Syllabus : B.Sc. Part-II

1. PHYSICS

Scheme :

Min. Pass Marks : 36		Max. Marks : 100
Paper-I	3 hrs.duration	Max. Marks : 33
Paper-II	3 hrs.duration	Max. Marks : 33
Paper-III	3 hrs.duration	Max. Marks : 34
Practical Min.Marks: 18	5 hrs. duration	Max. Marks : 50

Paper-I : Statistical and Thermodynamical Physics

Duration : 3 Hrs.   **M.M. 33**

Note : 10 questions are to be set taking two from each unit. Candidates have to answer five questions in all taking not more than one form each unit. The paper will have about 40 percent weightage (markwise) on problems. Teaching : 2 hrs./week

Unit 1

Thermal and adiabatic interactions:

Thermal interaction; Zeroth law of thermodynamics; System in thermal contact with a heat reservoir (canonical distribution); Energy fluctuations; Entropy of a system in a heat bath; Helmholtz free energy; Adiabatic interaction and enthalpy; General interaction and first law of thermodynamics; Infinitesimal general interaction; Gibb's free energy; Phase transitions; Clausius-Clapeyron equation; Vapour pressure curve; Heat engine and efficiency of engine, Carnot's Cycle; Thermodynamic scale as an absolute scale; Maxwell relations and their applications.

Unit 2

Production of low temperatures and applications:

Joule Thomson expansion and J T coefficients for ideal as well as van der Waal's gas, porous plug experiment, temperature inversion, Regenerative cooling, Cooling by adiabatic expansion and demagnetization; Liquid Helium, He I and He II, superfludity, Refrigeration through Helium dilution; Quest for absolute zero, Nernst heat theorem.

Unit 3

The distribution of molecular velocities:

Distribution law of molecular velocities, most probable, average and rms velocities; Energy distribution function; effusion and molecular beam, Experimental verification of the Maxwell velocity distribu-

tion; The principle of equipartition of energy.

Transport phenomena :

Mean free path, distribution of free paths, coefficients of viscocity, thermal conductivity, diffusion and their interaction.

Unit 4

Classical Statistics:

Validity of classical approximation; Phase space, micro and macro states; Thermodynamic probability, relation between entropy and thermodynamic probability; Monoatomic ideal gas; Barometric equation; Specific heat capacity of diatomic gas; Heat capacity of solids.

Unit 5

Quantum Statistics:

Black body radiation and failure of classical statistics; Postulates of quantum statistics, indistinguishibility, wave function and exchange degeneracy, a priori-probability; Bose-Einstein statistics and its distribution function; Planck distribution function and radiation formula; Fermi-Dirac statistics and its distribution function, contact potential, thermionic emission; Specific heat anomaly of metals; Nuclear spin statistics (para-and ortho-hydrogen).

Reference books:

1. Berkeley series Vol. V, Statistical Physics
2. Reif-Thermodynamics and Statistical Physics
3. Lokanathan and Khandelwal-Thermodynamics and Statistical Physics
4. Sears- Thermodynamics, Kinetic theory of gases and Statistical Physics
5. Kittle - Thermal Physics

Paper-II : OPTICS

Duration : 3 Hrs.   **M.M. 33**

Note : 10 questions are to be set taking two from each unit. Candidates have to answer five questions in all taking not more than one from each unit. The paper will have about 40 percent weightage (markswise) on problems. Teaching : 2 hrs./week

Unit 1

Elements of geometrical optics :

Fermat's principle, laws of reflection and refraction from Fermat's principle; Refraction at a spherical surface; Linear and lateral mag-

nifications; Refraction through a thick lens; Focal lengths of thick and thin lenses, combination of two lenses; Cardinal points.

Unit 2

Interference :

Superposition of waves from two point sources, necessity of coherence; Interference by division of amplitude, interference in thin films, colours of thin films in transmission and reflection; Newton's Rings; Michelson interferometer, fringes of different shapes with Michelson's interferometer.

Determination of wavelength with Michelson interferometer; Measurement of refractive index by Newton's ring and Michelson's interferometer.

Unit 3

Fraunhofer diffraction :

Fraunhofer diffraction by single slit and a circular apeature, Fraunhoffer diffraction by N parallel slits with two slits as an application, missing order, plane diffraction grating; Dispersion by a grating; Rayleigh's criterion of resolution, resolving Power of grating and telescope.

Unit 4

Fresnel's diffraction, lasers and holography :

Fresnel's diffraction by a circular aperature, straight edge and a thin slit; Zone Plate; Spontaneous and stimulated emission, Einstein's co-efficients, energy density of radiation as a result of stimulated emission and absorption; population inversion, methods of optical pumping; Energy level schemes and working of He-Ne, ruby and CO_2 laser; Basic concept of holography, construction of hologram and reconstruction of the image.

Unit 5

Polarization :

Plane electromagnetic waves, E and B of linearly, circularly and elliptically polarized EM waves; Polarization by reflection.

EM wave propagation in an anisotropy media, Huygen's theory of double refraction; Production and analysis of Plane, circularly and elliptically polarized light; Quarter and half wave plates.

Optical activity, specific rotation, biquartz and half shade polarimeters.

Reference Books :

1. Principles of Optics by B.K. Mathur

2. Optics by D.P. Khandelwal
3. Introduction to Modern Optics by A.K. Ghatak (Tata McGraw Hill)
4. Optics by Brij Lal and Subramanium.
5. An Introduction to Modern Optics by G.R. Fowels.
6. Optical Physics by Lipson and Lipson
7. Essentials of Lasers by Allen.

Paper III : Electronics and Solid State Devices

Duration : 3 Hrs. **M.M. 34**

Note : 10 questions are to be set taking two from each unit. Candidates have to answer five questions in all taking not more than one from each unit. The paper will have about 40 percent weightage (markswise) on problems. Teaching : 2 hrs./week

Unit 1

Circuit analysis: Networks-some important definitions, loop and nodal equations based on DC and AC circuits (Kirchhof's Laws).

Four terminal network: Ampere- volt conventions, open, close and hybrid parameters of any four terminal network; Input, output and mutual impendence for an active four terminal network.

Various circuit theorems: Superposition, Thevenin, Norton, reciprocity, compensation, maximum power transfer and Miller theorems.

Unit 2

Semi-conductors and rectification: Charge densities in N and P materials; Conduction by drift and diffusion of charge carriers, PN diode equation; capacitance effects.

Rectifiers: Half-wave, full wave and bridge rectifier : calculation of ripple factor, efficiency and regulation; Filters: series inductor, shunt capacitor, L section and π section filters.

Voltage regulation: Voltage regulation and voltage stabilization by Zener diode, voltage multiplier.

Unit 3

Transistor and transistor bias circuits: Notations and volt-ampere characteristics for bipolar junctions transistor; Concept of load line and operating point; Hybrid parameters.

Transistor- as amplifier: CB; CE, CC configurations; Analysis of

transistor amplifiers using hybrid parameters and its gain-frequency response; Cascade amplifiers, basic idea of direct coupled and R-C coupled amplifiers; Differential amplifiers.

Need of bias and stability of Q point: stability factors, various types of bias circuits for thermal bias stability: fixed bias, collector to base feed back bias and four resistor bias.

Unit 4.

Amplifier with feed back: Concept of feed back, positive and negative feed back, voltage and current feed back circuits.

Advantages of negative feed back: Stabilization of gain, effect of negative feed back on output and input resistance, reduction of nonlinear distortion, effect on gain - frequency response.

Oscillators: Criteria for self excited and self sustained oscillations, circuit requirement for build-up of oscillation; Basic transistor oscillator circuit and its analysis: Colpitt's and Hartely oscillators, R.C Oscillators, crystal oscillators and its advantages.

Unit 5

Field effect transistors and logic circuits: Junction field effect transistor (JFET) and metal oxide semiconductor field effect transistor (MOSFET): circuit symbols, biasing and volt-ampere characteristics, source follower operation of JFET, FET as variable voltage resister.

Logic circuits: Logic fundamentals: AND, OR, NOT, NOR, NAND, XOR gates, Boolean algebra, De Morgan's theorem, positive and negative logic, logic gates circuit realization using DTL and TTL logic, simplification of Boolean expressions.

Reference books :

1. John D. Ryder, Electronic Fundamentals and Applications, Prentice Hall of India Pvt. Ltd., New Delhi.

2. John D. Ryder, Engineering Electronics, McGraw Hill Book Company, New Delhi.

3. Jacob Millman and Christosc Hailkias, Integrated Electronics. Analog and Digital Circuits and systems: McGraw-Hill Ltd. (1972)

4. Albert Paul Malvino, Digital Computer Electronics, Tata McGraw- Hill Pub. Co. Ltd., New Delhi (1983).

5. Kumar & Gupta, Hand book of Electronics.

6. G.K. Mithal, Hand Book of Electronics.

7. G.K. Mithal, Electronics Devices and Applications.
8. R.P. Jain, Digital Electronics.

PRACTICAL

Teaching : 4 hrs/week

Practical One-Paper

Min Pass Marks : 18

5 hrs. duration

Max. Marks : 50

Note : Total number of experiments to be performed by the students during the session should be 16 selecting any 8 from each section.

Section-A

1. Study of dependence of velocity of wave propagation on line parameter using torsional wave apparatus.
2. Study of variation of reflection coefficient of nature of termination using torsional wave apparatus.
3. Using platinum resistance thermometer find the melting point of a given substance.
4. Using Newton's rings method find out the wave length of a monochromatic source and find the refractive index of liquid.
5. Using Micheloson's interferometer find out the wavelength of given monochromatic source (Sodium Light)
6. To determine dispersive power of prism.
7. To determine wave length of sodium light using grating.
8. To determine wave length of sodium light using Biprism.

9. Determine the thermodynamic constant $\gamma = \dfrac{c_p}{c_v}$ using Clement's & Desorme's method.

10. To determine thermal conductivity of a bad conductor by Lee's method.
11. Determination of ballistic constant of a ballistic galvanometer.
12. Study of variation of total thermal radiation with temperature.

Section-B

1. Plot thermo emf versus temperature graph and find the neutral temperature (Use sand bath).
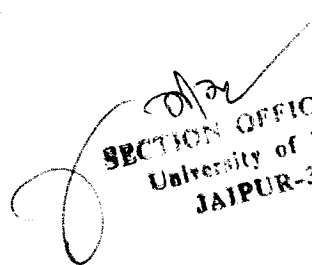2. Study of power supply using two diodes/bridge rectifier with various filter circuits.

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3. Study of half wave rectifier using single diode and application of L and π section filters.

4. To study characteristics of a given transistor PNP/NPN (common emitter, common base and common collector configurtainos).

5. Determination of band gap using a junction diode.

6. Determination of power factor (cos θ) of a given coil using CRO.

7. Study of single stage transistor audio amplifier (variation of gain with frequency).

8. To determine e/m by Thomson's method.

9. Determination of velocity of sound in air by standing wave method using speaker, microphone and CRO.

10. Measurement of inductance of a coil by Anderson's bridge.

11. Measurement of capacitance and dielectric constant of a liquid and gang condensor by de-Sauty bridge.

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2. CHEMISTRY

Scheme :

Paper	Duration	Max. Marks	Min. Pass Marks
Paper I	3 hrs. duration	33	
Paper-II	3 hrs. duration	33	36
Paper-III	3 hrs. duration	34	
Practical	5 hrs duration	50	18

Note : 10 questions are to be set taking two from each unit. The student will attempt 5 questions selecting one question from each unit.

CH-201 : Inorganic Chemistry-I (2 Hrs. or 3 periods/week)

Unit-I

Chemistry of Elements of First Transition series

Characteristic properties of *d*-block elements.

Properties of the elements of the first transition series, their binary compounds and complexes illustrating relative stability of their oxidation states, coordination number and geometry.

Chemistry of Elements of Second and Third Transition Series

General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviour, spectral properties and stereochemistry.

Unit-II

Coordination Compounds

Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes.

Unit-III

Chemistry of Lanthanide and Actinide Elements

Electronic structure, oxidation states and ionic radii and lanthanide contraction, complex formation, occurrence and isolation, lanthanide compounds.

General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from U, similarities between the later actinides and the later lanthanides.

Unit-IV

Oxidation and Reduction

Use of redox potential data-analysis of redox cycle, redox stability in water-Frost, latimer and Pourbaix diagrams, Principles involved in the extraction of the elements.

Unit-V

Acids and Bases

Arrhenius, Bronsted-Lowry, the Lux-Flood, solvent system and Lewis concepts of acids and bases.

Non-aqueous Solvents

Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH_3 and liquid SO_2.

CH-202 Organic Chemistry-II (2 Hrs. or 3 periods/week)

Unit-I

Electromagnetic Spectrum : An Introduction

Absorption Spectra

Ultraviolet (UV) absorption spectroscopy-absorption laws (Beer-Lambert Law) molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of slovents on transitions, effect of conjugation, Concept of chromophore and auxochrome Bathochromic, hypsochromic and hyperchromic and hypochromic shifts, UV spectra of conjugated enes and enones.

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Infrared IR absorption spectroscopy-molecular vibrations, Hook's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristics absorption of various functional groups and interpretation of IR spectra of simple organic compounds.

Unit-II

Alcohols

Classification and nomenclature.

Monohydric alcohols-methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters, Hydrogen bonding, Acidic nature, Reactions of alcohols.

Dihydric alcohols-methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [$Pb(OAc)_4$ and HIO_4] and pinacol-pinacolone rearrangement.

Trihydric alcohols-methods of formation, chemical reactions of glycerol.

Phenols

Nomenclature, structure and bonding, Preparation of Phenols, physical properties and acidic character. Comparative acidic strength of alcohols and phenols, resonance stabilization of phenoxide ion. Reactions of phenols, electrophilic aromatic substitution, acylation and carboxylation. Mechanisms of Fries rearrangement, Claisen rearrangement. Gatterman synthesis, Hauben-Hoesch reaction, Lederer Manasse reaction and Reimer Tiemann reaction.

Ethers and Epoxides

Nomenclature of ethers and methods of their formation, physical properties, Chemical reactions-cleavage and autooxidation, Ziesel's method.

Synthesis of epoxides. Acid and base-catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides.

Unit-III

Aldehydes and Ketones

Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the syntheses of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids. Physical properties.

Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations, Condensation with ammonia and its derivatives. Witting reaction, Mannich reaction.

Use of acetals as protecting group. Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro reaction, MPV, Clemmensen, Wolff-Kishner, $LiAlH_4$ and $NaBH_4$ reductions, Halogenation of enolizable ketones.

Unit-IV

Carboxylic Acids

Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Preparation of carboxylic acids, Reactions of Cabroxylic acids Hell-Volhard-Zelinsky reaction. Synthesis of acid chlorides, esters and amides, Reduction of carboxylic acids, Mechanism of decarboxylation.

Methods of formation and chemical reactions of halo acids. Hydroxy acids; malic, tartaric and citric acids.

Methods of formation and chemical reactions of α, β-unsaturated monocarboxylic acids.

Dicarboxylic acids : methods of formation and effect of heat and dehydrating agents (succinic, glutaric and adipic acids).

Carboxylic Acid Derivatives

Structure and nomenclature of acid chlorides, esters, amides (urea) and acid anhydrides. Relative stability of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution.

Preparation of carboxylic acid derivatives, chemical reactions, Mechanisms of esterification and hydrolysis (acidic and basic).

Unit-V

Organic Compounds of Nitrogen

Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes, Mechanisms of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline media, Picric acid.

Halonitroarenes : reactivity, Structure and nomenclature of amines, physical properties, Stereochemistry of amines. Separation of a mixture of primary, secondary and tertiary amines. Structural

features effecting basicity of amines. Amine salts as phase-transfer catalysts. Preparation of alkyl, and aryl amines (reduction of nitro compounds, Nitriles), reductive amination of aldehydic and ketonic compounds. Gabriel-phthalimide reaction, Hofmann bromamide reaction.

Reactions of amines, electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid. Diazotisation, mechanism. Synthetic transformations of aryl diazonium salts, azo coupling.

