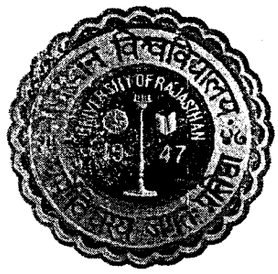

University of Rajasthan
Jaipur

SYLLABUS

B.Sc. PART-II

2016

Annexure - I

B.Sc. Part II - Exam - 2016

1. PHYSICS

Scheme :			Max. Marks: 100
Min. Pass Marks : 36			
Paper I	3 hrs. duration	Max. Marks: 33	Min. Pass marks 12
Paper II	3 hrs. duration	Max. Marks: 33	Min. Pass marks 12
Paper III	3 hrs. duration	Max. Marks: 34	Min. Pass marks 12
Practical	5 hrs. duration	Max. Marks: 50	Min. Pass marks 18

Paper-I : Thermodynamics and Statistical Physics

Work Load: 2 hrs. Lecture /week

Examination Duration: 3 Hrs.

Scheme of Examination: First question will be of nine marks comprising of six parts of short answer type with answer not exceeding half a page. Remaining four questions will be set with one from each of the unit and will be of six marks each. Second to fifth question will have two parts namely (A) and (B) each carrying 3 marks. Part (A) of second to fifth question shall be compulsory and Part (B) of these questions will have internal choice.

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 law temperatures and applications : Joule Thomson expansion and J T coefficients for ideal as well as Vander 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.

The distribution of molecular velocities : Distribution law of molecular velocities, most probable, average and r.m.s. velocities; Energy distribution function; effusion and molecular beam. Experimental verification of the Maxwell velocity distribution; The principle of equi-partition of energy.

Transport phenomena : Mean free path, distribution of free paths, coefficients of viscosity, thermal conductivity, diffusion and their interaction.

Unit-3

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-4

Quantum Statistics : Black body radiation and failure of classical statistics; Postulates of quantum statistics, indistinguishibility, wave function and exchange degeneracy, a priori-

Asstt. Registrar (Exam.)
University of Rajasthan
Jaipur

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).

Paper- II: Mathematical Physics and Special Theory of Relativity

Work Load: 2 hrs. lecture /week

Examination Duration: 3 Hrs.

Scheme of Examination: First question will be of nine marks comprising of six parts of short answer type with answer not exceeding half a page. Remaining four questions will be set with one from each of the unit and will be of six marks each. Second to fifth question will have two parts namely (A) and (B) each carrying 3 marks. Part (A) of second to fifth question shall be compulsory and Part (B) of these questions will have internal choice.

UNIT-1

Orthogonal curvilinear coordinate system, scale factors, expression for gradient, divergence, curl and their application to Cartesian, circular cylindrical and spherical polar coordinate.
Coordinate transformation and Jacobian, transformation of covariant, contra-variant and mixed tensor; Addition, multiplication and contraction of tensors; Metric tensor and its use in transformation of tensors.
Dirac delta function and its properties.

UNIT-2

Lorentz transformation and rotation in space-time like and space like vector, world line, macro-causality.
Four vector formulation, energy momentum four vector, relativistic equation of motion, invariance of rest mass, orthogonality of four force and four velocity. Lorentz force as an example of four force, transformation of four frequency vector, longitudinal and transverse Doppler's effect.
Transformation between laboratory and center of mass system, four momentum conservation, kinematics of decay products of unstable particles and reaction thresholds: Pair production, inelastic collision of two particles, Compton effect.

UNIT-3

(A) Transformation of electric and magnetic fields between two inertial frames.
(B) The second order linear differential equation with variable coefficient and singular points, series solution method and its application to the Hermite's, Legendre's and Laguerre's differential equations; Basic properties like orthogonality, recurrence relation, graphical representation and generating function of Hermite, Lagendre, Leguerre and Associated Legendre function (simple applications).

UNIT-4

Techniques of separation of variables and its application to following boundary value problems (i) Laplace equation in three dimensional Cartesian coordinate system-line charge between two earthed parallel plates (ii) Helmholtz equation in circular cylindrical coordinates-cylindrical resonant cavity, (iii) Wave equation in spherical polar coordinates the vibrations of a circular membrane, (iv) Diffusion equation in two dimensional Cartesian coordinate system heat

Asstt. Registrar (Acad.-I)
University of Rajasthan

conduction in a thin rectangular plate, (v) Laplace equation in spherical coordinate system-electric potential around a spherical surface.

