators, line integrals, Vector identity, Vector integration. three theorems as Theorems of Gauss, Green, Stokes and also solve the problems.

Paper B

In this paper studied the solid geometry where they learn about the cone and cylinder as surface generated by a line moving parallel to a fixed line and through fixed curve its Different kinds of cylinders such as right circular, elliptic, hyperbolic and parabolic in standard forms and quadratic surface in very detailed. This also help the to learn about the reduction quadratic equation of second degree.

Semester V

Paper A

This topic we deals with studied of motion as Rectilinear motion in a starlight line with uniform acceleration, Newton's laws of motion, Motion of two particles connected by a string. Motion along a smooth inclined plane, Variable acceleration, Simple Harmonic Motion. Curvilinear motion of particle in a plane, Definition of velocity and acceleration, projectiles, Oscillations: Free Vibrations, Simple Pendulum, Conical Pendulum. Work, Power

and Energy: Kinetic and Potential energy, Conservative forces. Theorem of conservation of energy. Work done against gravity.

Paper B

This is the studied of number basically the natural and integer's their behaviour as Preliminaries: Proof by induction, Binomial Theorem. Divisibility in Integers: Basic Definitions and Properties, The division Algorithm, GCD, The Euclidean Algorithm, LCM, Existence and determination of solution to the linear Diophantine equation $ax + by = c$, primes-definition & Properties, the fundamental theorem of Arithmetic. Euler's Phi-function. Congrunces-definition and properties, linear congruences, existence & solution of the linear congruence, Complete and reduces residue systems, Chinese remainder theorem. Fermat's theorem, Euler's theorem, Pseudoprimes Wilson;s theorem. Application to Cryptpgraphy-Factorization methods due to Fermat.

Semester VI

Paper A

This topic introduced the student with linear algebra in very detail as definition of groups, rings and fields with examples and Definition of a vector space, subspaces with examples. Linear dependence, Linear independence of vectors. Linear combination of vectors. Basis of a Finitely generated vector spaces. Existence theorem for basis Linear transformation. Algebra of linear transformation. Rank- Nullity theorem, Isomorphism and Isomorphic spaces. Matrix of a linear transformation. Changes of basis, Linear operator.

Paper B

The paper numerical Analysis deals with study of the system of liners, non-liners equations with the help of various method as Error generation, propagation, error estimation and error bounds, Solution of non-linear equations, Bisection method, Iteration method, Newton's Method, Generalized Newton's Method, Method of false position, Muller's method, Rate of convergence of these methods. Solution of linear system of equation; Direct method, Gauss elimination variant (Gauss Jordan and Crout reduction), Triangular Method, Iterative Method, Jacobi's Method, Gauss Seidel Method. Finite Differences: Forward, Backward, Central, Divided differences, shift operator, relationship between the operators and detection of errors by use of difference operator. Interpolation with divided difference, Newton's formula, Lagrangian Method, Finite difference interpolation, Gauss formula, Stirling formula, Bessel's formula, Error Estimation, Extrapolation. Numerical differentiation, Method based on interpolation. Numerical Integration with various methods. Numerical solution of ordinary differential equations, Initial value problem, Taylor's method, Euler's methods, Picard's method, Milne's Method, Runge-Kutta Method. Predictor- Corrector's Method.

The whole syllabus design by the university for the graduation TDC classes is very effective for the further study of mathematics. It help the student to get deep knowledge of the subjects some of the topic like **linear algebra** and **numerical analysis** and **analysis** are very much helpful in competitive exam like CISR TIFFR etc.