Ch-203 Physical Chemistry-III (2 Hrs. or 3 periods/week)

Unit-I

Thermodynamics-I

Definition of thermodynamic terms : system, surroundings etc. Types of systems intensive and extensive properties. State and path functions and their differentials. Thermodynamics process, concept of heat and work.

First Law of Thermodynamics : statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's law-Joule-Thomson coefficient and inversion temperature, calculation of w,q, dU & dH for the expansion of ideal gases under isothermal and adiabatic condition for reversible process.

Thermochemistry : Standard state, standard enthalpy of formation-Hess's Law of heat summation and its applications, Heat of reaction at constant pressure and at constant volume. Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy. kirchhoff's equation.

Unit-II

Thermodynamics-II

Second law of thermodynamics : Need for the law, different statements of the law, Carnot cycle and its efficiency. Carnot theorem. Thermodynamic scale of temperature.

Concept of entropy : Entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, Clausius inequality, entropy as a criteria of sponteneity and equilibrium, Entropy change in ideal gases and mixing of gases.

Third law of thermodynamics : Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions : Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities, A & G as Criteria for thermodynamic equilibrium and spontancity, their advantage over entropy change, Variation of G and A with P, V and T.

Unit-III

Chemical Equilibrium

Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Le Chatelier's principle.

Reaction isotherm and reaction isochore-Clapeyron equation and Clausius-Clapeyron equation, application.

Phase Equilibrium

Statement and meaning of the terms-phase, component and degree of freedom, derivation of Gibbs phase rule, phase equilibria of one component system-water, CO_2 and S systems, Phase equilibria of two component system-solid-liquid equilibria, simple eutectic Bi-Cd, Pb-Ag systems, desilverisation of lead.

Solid solutions-compound formation with congruent melting point (Mg-Zn) and incongruent melting point (NaCl-H_2O), (FeCl$_3$-H_2O) and $CuSO_4$-H_2O system, Freezing mixtures, acetone-dry ice.

Liquid-liquid mixtures-ideal liquid mixtures, Raoult's and Henry's law, Non-ideal system-azeotropes-HCl-H_2O and ethanol-water systems.

Partially miscible liquids-Phenol-water, trimethylamine-water nicotine water systems, Lower and upper consolute temperature, Effect of impurity on consolute temperature.

Immiscible liquids, steam distillation.

Nernst distribution law-thermodynamic derivation, applications.

Unit-IV

Electrochemistry-I

Electrical transport-conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of equivalent and specific conductance with dilution.

Migration of ions and Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes. Ostwald's dilution law its uses and limitations, Debye-Huckel

Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method and moving boundary method.

Applications of conductivity measurements : determination of degree of dissociation, determination of Ka of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations.

Unit-V

Electro chemistry-II

Types of reversible electrodes-gas-metal ion, metal-metal ion, metal-insoluble salt-anion and redox electrodes, Electrode reactions, Nernst equation, derivation of cell E.M.F. and single electrode potential, standard hydrogen electrode, reference electrodes, standard electrode potential, sign conventions, electrochemical series and its significance.

Electrolytic and Galvanic cells-reversible and irreversible cells, conventional representation of electrochemical cells.

EMF of a cell and its measurements, Computation of cell EMF. Calculation of thermodynamic quantities of cell reactions ($\Delta G, \Delta H$ and K), polarization, over potential and hydrogen overvoltage.

Concentration cell with and without transport, liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient, potentiometric titrations.

Definition of pH and pK_a, determination of pH using hydrogen quinhydrone and glass electrodes, by potentiometric methods.

PRACTICAL

CH-204 Laboratory Course-II   (4 Hrs. or 6 period/week)
Inorganic Chemistry

Calibration of fractional weights pipettes and burettes. Preparation of standard solutions.

Dilution-0.1 M to 0.001 M solutions.

Quantitative Analysis

Volumetric Analysis

(a) Determination of acetic acid in commercial vinegar using NaOH
(b) Determination of alkali content-antacid tablet using HCl.
(c) Estimation of calcium content in chalk as calcium oxalate by permanganometer.

(d) Estimation of hardness of water by EDTA.

(e) Estimation of ferrous and ferric by dichromate method.

(f) Estimation of copper using thiosulphate.

Gravimetric Analysis

Analysis of Cu as CuSCN and Ni as Ni (dimethylgloxime)

Organic Chemistry

Laboratory Techniques

A. Thin Layer Chromatography

Determination of R_f values and identification of organic compounds.

   (a) Separation of green leaf pigments (spinach leaves may be used).

   (b) Preparation and separation of 2, 4-dinitrophenyhydrazones of acetone, 2-butanone, hexan-2-and 3-one using toluene and light petroleum (40-60)

   (c) Separation of a mixture of dyes using cyclohexane and ethyl acetate (8.5 : 1.5).

B. Paper Chromatography : Ascending and Circular

Determination of R_f values and identification of organic compounds.

   (a) Separation of a mixture of phenylalanine and glycine. Alanine and aspartic acid, leucine and glutamic acid. Spray reagent-ninhydrin.

   (b) Separation of a mixture of DL-alanine, glycine and L-Leucine using n-butanol : acetic acid : water (4:1:5), Spray reagent-ninhydrin.

   (c) Separation of monosaccharides-a mixture of D-galactose and D-fructose using n-butanol : acetone : water (4 : 5 : 1) Spray reagent-aniline hydrogen phthalate.

Qualitative Analysis

Identification of an organic compound through the functional group analysis, determination of melting point and preparation of suitable derivatives.

Physical Chemistry

Transition Temperature

1. Determination of the transition temperature of the given substance by thermometric/dialometric method (e.g. $MnCl_2 4H_2O$/ $SrBr_2 2H_2O$).

Phase Equilibrium

1. To study the effect of a solute (e.g. NaCl, succinic acid) on the critical solution temperature of two partially miscible liquids (e.g. phenol-water system) and to determine the concentration of that solute in the given phenol-water system.

2. To construct the phase diagram of two component (e.g. diphenylamine-benzophenone) system by cooling curve method.

Thermochemistry

1. To determine the solubility of benzoic acid at different temperatures and to determine ΔH of the dissolution process.

2. To determine the enthalpy of neutralisation of a weak acid/weak base versus strong base/strong acid and determine the enthalpy of ionization of the weak acid/weak base.

3. To determine the enthalpy of solution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using Born Haber cycle.

(Instruction to examiners)

B.Sc. Part II Chemistry Practical (Pass course)

Max. Marks:50   Duration of Exam.:5 hrs.   Minimum Pass Marks:18

Inorganic Chemistry

Volumetric Analysis

Or

Gravimetric Analysis as mentioned in the syllabus   16

Organic Chemistry

Identification of an organic compound through the functional group analysis, determination of melting point and preparation of suitable derivatives.

Or

Perform one experiment out of 6 experiment on thin layer and paper chromatography.

Physical Chemistry   12

Perform one of the 6 physical chemistry experiments as mentioned in the syllabus.

Viva-voce   12

Record   5

                                                               5

                                                              50

3. ZOOLOGY

Scheme :

Min. Marks : 36

	Max. Marks : 100
3 Hrs. duration	Marks : 33
3 Hrs. duration	Marks : 33
3 Hrs. duration	Marks : 34
4 Hrs. duration	Marks : 50

Note :

1. The will be two parts of every theory question paper with total duration of 3 hours. First part of question paper will comprise question No.-1 containing 9 (paper I & II)/10 (paper - III) very short answer (maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Question should be evenly distributed covering entire syllabus.

   Second part of the question paper will be of long answer type question having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part i.e. three from each unit/section, out of which candidate will be required to attempt any four questions selecting at least one question from each unit/section. Each question will carry 6 marks.

2. The candidate has to answer all questions in the main answer book only.

Paper-I
Z-201 : Structure and Functions of Invertebrate Types
Section-A

Structure and functional organization of vital systems of non-choradates as exemplified by Amoeba, Paramecium, Euglena, Obelia, Sycon, Fasciola, Taenia, Nereis, Hirudinaria, Palaemon, Lamellidens, Pila and Aseterias :

1. Locomotion : Pseudopodal (Amoeba), ciliary (Paramecium) and flagellar (Euglena); Parapodial (Nereis); Pedal-Muscular foot (Pila) and tube-feet (Asterias).

2. Skeleton : Endoskeleton (Spicules of Sycon), Exoskeleton; chitinous (Palaemon), calcareous (Corals, Pila, Lamellidens and Asterias), siliceous (Radiolaria).

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3. Nervous System : Sensory and nerve cells (Obelia); brain ring and longitudinal nerves (Fasciola and Taenia) : brain and ventral nerve cord (Nereis, Palaemon); Nervous system of Pila and Lamellidens.

4. Sense-organs : Statocyst and ospharadium (Lamellidens and Pila), compound eye (Palaemon) and simple eye (Nereis, Pila); tactile and olfactory organs (Palaelmon); nuchal organs (Nereis).

Section-B
Structure and Function-II

1. Food, Feeding, Digestive Structures and Digestion : Autotrophic (Euglena); Heterotrophic : through food vacuole (Paramecium) and in hydroid and medusoid zooids (Obelia); Parastitic (Fasciola, Taenia, Hirudinaria); Predatory (Nereis, Palaemon, Asterias) : Filter-feeding (Lamellidens).

2. Respiration : Aquatic : general body surface (Euglena, Nereis, Hirudinaria); dermal bronchiease (Asterias), parapodia (Nereis), gills (Palaemon, Lemellidens, Pila); Aerial : pulmonary sac (Pila), trachea (Insect) ; anaerobic (Faciola, Taenia).

3. Excretion : General body surface (Protozoa, Sycon, Obelia); protonephridial system and flame cells (Fasciola, Taenia); nephridia (Nereis, Hirudinaria); malphighian tubules (Insect); organ of Bojanus (Lamellidens, Pila).

4. Circulation : Cyclosis (Euglena, Paramecium); diffusion (Sycon, Obelia, Fasciola, Taenia) ; open circulatory system (Hirudinaria, Palaemon, Lamellidens, Pila, Asterias); closed circulatory system (Nereis).

5. Reproduction : Asexual (Paramecium, Euglena, Sycon); alternation of generation (Obelia); sexual (Fasciola, Taenia, Nereis, Lamellidens, Pila, Hirudinaria, Asterias).

Section-C
Invertebrate Ada ptations

1. Salient features of Hemichordata.
2. Evolution of canal system of sponges.
3. Parasitic adaptations in Helminths.
4. Social organization in termites and bees.
5. Direct and indirect development in insects.
6. Water vascular system of starfish.

Paper-II
Z-202 : Animal Physiology and Biochemistry

Note :

1. The will be two parts of every theory question paper with total duration of 3 hours. First part of question paper will comprise question No.-1 containing 9 (paper I & II)/10 (paper - III) very short answer (maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Question should be evenly distributed covering entire syllabus.

   Second part of the question paper will be of long answer type question having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part i.e. three from each unit/section, out of which candidate will be required to attempt any four questions selecting at least one question from each unit/section. Each question will carry 6 marks.

2. The candidate has to answer all questions in the main answer book only.

Section-A
Animal Physiology with special reference to mammals

1. Osmoregulation, Membrane Permeability : active and passive transport across membrane.
2. Physiology of Digestion : Nature of food-stuff, various types of digestive enzymes and their digestive action in the alimentary canal.
3. Physiology of Circulation : Composition and function of blood : mechanism of blood clotting; heart beat; cardiac cycle; blood pressure; body temperature regulation.
4. Physiology of respiration : Mechanism of breathing : exchange of gases : transportation of oxygen and carbon dioxide in blood; regulation of respiration.
5. Physiology of Excretion : Kinds of nitrogenous excretory endoproducts (ammonotelic, uricotelic and ureotelic); role of liver in the formation of these end products. functional architecture of mammalian kidney tubule and formation of urine; hormonal regulation of water and electrolyte balance.

Section-B
Regulatory aspect of animals Physiology

1. Physiology of Nerve Impulse and Reflex Action : Functional architecture of a neuron, origin and propagation of nerve impulse, synaptic transmission; spinal reflex arc; central control of reflex action.
2. Physiology of Muscle Contraction : Functional architecture of skeletal muscles; chemical and biophysical events during contraction and relaxation of muscle fibers.
3. Types of Endocrine Glands, their secretions and functions : Pituitary, adrenal, thyroid, islets of Langerhans, testis and ovary.

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4. Physiology of Reproduction : Hormonal control of male and female reproduction, implantation, parturition and lactation in mammals.
5. Preliminary idea of Neurosecretion : Hypothalmic control of pituitary function, neuroendocrine and endocrine mechanism of Insects.

Section-C
Biochemistry

1. Carbohydrates : Structure, function and significance, oxidation of glucose through glycolysis, Kreb's cycle and oxidative phosphorylation; elementary knowledge of interconversion of glycogen and glucose in liver, role of insulin.
2. Proteins : Structure, function and significance. Essential and non-essential amino acids, transformation of amino acids, deamination, transamination, decarboyxlation, synthesis of protein and urea, fate of ammonia (Ornithine cycle) : fate of carbon skeleton.
3. Lipids : Structure, function and significance, Beta-oxidative pathway of fatty acids; brief account of biosynthesis of triglycerides. cholesterol and its metabolism.
4. Catabolism and biosynthesis of nucleotides.
5. Mineral Metabolism : Iodine, Iron, Calcium and Zinc.

Paper-III
Z-203 : Immunology, Microbiology & Biotechnology

Note :
1. The will be two parts of every theory question paper with total duration of 3 hours. First part of question paper will comprise question No.-1 containing 9 (paper I & II)/10 (paper - III) very short answer (maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Question should be evenly distributed covering entire syllabus.
   Second part of the question paper will be of long answer type question having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part i.e. three from each unit/section, out of which candidate will be required to attempt any four questions selecting at least one question from each unit/section. Each question will carry 6 marks.
2. The candidate has to answer all questions in the main answer book only.

Section-A
Immunology

1. Immunology : Definition, types of immunity; innate and acquired : humoral and cell mediated.
2. Antigen and Antibody : Antigenicity of molecules, haptens, antibody types.
3. Antigen-Antibody Reactions : Precipitation reaction, agglutination reaction, neutralizing reaction, complement and lytic reactions and phagocytosis.

4. Immunity Regulating Cells : Macrophages, lymphocytes (B- and T- types) T- helper cells. T-killer cells, plasma cells and memory cells.
5. Mechanism of Humoral or Antibody Mediated Immunity.

Section-B
Microbiology

1. Brief introduction to the History of Microbiology : Work of Anatony Van Leeuwenhock; theory of spontaneous generation : germ theory of fermentation and disease : work of Louis Pasteur, John Tynadal, Robert-Koch and Jenner.
2. The Prokaryota (Bacteria) : Structural organization :
    i.   Size, shapes and patterns of arrangement
    ii. Structural organization : Slime layer (capsule) : cell envelopes : cytoplasmic membrane (inner membrane). cell wall (outer membrane) of Gram negative and Gram-positive bacteria; mesosomes; cytoplasmic organization; cell projection : flagella and cilia.
3. Genetic Material of Bacteria : (i) Chromosome (ii) Replication of bacterial DNA
4. Reproduction in Bacteria : Asexual reproduction binary fission, budding, endospore formation, exospore and cyst formation; Sexual reproduction, conjugation.
5. Microbial Nutrition : Culture of Bacteria
    a. Carbon and energy source
    b. Nitrogen and minerals
    c. Organic growth factors
    d. Environmental factors : Temperature and pH
6. Bacteria of Medical Importance :
    (i) Gram-Positive :
    a. Cocci : Staphylococci, Streptococci
    b. Bacilli : Diptheria, Tetanus.
    (ii) Gram-Negative :
            a. Cocci : Gonnorrhea, Meningitis
            b. Bacilli : Diarrohea
    (iii) Mycobacteria : Tuberculosis, Leprosy
7. AIDS and Hepatitis. The causative agents, transmission, pathogenecity, laboratory diagnosis, treatment and prevention (elementary idea only).

Section-C
Biotechnology

1. Definition, history, scope and application of biotechnology, major areas of biotechnology (microbial, plant and animal biotechnology).
2. Vectors for gene transfer (plasmids and phages).
3. Basic concepts of animal cell, tissue, organ and embryo culture.
4. Protoplast fusion in prokaryotes and eukaryotes.

5. Recombinant DNA technology and hybridomas and their applications.
6. Monoclonal antibodies and their applications.
7. Genetic Engineering (outline idea only) : Applications of genetic engineering, hazards and regulations.
8. Transgenic animals, their uses in biotechnology.
9. Brief account of cloning, its advantages and disadvantages.
10. Biotechnology in Medicine (outline idea only) : P.C.R., antibiotics. vaccines, enzymes, vitamins, hormones, artificial blood.
11. Environmental Biotechnology (outline idea only) : Metal and petroleum recovery, pest control, waste-water treatment.
12. Food, Drink and Diary Biotechnology (outline idea only) : Fermented food production; dairy products, alcoholic beverages and vinegar microbial spoilage and food preservation.
13. Scope of biotechnology based industries and entrepreneurship with particular reference to Rajasthan.

Practical-B.Sc. Part-II Zoology

Min.Marks : 18   4 Hours Duration   Max.Marks. :50
(Examination : 50 Marks : 4 Hours)

I. **Study of Museum Specimens :**

Platyhelminthes : *Taenia*

Aschelminthes : *Ascaris*

Annelida : *Neanthes, Heteronereis, Aphrodite, Chaetopterus, Arenicola, Glossiphonia, Pontobdella, Polygordius.*

Onychophora : *Peripatus*

Arthropoda : *Limulus, Spider, Scorpion, Centipede, Millipede, Lepas, Balanus, Squilla. Eupagurus, Crab, Mantis, Honey-bee, Locust, Silkworm moth, Beetle, White grub.*

Mollusca : *Chiton, Aplysia, Cypraea, Mytilus, Pearl oyster, Dentalium, Loligo, Nautilus.*

Echinodermata : *Pentaceros, Echinus, Ophiothrix, Cucumaria, Antedon.*

Hemichordata : *Balanoglossus.*

II. **Study of Microscopic Slides**

Platyhelminthes : *Planaria, Fasciola,* T.S. body of Fasciola, *Miracidium, Sporocyst,* Redia and Cercaria

larva of *Fasciola*, Scolex, T.S. mature proglottid of *Taenia*, Cysticercus.

Aschelminthes	:	*Wuchereria*, *Dracunculus*
Annelida	:	T.S. body of *Nereis*
Arthropoda	:	V.S. of integument (cuticle) : *Pediculus*, Bedbug, Termite and its various types, *Cyclops*, *Daphnia*, crustacean larvae.
Mollusca	:	V.S. shell, T.S. gill of *Pila* : Glochidium.

III. Permanent Preparation and Study of the following :

Hastate plate and statocyst of Prawn : gill-lamella, radula and T.S. osphradium of *Pila*.

IV. Dissection :

Prawn/Squilla	:	External features appendages, alimentary canal and nervous system.
Pila	:	External anatomy. pallial organs and nervous system.

V. Microbiology :

1. Preparation and use of culture media for microbes.
2. Study of microbes in food materials (like curd etc.)
3. Educational tour to any Microbiology Laboratory, Dairy, Food processing factory, Distillery, Museum of natural science for first hand study, Collection of material may also be encouraged wherever possible. Candidates are expected to submit a report on such visit.

VI. Animal Physiology

1. Counting of red and white blood cells in a blood sample.
2. Estimation of haemoglobin in a blood sample.
3. Estimation of haematocrit value(PCV) in a blood sample.
4. Demonstration of enzyme activity (catalase) in liver.
5. Study of salivary digestion of starch and the effect of heat and alcohol.
6. Study of estrus cycle by vaginal smear technique in the rat/ mouse.
7. Study of histological structure of major endocrine glands of mammals.

VII. Biochemistry

1. Detection of proteins, carbohydrates and lipids in animal tissue food sample.

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2. Identification of different kinds of mono-di-and polysaccharides in the given samples.
3. Demonstration of the principle of paper chromatography.

Scheme of Practical Examination

Time : 4 Hrs.   Min. Pass Marks : 18   Max. Marks : 50

	Regular	Ex-students
1. Dissection	6	8
2. Permanent Preparation	4	6
3. Microbiological Preparation	2	3
4. Exercise in Animal Physiology	6	6
5. Exercise in Biochemistry	6	6
6. Identification and Comments on Spots (1 to 8)	16	16
7. Viva-voce	5	5
8. Class record	5	—
Total	50	50

Note :

1. With reference to dissection the candidates must be well versed with the techniques of flag labeling and black paper insertion, as the case may be for a clear illustration.
2. With reference to whole mounts and museum specimens in case of unavailability, the animal types should be substituted with diagrams, photographs, models, etc.
3. Candidates will keep a record of all work-done in the practical class and it will be submitted for inspection at the time of practical examination.
4. Emphasis should also be given on writing part, allocation separate marks.

Recommended Books :

1. Barnes, R.D. : Invertebrate Zoology, W.G. Saunders, Philadelphia.
2. Bell, J.N. and Davidson, Gh. H. : Text Book of Physiology and Biochemistry ELBS London.
3. Lehninger Principles of Biochemistry. David L. Nelson and Michael M.Cox. Macmillan worth Publishers, New York.
4. Biochemistry. Satyanarayana, U., Books and Alied (P) Ltd., Kolkata.
5. Animal Physiology and Biochemistry, Sastry K.V., Rastogi Publications, Meerut.

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6. Eckert Animal Physiology. Randall, D., Burggren W., French K. W.H. Freeman and Company, New York.
7. Biotechnology, Satyanaryana, U., Books and Allied (P) Ltd., Kolkata.
8. Biotechnology and Genomics. Gupta, P.K., Rastogi Publications Meerut.
9. Animal Physiology and Biochemistry. Bhatia, A.L. and Kohli K.S, Ramesh Book Depot, Jaipur.
10. Microbiology. Prescott, L.M., Harley J.P., Klein, D.A. McGraw Hill, New Delhi.
11. Invertebrate structure and Function. Kotpal R.L. and Singh H.S., Rastogi Publication, Meerut.

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4. BOTANY

Max Marks : 100		Min Pass Marks	: 36
Paper-I	3 hours duration	Max Marks	: 33
Paper-II	3 hours duration	Max Marks	: 33
Paper-III	3 hours duration	Max Marks	: 34
Practical	5 hours duration	Max Marks	: 50

Duration of examination of each theory paper   -   3 hours

Duration of examination of practical   -   5 hours

Note :-

1. There Will be 5 Questions in each paper. All questions are compulsory. Candidate has to answer all questions in the main answer book only.

2. Q. No. I (objective / short answer type) will have 20 questions covering entire syllabus.

3. Each paper is divided into four units. There will be one question from each unit. These Q. No. 2 to 5 will have internal choice.

Paper-I
PLANT MORPHOLOGY AND ANATOMY
(2 hrs or 3 periods per week)
Unit-1

The basic body plan of flowering plant-modular type of growth. Diversity of Plant form in annuals, biennials and perennials;

convergence of evolution of tree habit in gymnosperms, monocotyledons and dicotyledons; meristematic simple and complex and secretary tissues, tissue systems.

Unit-2

The Shoot system : The shoot apical meristem and its histological organization; vascularisation of primary shoot in monocotyledons and dicotyledons; formation of internodes; branching pattern; monopodial and sympodial growth; canopy architecture; cambium and its functions; formation of secondary xylem; a general account of wood structure growth rings; sapwood and hertwood; secondary phloem-structure and function; periderm. Anomalous secondary growth.

Unit-3

The Leaf; origin, development, arrangement and diversity in size, and shape; Stomata-Structure and types, stomatal index, vascularisation of leaf-nodal structure and venation; internal structure in relation to photosynthesis and water loss. Sensescence and abscission.

The root system : Root apical meristem; differentiation of primary and secondary tissues and their functions; structural modification for storage, respiration, reproduction and for microbial interaction with microbes.

Unit-4

Morphology and anatomy of seed (monocotyledons and dicotyledons). Significance of seed-suspended animation; ecological adaptation; Unit of genetic recombination and replenishment; dispersal strategies. Vegetative reproduction: Vegetative propagation, grafting economic aspects.

Suggested readings :

Cutter, E.G. 1969. Part I Cells and Tissues. Edward Arnold, London.

Cutter, E.G. 1971. Plant Anatomy : Experiment and interpretation part-II, organs. Educated Arnold; London.

Esau, K. 1977. Anatomy of Seed Plants, 2nd edition, John Wiley & Sons, New York.

Fahn, A. 1985. Plant Anatomy, Pergamon Press, Oxford.

Hartman, H.T. and Kestler, D.E. 1976. Plant Preparation : Principles and of India Pvt. Ltd., New Delhi.

Manseth, J.D. 1988. Plant Anatomy. The Benjamin/Cummings Publishing Co. Inc. Menlo Park, California, USA.

Roven, P.M. Evert, R.F. and Eichhien; S.E. 1999. Biology of Plants, W.H. Freeman and Co. Worth Publishers, New York.

Thomas, P. 2000. Trees Their National History. Cambridge University Press, Cambridge.

Suggested Laboratory Exercsies :

1. Study of any commonly occurring dicotyledonous plant to understand the body plan and modular type of growth.

2. Life forms exhibited by flowering plants (by visit to a forest or a garden).

3. L.S. of shoot tip to study the organization of meristem and origin of leaf primordial.

4. Monopodial and sympodial types of branching in

5. Anatomy of primary and secondary growth in monocots and dicots using hand out sections of sunflower, maize, cucurbit a stem and roots.

6. Anamolous secondary growth in stem.

7. Study of diversity in leaf shape and size. Internal structure of leaf- Dorsiventral and bilateral leaves; study of stomatal types.

8. Examination of seed (monocot and dicot). Structure

9. Specimen study of modifications of plant parts for Vegetative reproduction.

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Paper-II

CELL BIOLOGY GENETICS AND PLANT BREEDING

(2 hrs or Three periods/week)

Unit-I

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Cell Biology

Tools and techniques used in cell study; ultrastructures and functions of different cell organelles of eukaryotes and prokaryotes (cell wall, plasmamembrane, nucleus, mitochondria, chloroplast, ribosome, peroxisomes, Lysosome, golgi bodies, etc.) Chromosome organization

: (eukaryotic and prokaryotic. Chromosomes morphology; specialized types of chromosomes (Sex chromosomes, lampbrush Chromosome, Polytene chromosomes). Chromosomal aberrations; deletion, duplication, translocation, inversion, Aneuploidy and polyploidy.

Cell divisions: cell cycles, mitosis structure and functions of spindle apparatus; anaphasic chromosome movement; Meiosis, synaptonemal complex chiasmata and crossingover.

Unit-2

Genetics-I

Experimental basis for DNA as genetic material; nucleic acids : Structure of DNA and RNA and DNA replication, RNA Primers, Okazaki-fragments, polymerases exons and introns; DNA-Protein interactions, Nucleosome models; Structure of Gene; Regulation of gene expression in prokaryotes and eukaryotes; genetic code : Extra nuclear genome; presence and function of mitochondria and plastid DNA; plasmids; transposons.

Unit-3

Genetics-II

Genetic inheritance : Mendel's laws of inheritance and their exceptions; allelic (complete dominance, co-dominance and incomplete dominance, lethality) and non-allelic interactions (complementary genes, epistasis and duplicate genes), linkage and crossing over. Elementary ideas of chromosome mapping. Cytoplasmic inheritance-material influence, shell coiling in snails, Kappa particles in *Paramaecium*, Multiple allelism : ABO blood groups in men. Multiple gene inheritance : characteristics; plant height; grain colour in wheat.

Unit-4

Plant Breeding

Introduction and objectives of plant breeding; general methods of plant breeding (Introduction and acclimatization, selections, hybridizations); hybrid vigour and inbreeding depression. Role of mutation and polyploidy in plant breeding. Famous Indian and international plant breeders and their contribution National and International agricultural research institutes.

Plant breeding work done on what and rice in India green revolution

Methods of breeding in self-pollinated and cross-pollinated and vegetatively propagated crop plants.

Suggested Laboratory Exercises :

1. Study of cell structure from Onion, *Hydrilla and Spirogyra.*

2. Study of cyclosis in staminal hairs of *Tradescantia* spp.

3. Study of platids for pigment distribution in *Lycopersicon, Cassia* and *Capsicum.*

4. Study of electron microphotographs of eukaryotic cell for various cell organelles.

5. Study of electron microphotographs of virus, bacteria and eukaryotic cells for comparative cellular organization.

6. Study of different stages of mitosis and meiosis in root-tip cells and flower buds respectively of onion.

7. To solve genetic problems based upon Mendel's laws of inheritance.

8. Permament slides/photographs of different stages of mitosis and meiosis, sex chromosomes, polytene chromosome and salivary gland chromosomes.

Suggested Readings :

1. Alberts; B., Bray, D.J., Raff, M., Roberts, K. and Wasson, L.D. Molecular Biology of Cell, Garland Publishing Co., Inc., New York (2001).

2. Choudhary, H.K. : Elementary Principles of Plant Breeding. Oxford and IBM Publishing Co., New Delhi, 1989.

3. Gupta, P.K. : Cytology, Genetics, Evolution. and Plant Breeding, Rastogi Publications, Meerut (2000).

4. Miglani, G.S. : Advanced Genetics, Narosa Publishing House, New Delhi (2000).

5. Russel, P.J. Genetics. The Benejamins/Cummings Publishikng Co., Inc. U.S.A. (1998).

6. Shukla, R.S. and Chandel, P.S. : Cytogenetics, Evolution and Plant Breedings, S. Chand & Co. Ltd., New Delhi (2000).

7. Singh, R.B. : Text Book of Plant Breeding, Kalyani Publishers, Ludhiana (1999).

Paper-III
PLANT PHYSIOLOGY AND BIOCHEMISTRY
(2 hrs or Three periods/week)
Unit-1

Water relations :

Water : Structure, physiochemical properties, importance to plant life, concept of water potential. Absorption of water and Transport of water; Ascent of sap Mechanism of process : Transpiration Cuttation, stomatal movement, limiting factors.

Mineral Nutrition : Essential micro and macro nutrients; their uptake, hydroponics-and nutrient requirement deficiency and toxicity symptoms.

Transport of organic substances : Mechanisms of phloem transport, factors regulating the translocations of nutrients.

Unit-2

Metabolism :

Photosyntheis : Photosynthetic apparatus, photochemistry, pigments, light reaction, photo system I & II, Z scheme, photophosphorylation, C3 Calvin cycle, C4 cycle, photorespiration, Crassulacean acid metabolism and factors affecting the photosynthesis.

Respiration : ATP-the biological energy currency, aerobic and anaerobic respiration; Kreb's cycle electron transport system, oxidative phosphorilation, Pentose phosphate pathway, respiratory inhibitors and factors affecting the process.

Nitrogen Metabolism : Biological N_2 fixation by free living organism, symbiotic N_2 fixation, root nodules, nitrogenase and ammonium assimilation.

Unit-3

Molecules :

Carbohydrates : Importance, nomenclature, classification, structure & function of mono, di and polysaccharides, their properties, glycosidic linkages and glycoprotein.

Proteins : Importance of amino acids-structure, electrochemical properties, peptide bonds, chemical bonds and nomenclare, structure and classification of proteins, protein synthesis, physical and chemical properties.

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Enzymes : Nomenclature, EC number, characteristics of enzymes, enzyme kinetics, mechanism of action, Km value, active sites, holoenzyme, apoenzyme, coenzyme and factors, multienzyme system, regulation of enzyme activity.

Lipids : Importance of fatty acids (saturated and unsaturated) biosynthesis; Alpha and Beta oxidation.

Secondary metabolites : Concept of secondary metabolism classification and significance of secondary metabolites with special reference to flavanoids, alkaloids and steroids.

Unit-4

Phases of growth and development : Seed dormancy and germination, plant movement, "senescence Biological clock-their regulatory factors.

Photoperiodism & vernalisation; physiology and mechanism of action, concept of florigen and phytochrome.

Plant hormones : auxins, gibberellins, cytokinins, ethylene and growth retardants; discovery, bioassay & physiology.

Experimental Exercises :

1. To determine the osmotic potential of vacuolar sap by plasmolytic method.
2. To study the permeability of plasma membrane using different concentrations of organic solvents.
3. To study the effect of temperature of permeability of plasma membrane.
4. To separate chloroplast pigments by solvent method.
5. To separate chloroplast pigments using paper chromatography.
6. To separate amino acids in a mixture by paper chromatography.
7. To prepare the standard curve of protein.
8. To demonstrate the tests for proteins in the unknown samples.
9. To demonstrate the enzyme activity - Catalase, peroxidase and amylae.
10. To demonstrate the tests for different types of carbohydrates and lipids.
11. Bioassay of growth hormone (auxin, cytokinin, gibberellin)
12. Demonstration of phenomenon of osmosis by use of potato osmometer.

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13. To demonstrate root pressure
14. To demonstrate rate of transpiration by use of potometers.
15. Photosynthesis by inverted funnel method , Moll's experiment
16. To demonstrate anaerobic and aerobic respiration
17. R.Q. by Ganong's respiromater
18. Measurement of growth using auxanometer.

BOTANY PRACTICAL EXAMINATION
M.M. : 50   SKELETON PAPER.   Time : 5 hours

		Regular	ExNC
Q.No.1	Prepare T.S../L.S. of the material A provided to you. Draw a well- labelled diagram. Identify giving reasons.	(5)	(6)
Q.No.2.	Prepare T.S./L:S. of the material B provided to you. Draw a well- labelled diagram: Identify giving reasons.	(5)	(6)
Q.No.3	(a) Prepare the acetocarmine stained slide of the material C provided to you. Draw a well labelled diagram of anyone stage of nuclear division. Identify it giving reasons.	(5)	(6)
	(b) Comment and solve the problem allotted to you along with suitable reasons	(3)	(3)
Q.No.4	(a) Perform the given experiment and write the principles, procedures results and precaution involved.	(7)	(8)
	(b) Perform the chemical test of the given experiment and discuss the observation giving reasons.	(3)	(4)
Q.No.5	Comment upon spots (1-6)	(12)	(12)
Q.No.6	Viva-Voce	(5)	(5)
Q.No.7	Practical records.	(5)	(0)

(33)

5. GEOLOGY

Scheme

Min. Pass Marks : 36

Max. Marks : 100

Paper-I	3 hs. duration	Max. Marks : 50
Paper-II	3 hs. duration	Max. Marks. : 50
Practical one	3 hrs. duration	Max. Marks : 50
		Min. Pass Parks : 18

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Note : The paper will contain nine questions having three question in each section. Candidates are required to attempt five question in all taking atleast one question from each section.

Paper-I : Palaeontology and Structural Geology

Section-A

Definition, Scope, sub-division, and relationship of palaeontology with other branches.

Fossils-condition necessary for preservation, modes of preservation, uses. Elementary ideas about origin of life, evolution and fossil records.

Skeletal morphology and geological distribution of following groups :—

Foramanifers, Brachiopods. Mollusca (Lamelibranches, Gastropods and Cephalopods-Nautiloids, Ammnoids, Dibranchia), Trilobites. Echinoids, Graptoloids and Corals.

Section-B

Gondwana Flora-morphological characters of the flora : Vertebraria, Glossopteris, Gangamopteris, Ptilophyllum.

Unconformity-its kinds, recognition in the field and geological significance. Overlap and Offlap.

Inliers and Outliners. Basic Concept of cleavages. Lineation, Joints, Salt Domes.

Section-C

Attitude of planes (Bledding Planes) and lines. Dip (true and apparent, Strike, Pitch and Plunge. Uses of Clinometer/Bed : apparent and vertical thickness. Criteria to determine top and bottom sequence, Morphology of folds and faults, their geometric and genetic classification and recognition in the field. Elementary ideas of the mechanics of folding and faulting.

Practical

Palaeontology : Identification, description and drawing of different views of the following fossils :

Nummulites, Calymene, Paradoxide, Trinucleus, Phacops, Olenus, Olenellus, Terebratuala, Products, Spirifer, Rhynchonella, Atrypa, athyris, Lingula, Strophomena, Arca, Pecten, trigonia, Cardium, Hippurite, Venus, Lima, Inoceramus, Lopha, Gryphaea, Exogyra, Spondlylus, Trochus, Conus, Natica, Turritella, Physa, Murex, Cyprea, Bellerophone, Nautilus, Ganiatites, Ceratites,

Perisphinctes, Belemnite, Cidaris, Hemiaster, Glossopteris, Gangamopteris, Vertebraria, Ptillophylum.

Structural Geology : Study of physiographic features in topographical maps and use of clinometer compass, drawing profiles and geological section along given direction.

Simple dip and strike problems connected with true and apparent dips, true and vertical thickness and width of the outcrop by calculation and geometrical methods.

Completion of outcrops : Determination of thickness of beds, identification of structural features in hand specimen, drawing of profiles and section showing the following features : Simple beds, folds, faults, unconformities, overlaps, offlaps and intrusion.

Books recommended.

❖ Woods, H. : Palaeontology invertebrate.
❖ Lehmann, U., Hillmer, g. 1983; Fossil Invertebrates. Cambridge University Press.
❖ Nield, E.W. and Tucer V.C.T., 1985; Palaeontology-An Introduction, Pergamon Press.

Paper-II : Petrology

Note : The paper will contain nine question in each section. Candidates are required to attempt five questions in all selecting at least one question from each section.

Section-A

Nature and composition of magmas, plutonic, hypabysal and volcanic rocks, intrusive and extrusive forms, structure and texture. Elements of classification of igneous rocks.

Crystallization of basaltic magma, Bowen's Reaction Principle, differentiation and assimilation.
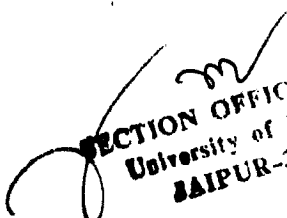
Crystallisation of unicomponent and bicomponent silicate melts. Diposide-Albite-Anorthite basalt system and variation of igneous rocks. Study of common igneous rocks-Granite, rhyolite, gabbro, basalt, Pegmatite, dolerite, syenite, diorite and peridotite.

Section-B

Process of formation of sedimentary rocks-Weathering, decomposition, disintegration, transportation and deposition. Concept of lithification and diagenesis.

Sedimentary rocks-Structure, texture, residual, mechanically transported, chemical and organic deposits. Elementary idea of sedimentary environments and provenance.

Study of common sedimentary rocks-sandstone, limestone, shale, conglomerate and greywacke.

Section-C

Metamorphism : agents and types, Concept of grade. and facies of metamorphism, Texture, structure and classification of metamorphic rocks.

Types of metamorphism and their products, Cataclastic, thermal and regional metamorphism. Dynamothermal metamorphism of argillaceous and calcareous rocks.

Retrograde metamorphism and metasomatism; anatexis. Study of important metamorphic rock, slate, schist, gneiss, granulite, marble.

Practical

Petrology : Neat drawing of different forms assumed by intrusive igneous rocks. Study and recording of the typical textures of plutonic, hypabyassal and volcanic rocks.

Megascopic study of the following igneous rocks : Granite, pegmatite, aplite, syenite, nepeline syenite, diorite, gabbro, norite, dunite, peridotite, basalts, obsidian, lamprophyre, phonolite and trachyte.

Microscopic study of the following rocks; Granite, syenite, diorite, gabbro, dunite, pyroxenite, dolerite, rhyolite and basalt.

Sedimentary and Metamorphic rocks : Study of typical textures of sedimentary and metamorphic rocks. Systematic megascopic and microscopic study of the following rocks types : Conglomerate, breccia, sandstone, arkose, greywacks, shale, limestone, slate, phyllite, schist, gneiss, marble, quartzite, migmatite and charnockite.

Book Recommended

1. Tyrrel., G.W. : The principles of Petrology, Metheum & Co. London.
2. Harker, A. : Petrology, McGraw Hill Book Co. Inc. New York.
3. William, Turner & Gilbert, Petrogaphy CBS Publisher, Delhi.
4. Jackson, J. Text Book of Lithology.
5. Hatch & Wales, Petrology.
6. Smith, H.G. : Minerals & Microscope.
7. Kerr : Optical Mineralogy, CBS Publisher, Delhi.

6. MATHEMATICS
B.A./B.Sc. PART-II-2008

Teaching : 3 Hours per Week per Theory Paper
2 Hours per Week per Batch for Practical
(20 candidates in each batch)

Examination:

	Min. Pass Marks	Max. Marks
Scheme :	Science–54	150
	Arts–72	200

		Duration	Max. Marks	Min Pass Marks
Paper-I	Real Analysis and Metric Space.	3 hrs	50 (Science) 66 (Arts)	18 (Science) 24 (Arts)
Paper-II	Differential Equations	3 hrs.	50 (Science) 66 (Arts)	18 (Science) 24 (Arts)
Paper-III	Numerical Analysis and	Theory : 2½ hrs.	32 (Science) 44 (Arts)	12 (Science) 16 (Arts)
	Vector Calculus	Practical : 2 hrs.	18 (Science) 24 (Arts)	06 (Science) 08 (Arts)

Note :

1. Papers I and II are divided into Five Units. Two questions will be set from each Unit. Candidates are required to attempt Five questions in all taking One question from each Unit. All questions carry equal marks.

2. Paper III is divided into Four Units. Two questions will be set from each Unit. Candidates are required to attempt Four questions in all taking One question from each Unit. All questions carry equal marks.

3. Common paper will be set for both the Faculties of Social Sciences and Science. However, the marks obtained by the candidate in the case of Faculty of Social Sciences will be converted according to the ratio of the maximum marks of the papers in the two Faculties.

4. Each candidate is required to appear in the Practical examination to be conducted by internal and external examiners. External examiner will be appointed by the Principal in consultation, with Local Head/Head, Department of Mathematics in the college.

5. An Internal/external examiner can conduct Practical Examination of not more than 100 (Hundred) Candidates (20 Candidates

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in one batch).

6. Each candidate has to pass in Theory and Practical examinations separately.

Paper-I : Real Analysis and Metric Space

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours   Max. Marks : 50 (Science)
66 (Arts)

Note : This paper is divided into Five Units. Two questions will be set from each Unit. Candidates are required to attempt Five questions in all taking One question from each Unit. All questions carry equal marks.

Unit 1: Real numbers as complete ordered field, Limit point, Bolzano-Weierstrass theorem, Closed and Open sets, Union and Intersection of such sets. Concept of compactness. Heine-Borel theorem. Connected sets.

Real sequences-Limit and Convergence of a sequence, Monotonic sequences.

Unit 2: Cauchy's sequences, Subsequences. Cauchy's general principle of convergence. Properties of continuous functions on closed intervals. Properties of derivable functions. Darboux's and Rolle's theorem.

Unit 3: Notion of limit and continuity for functions of two variables. Riemann integration—Lower and Upper Riemann integrals, Riemann integrability, Mean value theorem of integral calculus. Fundamental theorem of integral calculus,

Unit 4: Sequence and series of functions—Pointwise and Uniform convergence, Cauchy's criterion, Weierstrass M-test, Abel's test, Dirichlet's test for uniform convergence of series of functions, Uniform convergence and Continuity of series of functions, Term by term differentiation and integration.

Metric space—Definition and examples, Open and Closed sets, Interior and Closure of a set, Limit point of a set.

Unit 5: Subspace of a metric space, Product space, Continuous mappings, Sequence in a metric space, Cauchy sequence. Complete metric space, Baire's theorem, Compact sets and Compact spaces. Connected metric spaces.

Paper-II: Differential Equations

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours   Max. Marks : 50 (Science)
66 (Arts)

Note : This paper is divided into Five Units. Two questions will be set from each Unit. Candidates are required to attempt Five questions in all taking One question from each Unit. All questions carry equal marks.

Unit 1: Degree and order of a differential equation. Equations of first order and first degree. Equations in which the variables are separable. Homogeneous equations and equations reducible to homogeneous form. Linear equations and equations reducible to linear form. Exact differential equations and equations which can be made exact.

Unit 2: First order but higher degree differential equations solvable for x,y and p. Clairaut's form and singular solutions with Extraneous Loci. Linear differential equations with constant coefficients, Complimentary function and Particular integral.

Unit 3: Homogeneous linear differential equations, Simultaneous differential equations. Exact linear differential equations of nth order. Existence and uniqueness theorem.

Unit 4: Linear differential equations of second order. Linear independence of solutions. Solution by transformation of the equation by changing the dependent variable/independent variable, Factorization of operators, Method of variation of parameters, Method of undetermined coefficients.

Unit 5: Partial differential equations of the first order. Lagrange's linear equation. Charpit's general method of solution. Homogeneous and non-homogeneous linear partial differential equations with constant coefficients. Equations reducible to equations with constant coefficients.

Paper-III: Numerical Analysis and Vector Calculus
Teaching : 3 Hours per Week
Duration of Examination : 2½ Hours   Max. Marks : 32 (Science)
44 (Arts)

Note : (i) This paper is divided into Four Units. Two questions will be set from each Unit. Candidates are required to attempt Four questions in all taking One question from each Unit. All questions carry equal marks.

(ii) Non-Programmable Scientific Calculators are allowed.

Unit 1: Differences, Relation between differences and derivatives. Differences of a polynomial. Newton's formulae for forward and backward interpolation. Divided differences. Newton's divided difference, Interpolation formula. Lagrange's interpolation formula.

Unit 2: Central differences. Gauss's, Stirling's and Bessel's interpolation formulae. Numerical Differentiation. Derivatives from interpolation formulae. Numerical integration, Newton-Cote's formula, Trapezoidal rule, Simpson's one-third, Simpson's three-eighth and Gauss's quadrature formulae.

Unit 3: Numerical solution of algebraic and transcendental equations. Bisection method, Regula-Falsi method, Method of iteration, Newton-Rapshon method. Gauss elimination and Iterative methods (Jacobi and Gauss Seidal) for solving system of linear algebraic simultaneous equations. Solutions of ordinary differential equations of first order with initial and boundary conditions using Picard's and modified Euler's method.

Unit 4: Scalar point function. Vector point function. Differentiation and integration of vector point functions. Directional derivative. Differential operators—Gradient, Divergence and Curl. Theorems of Gauss, Green, Stokes (without proof) and problems based on these theorems.

Practical:
Teaching : 2 Hours per Week Per Batch
(20 Candidates in each Batch)

Examination		Duration : 2 Hours	
Scheme		Science	Arts
Max.Marks		18	24
Min.Pass Marks		06	08

Distribution of Marks :
Two Practicals one from each group

6 Marks each	=	12 Marks	(08 Marks each)	16
Practical Record	=	03 Marks		04
Viva-Voce	=	03 Marks		04
Total Marks	=	18 Marks		24 Marks

Group A: Numerical integration using Trapezoidal and

Simpson's rules. Numerical solution of Algebraic and Transcendental equations using (i) Iteration method (ii) Newton-Raphson method and (iii) Regula-Falsi method

Group B: Numerical solution of the system of linear equations by Jacoli and Gauss-Seidel methods Solution of linear differential equations of first order and first degree with initial and boundary conditions using Picard's and modified Euler's method.

Note :
1. Problems will be solved by using Scientific Calculators (non-Programmable)
2. Candidates must know about all functions and operations of Scientific Calculator.
3. Each Candidate (Regular/non-Collegiate) has to prepare his/her practical record.
4. Each Candidate has to pass in Practical and Theory examinations separately.

7. ECONOMICS

Scheme :	Min. Pass Marks	Max. Marks
Arts	72	200
Science	54	150
Paper-I	3 hrs. duration	Arts 100
		Science 75
Paper-II	3 hrs. duration	Arts 100
		Science 75

Note : There will be two papers of Economics. Each paper will have 3 questions from each section. In addition to these nine questions (3 questions from each section) there shall be one multiple choice objective type question in each of the two papers. This question shall be compulsory.

The candidate will be required to attempt five questions in all in each paper selecting atleast one question from each section and one compulsory multiple choice/objective type question. Each question will carry 20 marks.

The multiple choice/objective type question will consist of 20 questions of one mark each.

Paper (I)   Macroeconomics Theory

Section – A

Basic concepts- static, comparative static and dynamic macroeconomics, interdependence between microeconomics and macroeconomics, fallacy of composition; classical, neo-classical and Keynesian macroeconomics; constants and variables, dependent and independent variables, stock and flow variables, ex-ante and ex-post variables.

Circular flow of income, injection and leakages; definition, components and measurement of national income, estimation of national income in India, national income deflator, problems in measurement of national income, national income and economic welfare.

Definition of money, monetary standard, various forms of money, functions of money, supply of money , measurement of money in India- M_1, M_2, M_3 and M_4, determinants of money supply- H theory; Quantity theory of Money –Fisher and Cambridge approaches , Keynesian theory of demand for money; value of money and its changes in value of money.

Section – B

Classical theory of output and employment, Say's law of market, Keynesian theory of output, employment and income, concepts of aggregate demand, aggregate supply, effective demand, consumption function and investment function, relevance of Keynesian theory for developing economies.

Multiplier- investment multiplier, complex multiplier, government expenditure, tax and transfer payments multipliers, balanced budget multiplier and foreign trade multiplier;

acceleration principle; trade cycle – definition, phases and types, Hicks - Samuelson multiplier -accelerator interaction trade cycle model, control of trade cycles.

Section – C

Central Bank- functions of a central bank with reference to India, credit control by a central bank, quantitative and qualitative methods- bank rate; cash reserve ratio, statutory liquidity ratio, open market operations, repo rate, reverse repo rate and credit rationing, relationship between central bank and treasury.

Commercial banks- functions of commercial banks, multiple credit creation, credit multiplier and deposit multiplier, role of commercial banks in a globalized world, e-banking.

Banking reforms after 1991

Monetary policy of India and its role in promoting economic development and achieving price stability after 1991

Books Recommended

1. K.C. Rana and K.N. Verma, Macroeconomic Analysis, Vishal Publishing Company, Jalandhar, Latest Edition (Englisi & Hindi).
2. H L. Ahuja, Advanced Macroeconomic Theory, S. Chand and Co., Delhi, Latest Edition (English & Hindi).
3. Deepashree and Vanita Agarwal, Macroeconomics, Tata McGraw-Hill Education, New Delhi, 3rd Edition, Reprint 2010.

Paper – II (a)Basic Mathematics and Statistics for Economics

Section – A

Surds, indices, quadratic equation, logarithms, permutation and combination, arithmetic progression, geometric progression and harmonic progression, matrices and determinants, solution of simultaneous equations, by Cramer's rule and matrix inverse method ; differentiation – simple and partial (involving two independent variables), unconstrained and constrained maxima and minima; simple integration.

Section – B

Statistics- definition and importance, population and sample, methods of sampling, diagramming and graphical representation of data; measures of central tendency, dispersion and skewness.

Section – C

Correlation and regression. analysis of time series, index numbers. interpolation (binomial expansion and Newton's method), association of attributes

(Note: Use of calculator is permitted)

Books Recommended:

1. B.C Mehta and G.M.K. Madnani, Elementray Mathematics for use in Economics, Laxmi Narain Agarwal, Agra.

2. S.P. Gupta, Statistical Methods, Sultan Chand and Sons, New Delhi.

3. बी. सी. मेहता एवं जी एम. के. मदनानी, अर्थशास्त्र में प्रारम्भिक गणित - लक्ष्मीनारायण अग्रवाल, आगरा ।

4. कैलाश नाथ नागर सांख्यिकी के मूल तत्व, मीनाक्षी प्रकाशन, मेरठ ।

Books for References:

1. Hall and Knight, Higher Algebra

2. A. L. Nagar and R. K. Das. Basic Statistics, Oxford University Press, Bombay.

Paper – II (b) History of Economic Thought

Section – A

Mercantilism. Physiocrates, Quesnay's Table Economic. Concept of Surplus, growth theory of taxation and role of Government.

Classical school – Adam Smith, the invisible hand doctrine. Wealth of Nations, Laissez faire. Profits and wages. Modern revival of Adam Smith, Critiques of Adam Smith.

Malthus's theory of population and theory of under-competition. Ricardo-Principles of Political Economy and Taxation. Distribution theory – different rents.

Section – B

Crititics of the classical school – Sismondi, Socialist and the nationalist school Restatement of the classical position. Senior and the four postulates J.S. Mill-four prepositions and capital demand and supply bi-furcation wage fund

Rehabilitation by Cairsness, Stationery State Version non-competing groups.

Evaluation of socialist thought – Utopain, Socialism Saint Simon. Own Blane, Fourier, Proudhob, Scientific socialist

Section – C

Karl Mark – Efforts at scientific socialism. Organic composition of capital. Break down of capitalism Revival of Mark in Economics. The German Historical School and the development of Marginalism. The neo-classical school. Marshall.

Twentieth century economic thought-main features (only the rise of Keynesianism, the rise of mathematical Economics, dynamics and eco.ometrics) Critical evaluation of the development of economic thought Indian economic thought – Kautiya and Gandhi.

Books Recommended:

1. H. Haney: History of Economic Thought.
2. Eric Roll: History of Economic Thought.
3. Gide and Rist: History of Economic Doctrine
4. V C. Sinha: Arthik Vicharon Ka Itihas
5. K.L. Rangaswami: Aiavangar: Aspect of the ancient Economic Thought.
6. J. C. Kumarappa: Gandhian economic Thought.

8. GEOGRAPHY

Scheme :

Max. Marks

		For Arts 200	
		For Science 150	
Paper-I	3 hrs. duration	For Arts Max. Marks 75	
		For Science Max. Marks 50	
Paper-II	3 hrs. duration	For Arts Max. Marks 75	
		For Science Max. Marks 50	

Practical

Min. Pass Marks : 18   For Arts & Science Max. Marks 50

Note :

1. Students are permitted to use the stencils, simple calculator and Log tables wherever needed in the examination.
2. There will be a common paper for Arts/Science.
3. Ten questions will be set in top 1. Question No. 1 will be compulsory and will cover the entire course contents of the paper. Remaining Nine questions will be set ensuring three questions from each section.
4. Candidate will attempt five questions in all selecting at least one question from each section.
5. The allocation of marks will be different in Arts/Science.
6. Each question will be of 20% marks of the total.
7. Question No.1 be set in two parts :
   (a) Questions on Map (to be supplied) of 10% marks.
   (b) Objective type questions (multiple choice and very short answer) of 10% marks.
8. Practical Examination will be conducted by the Board of Examiners.

    Paper-I : Geography of Resources and Their Utilization.

Section-A

Nature, scope and significance of Resource Geography. Defini-

tion and classification of resources, resource evaluation.

Natural Resources : Distribution, exploitation, uses and conservation-forests, water, soils, fisheries, minerals (iron, mica, atomic minerals); Energy resources-coal, petroleum, non-conventional energy resources.

Section-B

Human Resources : Quantitative and Qualitative aspects, population growth, distribution and density patterns, causes of inequalities. Population and resource relationship-carrying capacity of land under different environments.

Population explosion : Causes, consequences and control. Human resource development : Problems and prospects.

Section-C

Concept and objectives of resource utilization and their conservation. Environmental and cultural constraints in resource utilization-typical examples of agriculture, water, forests, minerals and soils.

Objectives of land survey, land use classes, land capability classes and related land-use.

Resources regions of the world.

Paper-II : Human Geography
Section-A

Definition, aims and scope of Human Geography, relation of Human Geography with other social sciences. Principles of Human Geography. Essential facts of Human Geography according to Brunhes and Huntington.

Schools of thoughts in Human Geography : Determinism, Stop and go determinism and Possibilism. Races of mankind : Distribution and characteristics.

Section-B

International human migration : Causes, types and impacts in past and present times.

Principale human occupations and principale agglomerations, their ecological and distributional aspects.

Section-C

Human establishments and centers of human civilization. Building materials and house types. Types and patterns of rural & urban settlements. Causes of urbanization, principle agglomerations.

Elements of Environment and their impact on the habitat,

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economy and society of Eskimos, Pygmies, Bushman, Bhils, Gonds and Nagas.

Note : Questions will be asked on the world as a whole and its major regions and not on countries.

Books Recommended

1. Alexander, John, W : Economic Geography, Prentice Hall Ltd. New Delhi, Latest Edition.
2. Chandra, R.C.: A Geography of Population : Concepts Determinants and Patterns, Kalyani Publishers, New Delhi, 1986.
3. Stephen, G.S. Wright, J.K. & Tclaff, E.M. (eds) : A World Geography of Forest Resources, Ronald Press Co., New York.
4. Zelinsky, Willbur : A Prologue to Population Geography, Prentice Hall Inc., Englewood Cliffs, N.J. 1966.
5. Jnki, V.A. : Economic Geography, Concept Publishing Co., New Delhi, 1985.
6. Boesch, H. : A Geography of World Economy, D. Van Nostrand.
7. Jones, C.F. & Darkenwald, G.G. : Economic Geography, Macmillan Co., New York, (Latest Edition).
8. Miller, E : Geography of Manufacturing. Prentice Hall, New Jersey.
9. Chorely, R.J. : Water, Earth and Man, Methuen, London, 1967.
10. Eckstein, O : Water Resources Development, Harvard. University Press, Cambridge, Mass, 1965.
11. Fuoon : Resource Problem of Water : A World Survey Feber & Feber Grance, 1963.
12. Parapi, J.L. (ed) : Hand-Book of Water : Quality Management, Lanning Van Nostrand Reinhold, Co. N.Y. 1977.
13. Singh, R.A. and Singh S.R. : Water Management Principles and practice, Tara Publication, Varanasi, 1979.
14. I.C.A.R. : Soil & Water Conservation Research (1966-71)
15. I.C.A.R. : Soil Conservation in India.

Reference Books :

1. Hagget, Peter : Geography-A Modern Synthesis, Harper & Raw Publisher, New York, 1975.
2. Brown, L.R. : In the Human Interest, Affiliated East, East Press, New Delhi, 1976.
3. Cuitter, Susan L. Hillary, and Renwich, Willim II : Exploitation, Conservation and Preservation : A. I. Geographic Perspective

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and Natural Resource use, Rowman and Allahabad, Totwa, N.J. : 1985.

4. UNESCO : USE and Conservation of the Biosphere, Paris, 1978.
5. Clawson, Marien (ed.) Natural Preouces and International Development, New York.
6. Hussain Majid : Human Geography, Rawat Brothers, Jaipur.

Reference Books :
1. Davis, D.H. : The Earth and Man Macmillan Co. New York.
2. Huntington and Shaw : Principles of Human Geography, Champman and Hall, New York.
3. Money, D.C. : Introduction to Human Geography, University Tutorial Press, London.
4. Hussain Majid : Human Geography, Rawat Brothers, Jaipur.
5. मेहरोत्रा एण्ड सक्सेना—मानव भूगोल, लक्ष्मी नारायण अग्रवाल, आगरा
6. डॉ. कौशिक—मानव भूगोल, रस्तोगी एण्ड कम्पनी, मेरठ
7. विश्वनाथ द्विवेदी एण्ड कन्नोजिया—मानव भूगोल के सिद्धान्त, किताब महल, इलाहाबाद
8. नन्दा वल्लभ दोशी—मानव भूगोल की रूपरेखा।

Practicals

Max. marks : 50 (For Science & Arts)   Min. Marks : 18

Definition of Cartography, Types of cartographic symbols and their uses. Drawing instruments and materials.

Representation of agricultural, industrial and transport data with the help of lines, bars, squares, rectangles, circles, spheres, ring, pyramids, wheel diagrams, traffic flow diagram isochromic chart.

Classification and uses of maps and drawing of Isopleth, Choropleth, Chorochromatic, Choroschematic and Dot maps (simple, multiple and multi colour).

Application of mean, median, quartile and standard deviation in Geography, study and interpretation at least two topographical maps of India (one from mountaneous and another covering a plain area). Conventional symbols used in topographical maps.

Prismatic Compass Survey : open and closed traverse, Correction of bearings-Bowditch method and Included angles.

Distribution of marks for the purpose of examination.

1. Written Paper   3 hrs.   24 Marks
2. Record and viva   12 (7+5) Marks.

3. Field Survey and viva   2½ hrs.   14 (9+5) Marks

                                  Total   50 Marks

Notes :
1. Candidates will have to attempt three Questions out of 5 Questions.
2. The Non-Collegiate students will have to complete the practical work in consultation with the Head, Department of Geography at any one of the affiliated colleges of Rajasthan University in which Geography subject is taught and in the case of students appearing at examinations from any examination centre located in Jaipur City the practical camp shall be conducted by the University Post Graduate Geography Deptt. and the candidates will procure a certificate in this regard to be produced at the time of practical examination.

Books Recommended :
1. Monkhouse, F.J. : Maps and Diagrams, Methuen & Co., Lonin, Latest Edition.
2. Robinson, A.H. : Elements of Cartography, John Wiley and Sons New York, Latest Edition.
3. Singh, R.L. and Dutt, P.K. : Elements of Practical Geography, Students Friends, Allahabad.
4. Mishra R.P. and Ramesh A. : Fundamentals of Cartography, Macmillan, New Delhi, 1986.
5. Mahmood, Aslam : Statistical Studies, Rajesh Publishers, New Delhi.
6. Barrett E.C. and Curiti L.F. : Introduction to Environmental Remote Sensing, Chapman Hall, London 1976.
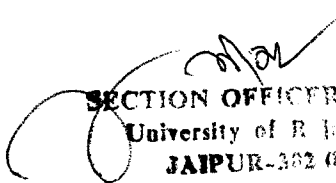
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B.Sc./B.A. Pt-II

9. STATISTICS

Marks Scheme

Paper	Nomenclature	Marks	
		Science	Arts
Paper I	Statistical Inference	50 marks	65 marks
Paper II	Statistical Applications in Society and Industry	50 marks	65 marks
Paper III	Practical based on Paper I,II	50 marks	70 marks

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	Total	150	200 Marks

Note: In each Question paper, 10 (ten) questions will be set having 2 (Two) from each unit. Candidates have to answer five questions in all, taking not more than one from each unit.

Paper I
<u>(Statistical Inference)</u>
Unit-I

Sampling from a distribution : Concept of statistic and its sampling distribution. Sampling distribution for mean of Binomial, Poisson and Normal Distribution. Chi-square Distribution: Definition, Moments, MGF, moments, C.G.F., Mode & Skewness, Limiting and Additive Property. Distribution of ratio of chi-square variates. Applications. Testing Normal Population variance, Test for Goodness of fit, Contingency table & Independence of attributes, Yate's correction.
18 hours

Unit-II

t-Distribution : Definition of Student's -t & Fisher's -t Statistic and derivations of their distributions. Constants & Limiting Property of 't'distribution. Applications-Testing of Single mean; Difference of two means; paired t-test and sample correlation coefficient. F-Distribution : Definition, Derivation, Constants, Application—Testing of equality of two variances. Relationship between t, F and chi-square Distributions.
18 hours

Unit-III

Theory of Estimation: Point Estimation-Concept and Problem for Point Estimation; Criterion of a good estimator (Unbiasedness, Methods of Maximum likelihood, Consistency, Efficiency, Sufficiency). MVUE. Method of moments. Interval Estimation-Concept, Confidence Interval, Confidence Coefficient, Construction of Confidence Interval for Population Mean, Variance, Difference of Population Means & Ratio of Variances for Normal Distributions.
18 hours

Unit-IV

Testing of Hypothesis: Simple, Composite, Null and Alternative Hypothesis. Types of error, Critical region. BCR, Neyman-Person's Lemma for BCR, BCR in case of Binomial, Poisson, and Normal and Exponential Population.
18 hours

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Unit-V

Large sample tests-Testing of single mean, proportion. Testing of difference of means and proportions. Non-Parametric Tests-Definition, Merits & Limitations. Sign test for one sample and two sample cases, Run Test, Median test.   **18 hours**

REFERENCES

1. Goon A.M. Gupta M.K., Das Gupta B. (1991) : Fundamentals of Statistics, Vol. 1, World Press, Calcutta.
2. Hodges J.L. and Lehman E.L. (1964) : Basic Concepts of Probability and Statistics, Holden Day.
3. Mood A.M., Graybill F.A. and Boes D.C. (1974) : Introduction to the Theory of Statistics, McGraw Hill.
4. Freund J.E. (2001) : Mathematical Statistics, Prentice Hall of India.
5. Gupta S.C. & Kapoor V.K. : Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.

ADDITIONAL REFERENCES

1. Bhatt B.R. Srivenkatramana T and Rao Madhava K.S. (1997) : Statistics : A Beginner's Text, Vol. II, New Age International (P) Ltd.
2. Rohatgi V.K. (1967) : An Introduction to Probability Theory and Mathematical Statistics, John Wiley & Sons.
3. Snedecor G.W. and Cochran W.G. (1967) : Statistical Methods, Iowa State University Press.
4. Dudewicz E.J. & Misra S.N. : Modern Mathematical Statistics, John Wiley and Sons.

Paper II

STATISTICAL APPLICATIONS IN SOCIETY AND INDUSTRY

Unit-I

Demographic Methods : Sources of demographic data-census, register, adhoc survey, hospital records, demographic profiles of Indian census. Measurement of mortality-Crude death rates, Infant mortality rates, Death rate by cause, Standardized death rate. Complete life table-Construction and its main features, Mortality rate and probability of dying. Relation between different columns of life table, uses of life table and its limitations. Measurement of fertility '

Crude birth rate, General fertility rate, Specific fertility rate, Total fertility rate, Gross Reproduction Rate, Net Reproduction Rate.

18 hours

Unit-II

Economic Statistics: Index numbers-Defination, Applications of index numbers, Price relatives, Quantity & Value relatives, Link and Chain Relatives. Problems involved in computation of index number. Use of averages, Simple aggregative and Weighted average methods. Laspeyre's, Paasche's and Fisher's index number. Tests for index numbers. Consumer price index. **18 hours**

Unit-III

Time Series Analysis: Definition & its different components, illustrations, additive and multiplicative models. Different Methods for determination of trend & seasonal fluctuation along with their merits & demerits. **18 hours**

Unit-IV

Educational Statistics: Methods of standardization of scales and tests, Z-scores, t-scores, Standard scores, Percentile score, Intelligence Quotient and its measurement and uses. Validity of test scores reliability of Scores and their determination. **18 hours**

Unit-V

Statistical Quality Control: Concept of SQC, Process control & Product control. Causes of variation in quality. General theory of control charts, control limits, sub-grouping. Summary of out-of control criteria. Control charts for variables: Construction of Mean and Range charts. Concept of Defects and Defectives. Control Charts for attributes: Construction of np-chart, p-chart, c-chart and their merits and demerits. **18 hours**

REFERENCES:

1. Croxton F.E., Cowden D.J. (1969): Applied General Statistics, Prentice Hall of India.

2. Duncan A.J. (1974): Quality Control and Industrial Statistics, Taraporewala and Sons.

3. Goon A.M. Gupta M.K. Das Gupta. B. (1986): Fundamentals of Statistics, Vol.II World Press, Calcutta.

4. Grant E.L. (1964): Statistical Quality Control, Mc Graw Hill.

5. Guilford J.P. & Fruchter B: Fundamental Statistics in Psychology and Education (1980). Mc Graw Hill.

6. Guilford J.P. (1954): Psychometric Method. Mc Graw Hill.
7. Srtivatava O.S. (1983): A Textbook of Demography, Vikas Publishing.
8. Gupta S.C. & Kapoor V.K.: Fundamentals of Applied Statistics, Sultan Chand and Sons., New Delhi.

ADDITIONAL REFERENCES:

1. Freeman Frank S. (1962): Psychological Testing, Oxford & IBH Publishing Co.
2. Gupta and Mukhopadhyay P.P : Applied Statistics, Central Book Agency.
3. Pressat R(1978): Statistical Demography, Methuen and Co. Ltd.

Paper III
Practical Paper

1. Tests of significance based on t, Chi-square, F. Testing of significance of sample correlation coefficient. Use of Z transformation.
2. Large sample tests for means and proportions. Tests of goodness of fit and independence of attributes in contingency tables.
3. Non parametric tests: Sign, Run, Median (for large samples)
4. Computation of mortality and fertility rates. Construction of life table.
5. Construction of Index Numbers by Laspeyre's, Paasche's, Fishers's, Chain Base Indices. Consumer price index.
6. Tests for Index numbers.
7. Determination of trend in a time series and construction of seasonal indices.
8. Drawing of $\overline{X}$, R, np, p and C-Charts.

10. APPLIED STATISTICS
Marks Scheme

Paper	Nomenclature	Marks	
		Science	Arts
Paper I	Statistical Inference	50 mark	65 marks
Paper II	Statistical Applications in Society and Industry	50 mark	65 marks
Paper III	Practical based on	50 mark	70 marks

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Paper I, II

| | Total 150 | 200 Marks |

Note: In each Question paper, 10 (ten) questions will be set having 2 (Two) from each unit. Candidates have to answer five questions in all, taking not more than one from each unit.

Paper I
Statistical Inference
Unit-I

Sampling from a distribution : Concept of statistic and its sampling distribution. Sampling distribution for mean of Binomial, Poisson and Normal Distribution. Chi-square Distribution: Definition, MGF, moments, C.G.F., Mode & Skewness and other properties (without proof). Applications.-Testing Normal Population variance, Test for Goodness of fit, Contingency Table & Independence of attributes, Yate's correction.   **18 hours**

Unit-II

t-Distribution : Definition of Student s -t & Fisher's -t Statistic. Property and Applications of t-distribution for testing-Single mean, difference of two means, observed sample correlation coefficient Paired t-test, F-Distribution : Definition, Mean, Variance & mode, Application of F distribution- Testing of equality of two variances. Relationship between t, F and chi-square Distributions. (without proof)
18 hours

Unit-III

/   Theory of Estimation: Point Estimation- Problems for Point Estimation; Criterion of a good estimator (Unbiasedness, Consistency, Efficiency, Sufficiency). MVUE. Method of moments and Methods of Maximum likelihood Interval Estimation- Confidence Interval for mean, variance, difference of means and ratio of variances for normal populations.   **18 hours**

Unit-IV

Testing of Hypothesis: Simple, Composite, Null and Alternative Hypothesis. Types of error, Critical region. BCR, Neyman-Person's Lemma (statement only) and its application. BCR in case of Binomial, Poisson, and Normal Population.   **18 hours**

Unit-V

Large sample test-Testing of single mean, proportion. Testing of difference of means and proportions. Non-Parametric Tests-Definition, Merits & Limitations. Sign test (for one sample and two sample cases) Run Test, Median test.   **18 hours**

REFERENCES

1. Goon A.M. Gupta M.K., Das Gupta B. (1991) : Fundamentals of Statistics, Vol. 1, World Press, Calcutta.
2. Hodges J.L. and Lehman E.L. (1964) : Basic Concepts of Probability and Statistics, Holden Day.
3. Mood A.M., Graybill F.A. and Boes D.C. (1974) : Introduction to the Theory of Statistics, McGraw Hill.
4. Freund J.E. (2001) : Mathematical Statistics, Prentice Hall of India.
5. Gupta S.C. & Kapoor V.K. : Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.

ADDITIONAL REFERENCES

1. Bhatt B.R. Srivenkatramana T and Rao Madhava K.S. (1997) : Statistics : A Beginner's Text, Vol. II, New Age International (P) Ltd.
2. Rohatgi V.K. (1967) : An Introduction to Probability Theory and Mathematical Statistics, John Wiley & Sons.
3. Snedecor G.W. and Cochran W.G. (1967) : Statistical Methods, Iowa State University Press.
4. Dudewicz E.J. & Misra S.N. : Modern Mathematical Statistics, John Wiley and Sons.

Paper II

STATISTICAL APPLICATIONS IN SOCIETY AND INDUSTRY
(Course contents are same as that of subject statistics.)

Unit-I

Demographic Methods : Sources of demographic data-census, register, adhoc survey, hospital records, demographic profiles of Indian census. Measurement of mortality-Crude death rates, Infant mortality rates, Death rate by cause, Standardized death rate. Complete life table-Construction and its main features, Mortality rate and probability of dying. Relation between different columns of life table, uses of life table and its limitations. Measurement of fertility : Crude birth rate, General fertility rate, Specific fertility rate, Total fertility rate, Gross Reproduction Rate, Net Reproduction Rate.　　　　18 hours

Unit-II

Economic Statistics : Index numbers-Definition, Applications of index numbers, Price relatives, Quantity & Value relatives, Link and Chain Relatives. Problems involved in computation of index number. Use of averages, Simple aggregative and Weighted average

methods. Laspeyre's Paasche's and Fisher's index number. Tests for index numbers. Consumer price index. **18 hours**

Unit-III

Time Series Analysis: Definition and its different components, illustrations, additive and multiplicative models. Different Methods for determination of trend & seasonal fluctuation along with their merits & demerits. **18 hours**

Unit-IV

Educational Statistics: Methods of standardization of scales and tests, Z-scores, t-scores, Standard scores, Percentile scores. Intelligence Quotient and its measurement and uses. Validity of test scores. Reliability of Test Scores and their determination. **18 hours**

Unit-V

Statistical Quality Control: Concept of SQC, Process control & Product control. Causes of variation in quality, General theory of control charts, control limits, sub-grouping, Summary of out-of control criteria. Control charts for variables: Construction of Mean and Range charts. Concept of Defects and Defectives. Control Charts for attributes: Construction of np-chart, p-chart, c-chart and their merits and Semerits **18 hours**

REFERENCES:

1. Croxton F.E. Cowden D.J. (1969): Applied General Statistics, Prentice Hall of India.
2. Duncan A.J. (1974): Quality Control and Industrial Statistics, Taraporewala and Sons.
3. Goon A.M. Gupta M.K. Das Gupta. B. (1986): Fundamentals of Statistics, Vol.II, World Press, Calcutta.
4. Grant E.L. (1964): Statistical Quality Control, Mc Graw Hill.
5. Guilford J.P. & Fruchter B: Fundamental Statistics in Psychology and Education (1980). Mc Graw Hill.
6. Guilford J.P. (1954): Psychometric Method. Mc Graw Hill.
7. Srtivatava O.S. (1983): A Textbook of Demography, Vikas Publishing.
8. Gupta S.C. & Kapoor V.K.: Fundamentals of Applied Statistics, Sultan Chand and Sons., New Delhi.

ADDITIONAL REFERENCES:

1. Freeman Frank S. (1962): Psychological Testing, Oxford & IBH Publishing Co.

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2. Gupta and Mukhopadhyay P.P : Applied Statistics, Central Book Agency.

3. Pressat R(1978): Statistical Demography, Methuen and Co. Ltd.

PAPER III
Practical Paper
(Course contents are same as that of subject statistics.)

1. Tests of significance based on t, Chi-square, F. Testing of significance of sample correlation coefficient mation.

2. Large sample tests for means and proportions. Tests of goodness of fit and independence of attributes in contingency tables.

3. Non parametric tests: Sign, Run, Median (for large samples)

4. Computation of mortality and fertility rates. Construction of life table.

5. Construction of Index Numbers by Laspeyre's, Paasche's, Fishers's, Chain Base Indices. Consumer price index.

6. Tests for Index numbers.

7. Determination of trend in a time series and construction of seasonal indices.

8. Drawing of $\overline{X}$, R, np, p and C-Charts.

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11. PSYCHOLOGY

B.A./B.Sc.

Max. Marks : Arts & Science
200   150

Scheme :

Paper-I	3 hrs. duration	Arts/Sci. 75/50
Paper-II	3 hrs. duration	Arts/Sci. 75/50
Paper-III	Practical	Arts/Sci. 50/50

Note :

1. There will be three papers in Psychology. Each paper will be of 3 hours. There will be a common paper for Arts and Science. In I and II paper, Questions No. 1 will be compulsory and will cover the entire course contents of the paper. Question No. 1 will contain two parts A & B. A part of the question will contain 20 questions of multiple choice. Each question will be of 3/4 marks for Arts students and of 1/2 marks for Science students. Thus A part will be of 15 marks for Arts students and of 10 marks for Science students. B part will contain 10 question to be answered in the limit of 20 words. Each question of B part will be of 1/2 marks for Arts students and of 1 mark for Science students.

2. Thus B part will be of 15 marks for Arts students and of 10 marks for Science students. Separate question paper for this objective type will be provided to each student and answers will be given in this question paper only in the space provided in the objective type question paper. Candidates will be given one hour to attempt this type question paper first compulsory question out of three hours in total time allotted for this paper. Thus total marks allotted for Arts students for first paper will be 30 and for Science students 20.

   In the second part of the question paper three questions of essay type will be attempted selecting at least one from each section. Each question will be of 15 marks for Arts students and 10 marks for Science students. Two hours will be given for attempting this part.

B.A./B.Sc. Pass Course Part-II

Paper-I Psychopathology

Section-A

1. **Introduction to Psychopathology;** The concept of normality and abnormality: Different Viewpoints; Characteristics of abnormal behaviour; Classification systems- ICD-10, DSM-IV (TR).

2. **Psychological Assessment:** Clinical Interview, Diagnostic tests- Intelligence, Neuropsychological, Personality; Behavioural and Bodily Assessment.

3. **Symptomatology and Etiology of Abnormal Behaviour:** Cognitive, Conative and Affective Symptoms; Biological, Psycho-social, Socio-cultural causes.

Section-B

4. **Anxiety Disorders-Nature and Types:** Generalized Anxiety and Panic disorder, Phobias and Obsessive Compulsive disorder.

5. **Somatoform and Mood disorder** – Nature and Types of Somatoform disorders- Conversion disorder and Hypochondriasis; Mood disorders- Depression and Bipolar disorder.

6. **Substance-Related disorders-** Substance-use and Substance-induced disorders; Alcohol-Related, Nicotine-Related and Sedative-Hypnotic or Anxiolytics-Related disorders and their treatment.

Section-C

7. **Schizophrenia** – Meaning, Clinical Symptoms, Types and Treatment.

8. **Clinical Intervention-** Psychoanalytic and Psychodynamic Therapy, Cognitive and Behaviour Therapy and Client Centered Therapy.

9. **Mental Health-** Meaning and Components, Factors Influencing Mental Health, Measures for Promoting Mental Health.

Reference Books:

1. Sarason, I.G. and Sarason, B.R. (2005) Abnormal Psychology. Delhi, Pearson Education
2. Lamm, A (1997): Introduction to Psychopathology N.Y. Sage.
3. Buss, A.H. (1999): Psychopathology, N.Y. John Wiley.
4. Arun Kumar Singh (2002), Adhunik Asamanya Manovigyan, Delhi, Motilal Banarsidas.

Paper-II Social Psychology

Section-A

1. **Introduction:** Social Psychology- Nature, Goal, Scope and New Perspectives; Methods of Social Psychology- Experimental and Non-experimental Method, Cross-cultural Research.

2. **Social Perception and Cognition:** Social Perception: Meaning, Non-verbal Communication, Attribution Theories: Correspondent Inference, Causal Attribution, Regulatory focus. Social Cognition: Schemas, Heuristics and Automatic Processing, Affect and Cognition.

3. **Attitudes:** Nature and Functions, Formation, Change and Measurement of attitudes, Attitude-Behavour Link.

Section-B

4. **Prejudice and Discrimination:** Nature and Origins, Reduction of Prejudice, Gender Stereotypes.

5. **Interpersonal Attraction:** Proximity and Affective basis; Acquaintance: Need to Affiliate, Effects of Observable Characteristics, Similarity and Mutual liking.

6. **Leadership:** Definition and Function; Types of Leadership; Trait and Situational Contingency Approaches; Leadership Training.

Section-C

7. **Communication:** Meaning and Nature, Types: Verbal and Non-Verbal; Barriers in communication.

8. **Prosocial Behaviour:** Personal, Situational and Socio-Cultural determinants. Explaining Prosocial Behaviour-The Empathy- Altruism Hypothesis, The Negative-State Relief Model, The Emphatic-Joy Hypothesis and The Genetic-Determinism Model.

9. **Aggression and Social Problems:** Aggression- Theories, Determinants, Prevention and Control; Meaning and Nature of Social Problems; Types of Social Problems-Poverty, Deprivation, Population Explosion, Economic Development; Solutions to Social Problems.

Reference Books:

1. Baron, R.A. and Byrne.D. (1998): Social Psychology, New Delhi, Prentice Hall.
2. Myers, David G (1994): Exploring Social Psychology, New York; McGraw Hill

3. अरुण कुमार सिंह (2002): समाज मनोविज्ञान की रूपरेखा' मोतीलाल बनारसीदास, दिल्ली1

Paper-III: Practical

1. Bogardus Social Distance scale
2. Sociometry
3. Measurement of Attitude
4. Measurement of Leadership
5. Measurement of Mental Health
6. Measurement of Anxiety
7. Quantification of Depression
8. Word Association Test
9. Sack's Sentence Completion test
10. Case study

11. PSYCHOLOGY

B.A./B.Sc.　　　　　　　　　　Max. Marks : Arts & Science
　　　　　　　　　　　　　　　　　　　　　200　　　150

Scheme :

Paper-I	3 hrs. duration	Arts/Sci. 75/50
Paper-II	3 hrs. duration	Arts/Sci. 75/50
Paper-III	Practical	Arts/Sci. 50/50

Note :

1. There will be three papers in Psychology. Each paper will be of 3 hours. There will be a common paper for Arts and Science. In I and II paper, Questions No. 1 will be compulsory and will cover the entire course contents of the paper. Question No. 1 will contain two parts A & B. A part of the question will contain 20 questions of multiple choice. Each question will be of 3/4 marks for Arts students and of 1/2 marks for Science students. Thus A part will be of 15 marks for Arts students and of 10 marks for Science students. B part will contain 10 question to

be answered in the limit of 20 words. Each question of B part will be of 1/2 marks for Arts students and of 1 mark for Science students.

2. Thus B part will be of 15 marks for Arts students and of 10 marks for Science students. Separate question paper for this objective type will be provided to each student and answers will be given in this question paper only in the space provided in the objective type question paper. Candidates will be given one hour to attempt this type question paper first compulsory question out of three hours in total time allotted for this paper. Thus total marks allotted for Arts students for first paper will be 30 and for Science students 20.

In the second part of the question paper three questions of essay type will be attempted selecting at least one from each section. Each question will be of 15 marks for Arts students and 10 marks for Science students. Two hours will be given for attempting this part.

Paper-I : Psychopathology
Section-A

I. Introduction to Psychopathology; The concept of normality and abnormality, Characteristics and elements of abnormal behaviour. Difference between normal and abnormal behaviour, Mental health professionals.

II. Psychological Assessment and Classification of Psychopathology. : Assessment, Clinical Interview, Diagnostic observations, Life records. International classification system-DSM IV Classification.

III. General Causes of Abnormal Behaviour-Biological causes, psycho-social causes, socio-cultural causes.

Section-B

IV. Anxiety Disorders-Nature and types of anxiety disorders, Phobias, manic disorder, Generalized Anxiety disorders, obsessive compulsive disorder.

V. Somato form disorder & mood disorder-Nature & types of somato form disorders, conversion disorder. Meaning & types of mood disorders, Bipolar disorder.

VI. Substance related disorders-Nature of substance related disorders, Types of substance related disorder-Alcoholism and its treatment. Nicotine and cigarette related disorders and its treatment, Sadative-Hypnotic disorders and its treatment.

Section-C

VII. Schizophrenia-Meaning, clinical symptoms of schizophrenia, Types and treatment.

VIII. Clinical Intervention.
   i. Psycho-analysis.
   ii. Behaviour Therapy.
   iii. Client centered Therapy.

IX. Mental Health-Meaning of Mental Health, components of mental health, characteristics of mentally healthy people, Importance of Mental Health, Factors Influencing mental health, measures for promoting mental health.

Reference :

1. Lamm, A (1997) : Introduction to Psychopathology N.Y. Sage.
2. Buss, A.H. (1999) : Psychopathology. N.Y. John Wiley.
3. अरुण कुमार सिंह : आधुनिक असामान्य मनोविज्ञान, मोतीलाल बनारसीदास, बंगलो रोड़, जवाहर नगर, दिल्ली संस्करण, 2002

Paper II : Social Psychology

Section-A

1. **Introduction :**
   Nature, goal and scope of social psychology; Social psychology and other social sciences; Methods of social psychology : Experimental and nonexperimental Method. Cross-cultural research.

2. **Social perception and cognition :**
   Perceiving ourselves-self-concept, self esteem, self perception, per ceiving others, Role of non-verbal cues, group stereotypes.

3. **Attitudes :**
   Nature and function of attitudes. Formation, change and measurement of attitudes.

Section-B

4. **Prejudice and Discrimination :**
   Nature and components of prejudice; Acquisition of prejudice :

Reduction of prejudice.

5. **Group Behaviour :**
Group structure and function; Task performance : Group cohesiveness, Norms and decision making.

6. **Leadership :**
Definition and function, types of leadership. Trait situational contingency approaches to leadership, Leadership training.

Section-C

7. **Communication :**
Meaning and nature of communication, types of communication-Verbal & non-verbal communication, Barriers in communication, interpersonal attraction and its determinants.

8. **Pro-social Behaviour and aggression :**
Co-operation and helping, Personal, situational and socio-cultural determinants, aggression-social and personal determinants of aggression, prevention and control of aggression.

9. **Present social problems :**
Meaning and characteristics of social problem, Types of social problem-1. Poverty 2 Problem of deprivation, 3 Population explosion, 4 Problem of economic development. Solution to social problems.

Reference :

1. Baron, R.A. & Byrne. D. (1998) : Social Psychology, New Delhi, Prentice Hall.
2. Myers, David G (1994) : Exploring Social Psychology, New York; Mcgraw Hill.
3. अरुण कुमार सिंह (2002) : समाज मनोविज्ञान की रूपरेखा, मोतीलाल बनारसीदास दिल्ली ।

Paper-III : Practical

1. Bogardus Social distance scale
2. Value Test
3. Measurement of Attitude
4. Measurement of Leadership
5. Measurement of Adjustment
6. Measurement of Personality (Introversion, Extroversion)
7. Measurement of Anxiety

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8. Quantification of Depression
9. Word Association test
10. Sack's Sentence Completion test

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12. TEXTILE CRAFT

Scheme : (Theory)
Min. Pass Marks 22

		Max. Marks 60
Paper-I	3 hours duration	30 Marks
Paper-II	3 hours duration	30 Marks

Paper-I

	Marks	Hours
(i) Theory	30	3
(ii) Practical	35	
(iii) Submission	35	6
Total	**100**	

Theory :

(i) Weaving Theory : Different aspects and requirements for the manufacture of cloth.

(ii) Weaving Practical : Working on looms to produce fabric samples of fabric weaves.

Paper-II

	Marks	Hours
(i) Theory	30	3
(ii) Practical	35	
(iii) Submission	35	6
Total	100	

Theory :

(i) Dyeing Theory : Use of different dyes on different yarns fabrics.

(ii) Printing Theory : Styles of printing : Direct Style, Discharge style and resist style.

Practical : Dyeing and Printing Practical

1. Block Printing.
2. Hand Printing.
3. Screen Printing (Paper Cut Method)
4. Dyeing different shades on yarn and fabric using different?
5. Designs for practical
6. Introduction to the concept of repeat

13. BIO-TECHNOLOGY

Scheme :

Min. Pass Marks : 36

Paper-I		Max. Marks : 100
Paper-II	3 hrs.duration	Max. Marks : 50
Practical Min.Marks: 18	3 hrs.duration	Max. Marks : 50
	5 hrs. duration	Max. Marks : 50

Paper—I : Biophysics and Molecular Biology   Max.Marks-50

Section – A

Energetics of living body sources of heat limits to temperature. Heat dissipation and conservation.

Lambert-Bear law. Spectrophtometry and colorimetry Primary events in photosynthesis.

Strategies of light reception in microbes, plants and animals. Correction of vision faults. Electrical properties of biological compartments. Electricity as a potential signal.

Generation and reception of sonic vibrations. Hearing aieds. Intra-and inter molecular interactions in biological systems. Spatial and charge compatibility as determinant of such interactions. Physical methods applied to find out molecular structure : X-ray crystallography and NMR.

General spectroscopy - UV-vis, fluorescence, atomic absorption, IR, Raman spectra.

Physical method of imaging intact biological intact biological structure : Ultrasound, optical filters, X-ray, CAT scan, ECG, EEG, NMR imaging.

Section – B

Molecular basis of life, Structure of DNA, DNA replication both prokaryotes and eukaryotes.

DNA recombination molecular mechanisms in prokaryot and eukaryot.

Insertion elements and transpons.

Structure of prokaryotic genes.

Prokaryotic transcription.

Prokaryotic Translation.

Prokaryotic gene expression (lac, his, trap, catabolic repression)

Section – C

Structure of eukaryotic genes.

Eukaryotic transcription.

Eukaryotic Translation.

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Eukaryotic gene expression transcription factors etc.

Gene expression in yeast.

Gene expression in protozoan parasites.

Gene organization and expression in mitochondria and chloroplasts.

Post translation regulation of gene expression.

Development and environment regulation of gene expression.

B.Sc. Part II

aper-II : Immunology Animal Cell Cultural and
Recombinant DNA Technology   Max. Marks–50

Section – A

The Immune system and immunity along with historical perspective.

Antigen-antibody and their structure.

The organs and the cells of the immune system and their function.

Antigen-antibody interaction.

Humoral and cell mediated immunity (role of MHC and genetic restriction)

Origin of diversity in the immune system

Effectors mechanisms.

Immunity to infectious of diseases, vaccines.

Section – B

History developed of cell cultures. The natural surrounding of animal cells.

Metabolic capabilities of animal cells. Simulating natural condition for growing animal cell.

Importance of growth factors of the serum.

Primary cultures. Anchorage dependence of growth. Non-anchorage dependent cells.

Secondary cultures. Transformed animal cells – Established/continous cell lines.

Commonly used animal cell lines–their origin and characteristics. Growth kinetics of cells in culture.

Application of animal cell culture for studies on gene expression. Organ culture

Transfixion of animal cell : Selectable markers. HAT selection. Antibiotic resistance etc.

Cell fusion : Transplantation of cultured cells. Differentiation of cells.

Section – C

What is gene cloning and why do we need to clone a gene? Tools and techniques-plasmids and other vehicles genomic DNA, RNA, CDNA, RT

enzymes and other reagents technique, laboratory requirements. Safety measures and regulations for recombinant DNA work. Choice and selection of the tools and the techniques.

Vehicles : Plastids and bacteriophages, available phagemids, cosmids, viruses.

Purification of DNA form bacteria, plant and animal cells.

Manipulation of purified DNA, Introduction of DNA into living cells. Cloning vectors for E.coli. Cloning vectors for organisms other than E.coli., yeast, fungi, plants-agrobact, plant virus animal viruses.

Application of cloning in gene analysis: How to obtain a clone of a specific gene,

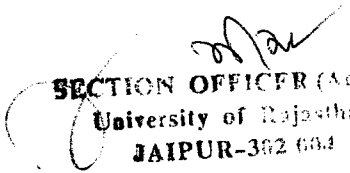studying gene location of structure, studying gene expression. Gene cloning and expression of foreign genes in research and biotechnology, Production of protein from cloned gene.

Gene cloning in medicine : Pharmaceutical compounds, artifical insulin gene, recombinant vaccine, diagnostic reagents.

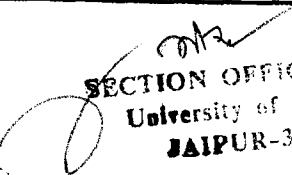**Practical -Bases on theory syllabus**   **M.M. : 50**

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14. GARMENT PRODUCTION & EXPORT MANAGEMENT

B.Sc-II

Theory	1	Fasion and Apparel Design	2	50	18	3
	2	Elements of marketing and finance	3	50	18	3
Practical	1	Clothing construction-2	4	25	09	4
	2	Apparel designing	3	25	09	4
Theory	1	Fasion and Apparel Design	2	30	13	3

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	2	Elements of marketing and finance	3	50	18	3
Practical	1	Clothing construction-2	4	60	26	4
	2	Apparel designing	3	60	26	4

B.Sc./B.A./B.Com. Part II
Theory Paper-I
Fashion and Apparel Design

BA/BCom MM 30

BSc MM 50

Section -A: Introduction to Fashion

1. Fashion terminology, sources of fashion, factors influencing fashion.
2. Fashion forecasting
3. Indian and International fashion designers.
4. History of customs of Indian civilization & brief knowledge of world costumes-French, German & European.

Section -B: Selection Criteria

5. Selection of suitable fabrics for Infants, Toddlers, Pre-school, Children, School going children, Adolesants, adults and Special needs.
6. Buying criteria for readymade garments, definition, origin & evolution of ready to wear garments.
7. Factors affecting selection of Household liners, Curtains; Draperies, towels and Carpets.

Section -C: Techniques in Pattern Making

1. Eight head theory
2. Pattern making- (1) Drafting
                    (2) Draping
                    (3) Flat Pattern
3. Colour & Colour Schemes, Psychological effects of Colour on clothes.

(73)

Reference:

1. GJ, Sumathi, Elements of Fashion & Apparel Design.
2. Biswas A
3. Roshan Alkaji-Costumes of India.
4. Littman Connic (1977)-Pattern Making
   Design, Litton Educational Publishing Inc.

B.Sc./B.A./B.Com. Part II
Paper-II
Elements of Marketing and Finance

Hrs. 3

BA/BCom MM 50

BSc MM 50

Section-A

1. Market structure - Types of market, market demand, elasticity of demand, demand forecasting: Market survey, Elements of cost:

Section-B

2. Cost analysis; Break-Even analysis, Garments Production Planning.
3. Finance; Sources of Finance and Working capital, Financing, Foreign trade, Methods of payment, various types of bills, Bill discounting, Letter of credit, Tariff, Customs, Insurance.

Section-C

4. Export credit and guarantee corporation, Procedures for exports and export-import policy of India, Export License, Export houses, Export Promotion Schemes and measure in India-Detailed study.

Reference:

K.K. Sharma, G.R. Basetia, Entrepreneurship and Small Business.

M.J. Mathew, Management of Marketing.

J.K. Tondan, International Finance.

B.Sc./B.A./B.Com. Part II
Practical – I
Clothing Construction

Hrs. 4

BA/BCom MM 80

BSc MM 50

1. Decorative Samples

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(a) Lace Edging (Machine)
(b) Gathers (machine)
(c) Pleats-Knife, Box & Inverted Box Pleats
(d) Frills-One side and two sided
(e) Tucks-Pin, Cross, shell, scalloped
(f) Placket-Even hem, Loop fasteners
(g) Zipper
(h) Machine Embroidery-Basic stitches (Running, Satin, Long & Short, patch work, applique work)

2. Childs bodice block.
3. Drafting, Cutting and Stitching of following garment:
   (a) Frock (Variations of A-Line/Gathered/Pleat/Umbrella)
   (b) Skirt and Top
   (c) Sun suit/Romper/Bushirt with shorts.

Reference:

Jindal, Ritu, Handbook of Fashion Designing.
Kallal, Mary Jo, Construction.
Mitchell Beazley, The Sewing Book a complete practical guide.

B.Sc./B.A./B.Com. Part II
Practical – II
Apparel Designing

BA/BCom MM 60
BSc MM 25

1. Color wheel and color schemes.
2. Introduction to Eight Head theory and Stick Figure 9½", 10½"
3. Developing a croquis from block figure.
4. Identification of different types of collars, sleeves, yokes and pockets.
5. Draping of garments on croquis (at least 8 sheets) using different media.
6. Introduction to the basics of computers, M.S. Word, internet.
7. Preparation of a portfolio.

Reference:

Ireland, Fashion Designing Drawing and Presentation.
Ireland, Patrick John, Fashion Design Illustration: Men

University of Rajasthan

Renee Weiss Chase, CAD for Fashion Design

B.Sc Part II : Geology and Mining 2014 Exam

Scheme:

Theory: Max Marks 100   Minimum Pass marks: 36

Paper I: Petrology   3 hrs duration   Max Marks 50

Paper II: Principles of Stratigraphy and   3 hrs duration   Max Marks 50

Geology of India

Practical (one)   4 hrs duration   Max Marks 50

Paper I: Petrology

Section-A –Igneous Rocks

Composition of magmas; intrusive and extrusive forms; structure and texture; Classification

Crystallization of basaltic magma, Bowen Reaction Principle; differentiation

Study of common igneous rocks: Granite, rhyolite, gabbro, basalt, pegmatite, dolerite, syenite and peridotite

Section-B- Sedimetary Rocks

Process of formation of sedimentary rocks; lithification and diagenesis

Structure and texture of rocks; Elementary idea of sedimentary deposits, sedimentary environments and provenance

Study of common sedimentary rocks: Sandstone, limestone, shale, conglomerate and breccia

(Prof- Anil Maheshwari)   (Dr HS Kolla)

Section-C –Metamorphic Rocks

Agents and types of metamorphism; concept of grade and facies; Structure and classification

Types of metamorphism and their products; metasomatism and anatexis

Study of common metamorphic rocks: Marble, schist, gneiss, quartzite, slate

Paper II: Principles of Stratigraphy and Geology of India

Section-A

Principles of stratigraphy; standard stratigraphic scale; principles of correlation;

Palaeogeography of India in Permo-Carboniferous period, Physiographic subdivisions of India

Stratigraphic divisions in India and their equivalents

Section-B

Stratigraphy, distribution, lithology and correlation of the Aravalli, Delhi and Vindhyans Supergroup of rocks

Distribution, succession, climate, correlation, fossil content and mineral resources of the Gondwana Supergroup

Section-C

Lithology, succession, distribution and fossil content of Triassic of Spiti, Jurassic of Kachchh, Tertiary period, Siwalik Supergroup

Origin, composition, distribution and age of Deccan Traps; Tectonic framework of India

Practical

Study of typical textures of rocks; Megascopic study of common Igneous, sedimentary and metamorphic rocks; Microscopic studies of granite, rhyolite, gabbro, dolerite, limestone, sandstone, schist, gneiss and marble

Neat drawings of paleogeographical maps of India during Permo-Carboniferous; Distribution of various geological formation in outline map of India; Identification and description of the representative stratigraphic rocks

Geological field work and collection of samples

16. ENVIRONMENTAL SCIENCE

Scheme :

Min. Pass Marks : 36		Max. Marks : 100
Paper-I	3 hrs. duration	Marks : 50
Paper-II	3 hrs. duration	Marks : 50
Practical one	4 hrs. duration	Marks : 18
		Max. Pass Marks : 50

Note :

1. Two types of question paper for each theory paper will be applicable. Total duration is of 3 hours. One question paper will comprise the objective type of question and the other will be of descriptive long answer type of question.

2. Descriptive type of question paper (to be given during the first two hours of the examination) will have 6 question out of which a student is supposed to attempt any 3. This portion of the paper will carry maximum 30 marks.

3. The objective type questions paper will be given after 2 hours of descriptive type paper and will have 35 objective type questions.

   —Multiple choice type question—20 of ½ marks each

   —Fill in the blanks/one word answer/true of false type 10 question of 1/2 marks each.

   —Very short answer type question—5 of 1 marks each.

Paper-I : Water Resources and Management
Section-A

Water Resources : Precipitation, infiltration, evaporation, transpiration, run off and hydrological cycle, Ground water (Aquifers, ground water hydrolics, safe yields, ground water collection system).

Water uses (Drinking water, water used as raw material cooling water, irrigation water, fishing water, Industrial water, recreation water).

Section-B

1. **Water quality monitoring** : Sampling methods for waste water, stream and lake water.
2. **Water treatment Processes** : Conventional water treatment process (coagulation and flocculation, sedimentation, filtration, disinfection, water softening).
3. **Specific treatment process** : Removal of iron, manganese defloridation, desalination.

Section-C

1. **Waste water Treatment**

   Primary treatment, Secondary treatment (Biological treatment), and Advanced waste water treatment.
2. Treatment and disposal of sewage.

Suggested Readings :

Water Resources and Management

1. Alvares, C. and Billorey, R. 1988. Damming the Narmada, Natraj Publishers, Dehradun.
2. Bourne P.G. 1984. Wale and Sanitration. Academic Press. Inc. New York.
3. Gupta, C.P. 1989. Appropriate methodologies for development & management of ground water resources in developing countries. IBH Publishing Co. Pvt. Ltd. New Delhi.
4. Kumar, P. 1988.Ground water and well drilling. CBS Publishers and Distributors, New Delhi.
5. Pillai, K.M. 1987. Water Management and Planning. Himalya Publishing, New Delhi.
6. Sinha, U.K. 1986. Ganga : Pollution and Health Hazards, Alka Enterprises, New Delhi.

Paper-II Computer Techniques Environmental Biotechnology and Microbiology

Section-A

1. Environmental Computer programming (Introduction to FORTAN

and C/C ++ language).

2. Use of Computer programs in Environmental modeling (wind roses and pollution roses diagrams)

Section-B

Role of Biotechnology in oil spills, pesticide, tannery, food, Industries for environmental improvement, Bioremediation, (Bioremediation of Surface Soil, Sludge), Biotechnology for Hazardous waste Management, Biotechnology for air pollution abatement (Bioscrubber, Biodeds, Biotrickling filters). Biodegradable plastics, Biotechnology for water pollution abatement.

Section-C

1. Introductory Microbiology, water and air borne diseases and their causative organism, Coliforms and Streptococci organism.

2. Role of microbial organism in metal and petroleum recovery, pest control, waste water treatment, food and dairy technology.

Practicals :

Based Upon theory papers.

1. Brown, C.M., old Camp bell, I and Priest, F.G. 1987.Introduction to Biotechnology, Blackwell Scientific Publishers, London.

2. Chakraverty, A. 1989.biotechnology and other Alternative Technologies. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.

3. Fik Sol, J. and Covello, V.T. 1986.Biotechnology, Risk assessment. Pergamon Press, New York.

4. Forsteb, C.F. 1985.Biotechnology and waste water treatment. Cambridge University Press, London.

5. Prentis, S. 1984.Biotechnology. A new Industrial Revolution. Orbis Publishing London.

6. Primose, S.B. 1987, Modern Biotechnology. Blackwell Oxford.

7. Rana, S.V.S. 1986.Recent trends in Biotechnology and biosciences. Pragati Press. Muzzafarnagar.

8. Rehm, H.J. and Redd, G. 1986. Biotechnology, Vol. I to B VCH Nemheim, FRG.

9. Sanunders, V.A. and sanders, J.R. 1987.Microbial Genetics applied to Biotechnology Cromm, Helm, London.

10. Walker, J.M. and Ginfold E.B. 1985.Molecular Biology and Biotechnology Dorset Press, Dorset.

11. Yoxen, E. and Dimartino, V. 1989.Biotechnology in future Society Grower Publishing Co. USA.

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17. COMPUTER APPLICATION
(Common for B.A./B.Com.I/B.Sc.)

		Science	Comm./Arts.
Paper I	Data Base Management System	50	65
Paper II	Structured Programming and Computer Graphics	50	65
Practical	Programming Laboratory On-the-Job training (4 Weeks)	50	70

The duration of these papers will be 3 hours.

Paper I : Data Base Management System

Categorization of DBMS Systems. Network. Hierarchical and relational databases. Application of DBMS systems.

Relationàl data bases management system. Why to use them and where. Data Description Language. Data Manipulation Language and Data Control Language.

Introduction to DBASE, DBASE commands. Development of an application under DBASE using forms, screens and PRG. files.

Security considerations in database management systems. Performance improvement in databases.

Relational databases-advanced concepts. Introduction to oracle/ ingres or a similar RDBMS on a multiuser environment.

Structured quarry language. Form fesign on a advanced RDBMS. Report generator, Querry by example and Report by form. Accessing RDBMS using programming languages.

System management. User management. Security considerations.

Practical.

Design of a database for a business application. design of data entry forms and report layouts for this database. Creation of programs to access and manipulate database.

Development of a business application in RDBMS.

Paper-II : Structured Programming and Computer Graphics

Introduction. Need of structured programming. Methods of documentation. Methods of analyzing a program requirements. Data flow diagrams. Entity relationship. Flow charts.

Various categories of programming language (3GL, 4GL, etc.) introduction to C and COBOL. Program development in C using

structured programming concepts.

Why Graphics. Various types of graphics programs. Drafting packages. DTP packages. Microsoft Windows. Various documentation cum DTP packages e.g. Wordeperfect, Microsoft Word etc.

Introduction to a pagemaker/Ventura or a similar package. preparation of documents using DTP package, Formatting. Various fonts and characters set. Various type of printers used in DTP. Introduction commercial DTP system available in market. Indian language fonts. Creation of Indian language fonts.

Practical

Development of a business application using C.

Preparation of a document and publishing it using a DTP System.

Creation of fonts.

Managing a Microsoft. Window session. Creating groups and program items under Window. Turning Windows for a computer system.

18. ELECTRONICS

Scheme :

Min. Pass Marks 36		**Max. Marks : 100**
Paper-I	3 hrs.duration	Max. Marks : 33
Paper-II	3 hrs.duration	Max. Marks : 33
Paper-III	3 hrs.duration	Max. Marks : 34
Practical Min.-18	5 hrs. duration	Max. Marks : 50

Paper-I- Amplifier Circuits

Max. Marks-33   **Time : 3 Hours**

Five questions are to be set taking one from each unit (each question will have an internal choice). Student will attempt all the five questions. 40% weightage will be given to problems and numericals.

Unit-1

Q point, Stability of Q point, Various Transistor biasing circuits, Thermal bias stability. An amplifier with feedback gain, Stabilization. Reduction of non linear distortion by negative feed back. Effect of feedback on input and output impedances.

Unit-2

Frequency response of linear amplifiers and noise distortion. current and voltage, series and parallel feed back. Examples of positive and negative feedback, Emitter follower, Differential amplifiers with balanced, unbalanced, single input and double input (DC and AC analysis), common mode rejection ratio.

Unit-3

Operational amplifiers, Differential amplifier, operational amplifiers as an integrator, differentiator, inverting amplifier, adder and subtractor amplifier, voltage comparator and logarithmic amplifier, Ideal and practical operational amplifier for offsets, input offset current and voltage, power supply using 741 operational amplifier, uses of operational amplifier as oscillator.

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Unit-4

Class A, B and C operating conditions for power amplifiers, condition of maximum power transfer, special features of transistors used for power amplification. Need of impedence matching in power amplifier, shunt feed power amplifier, Efficiency, Distortion, power dissipation and power amplification, phase inverters of push-pull amplifier, Class A, AB and B push-pull amplifier using transistors.

Unit-5

Problems in amplifier circuit elements at high frequency, Equivalent circuit, wide band amplifiers, High and low frequency compensation, pulse response and testing of an amplifier. Tuned amplifiers (single and double tuned) and their uses as I.F. amplification in radio and TV receivers (No mathematical derivations, only qualitative description)

Paper-II- Rectifiers and Oscillators

Max. Marks-33   **Time : 3 Hours**

Five questions are to be set taking one from each unit (each question will have internal choice). Student will attempt all the five questions. 40% weightage will be given to problems and numericals.

Unit-1

Half wave, Full wave and bridge rectifiers, Definition of ripple factor. Efficiency, voltage regulation, smoothing filters, L-section and π - section filters and their cascading, Filter efficiency, Metal rectifiers, common power supply, voltage regulation and V.R. tubes.

Unit-2

Zener diode Electronically regulated power supply, voltage multipilers, Trouble in low and high voltage power supply.

Barkhausen Criterion for maintained oscillations, grid biasing and self sustained oscillations, Tuned grid, Tuned emitters oscillator (Mainly transistor type), crystal controlled oscillators, R-C phase shift oscillators, Designing, Considerations of Harteley and Wein bridge oscillators.

Unit-3

Bistable multivibrator, Monostable and Bistable multivibrator (Collector coupled), Improvement of multivibrator response, synchronization Triggering in relaxation oscillators.

Unit-4

Response of sinusoidal, Triangular and Rectangular waves to CR and LR circuits. Their uses as integrating and differentiating circuits.

Non linear wave shapping circuits, Clipping and clamping circuits, slicer, limiter circuits, Limiting and clipping amplifier, peaping circuits.

Unit-5

Terminology used to describe sweep generator, Fundamental sweep voltage generator, Transistor constant current sweep generator.

References

1. Electron tube circuits J. Seeley

2. Engineering Electronics- Ryder

3. Hand book of Electronics-Gupta & Kumar

4. Applied Electronics - G.K. Mithal

5. Electronics - V.P. Arora

Paper-III- Digital Computer and Programming

Max. Marks-34   **Time : 3 Hours**

Five questions are to be set taking one from each unit (each question will have an internal choice). Student will attempt all the five questions. 40% weightage will be given to problems and numericals.

Unit-1

Variable resister network, Binary ladder, D/A Converter, A/D converter, simultaneous conversion, A/D converter-counter method, electromechanical A/D conversion, D/A and A/D conversion controls. Block diagram of a general purpose computer organization and control.

Unit-2

Central Processing Unit, I/O units, Arithmetic logic unit, Internal storage, Auxiliary storges like HDD, FDD, CD etc. Read only memory, Random Access Memory. Computer generations and classification.

Unit-3

Alogrithm-Definition and properties of alogrithm, flow chart, symbols of flow chart, converting a flow chart into a high level language. Examples of simple alogrithms. Low level language viz. machine language, assembly language, high level language like BASIC.

Unit-4

BASIC: BASIC character set, numeric constants and variables, arithmatic operators, expressions and functions, character string constrants and variables string operator, expressions and functions. Terminal features, system commands and editing, PRINT, REM, INPUT/OUTPUT statements.

Elementary BASIC programmes for numeric and string processing.

Unit-5

Flow of control, unconditional and conditional branching, relational logic operators, two way and multi-way selection statements; nesting repetition statements.
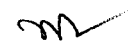
Definite and indefinite loops, subscripted variables. Vectors and arrays, simple programme exercises. Function definition and invocation. Subroutine, modular programmes; entering and exiting subroutine. Files, random and sequential files. Simple programming exercises.

Experiments for Practical work

Note:

A candidate has to perform at least sixteen experiments in all taking eight experiments from each section 'A' and 'B'.

In practical examination the candidate will be required to perform two experiments: one from section 'A' and the other from section 'B' The distribution of marks will be as follows—

Time duration - 5.00 Hrs. Expts.(two)- 30 (15 for each expt) marks

Viva Voce - 10 marks

Practical record - 10 marks

Total- 50 marks

Section-A

1. To study high pass frequency filter.

2. To study low pass frequency filter.

3. To study RC differentiating circuit.

4. To study RC integrating circuit.

5. To study bridge rectifier with L & π filter.

6. To study transistor biasing circuits.

7. Study of counters and shift registors.

8. To study bistable multivibrator (collector coupled).

9. To study Exclusive OR (XOR) gate and verify its truth table.

10. Solution of simple equations using analog computer.

Section-B

1. To study analog to digital convertor circuit.

2. To study digital to analog convertor circuit.

3. To study negative feed back amplifier.

4. To study triode value characteristics and calculate its parameters.

5. To study OP Amp as summing amplifier.

6. To study OP Amp as an invertor.

7. To study OP Amp as a non-invertor.

8. To study push-pull amplifier using transistor.

9. To study emitter follower and its frequency response.

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