Paper III: Electronics and Solid State Devices

Work Load: 2 hrs. lecture /week

Examination Duration: 3 Hrs.

Scheme of Examination: First question will be of ten marks comprising of five parts of short answer type with answer not exceeding half a page. Remaining four questions will be set with one from each of the unit and will be of six marks each. Second to fifth question will have two parts namely (A) and (B) each carrying 3 marks. Part (A) of second to fifth question shall be compulsory and Part (B) of these questions will have internal choice.

Unit 1: Circuit analysis and PN junctions

Circuit analysis: Networks- some important definitions, loop and nodal equation based on D.C. and A.C. circuits (Kirchhoffs 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.
PN junction: Charge densities in N and P materials: Conduction by drift and diffusion of charge carriers, PN diode equation; capacitance effects.

Unit 2: Rectifiers and transistors

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.
Transistors: Notations and volt-ampere characteristics for bipolar Junctions transistor, Concept of load line and operating point Hybrid parameters. CB, CE, CC configurations. Junction field effect transistor (JEFT) and metal oxide semiconductor filed effect transistor (MOSFET). Circuit symbols, biasing and volt-ampere characteristics, source follower operation of FET as variable voltage resister.

Unit 3: Transistor biasing and amplifiers

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

Amplifiers: Analysis of transistor amplifiers using hybrid parameters and its gain-frequency response: Cascade amplifiers, basis idea of direct coupled and R.C coupled amplifiers. Differential amplifiers. Amplifier with feedback: Concept of feedback, positive and negative feedback, voltage and current feedback circuits. Advantage of negative feedback: Stabilization of gain: effect of negative feedback on output and input resistance, reduction of nonlinear distortion, effect on gain - frequency response.

Unit 4: Oscillators and Logic Circuits

Oscillators: criteria for self-excited and self-sustained oscillation, 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 is advantages.

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

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.

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 Christose 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 — 5 hrs. duration

Min Pass Marks : 18 — 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 $\gamma = \frac{C_p}{C_v}$ 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.

SECTION OFFICER (Acad-I)
University of Rajasthan
JAIPUR-302 004

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.

SECTION OFFICER (Acad-I)
University of Rajasthan
JAIPUR-302 004

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

B.Sc. Part-II

2. CHEMISTRY

Scheme:
Max Marks: 150

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

Note: Ten (10) questions are to be set taking two (02) questions from each unit. Candidates have to answer any 5 questions selecting at least one question from each unit.

CH-201 Paper-I: Inorganic Chemistry
(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, ionic radii and lanthanide contraction, complex formation, occurrence and isolation of lanthanide compounds.
General features, chemistry of separation of Np, Pu and Am from U, electronic configuration, oxidation states, magnetic properties, complexation behavior, comparison of lanthanides and actinides, super heavy elements.

Unit-IV

Oxidation and Reduction:
Uses of Redox Potential data, analysis of redox cycle, redox stability in water. Frost, Latimer and Pourbaix diagrams. Application of redox data in the extraction of elements

Unit-V

Acids and Bases:
Theories: Arrhenius, Bronsted-Lowry, Lux-Flood. Solvent system concept and Lewis concept 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 Paper-II: Organic Chemistry
(2 Hrs. or 3 periods/week)

Unit-I

Electromagnetic Spectrum: An Introduction

Absorption Spectroscopy
Ultraviolet (UV) 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, hyperchromic and hypochromic shifts. UV spectra of conjugated dienes and enones.

Infrared (IR) 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 alcohol with mechanism.
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. 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
Methods of 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

Structure of the carbonyl group. Syntheses of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, syntheses 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. Wittig reaction, Mannich reaction. Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro reaction, MPV (Meervein-Pondrof-Verley), Clemmensen, Wolff-Kishner, $LiAlH_4$ and $NaBH_4$ reductions, Halogenation of enolizable ketones. Use of acetals and 1,3-dithiane as protecting group.

Unit-IV

Carboxylic Acids

Structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Preparation of carboxylic acids. Reactions of carboxylic acids, Hell-Volhard-Zelinsky reaction. Reduction of carboxylic acids, mechanism of decarboxylation.

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

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

Carboxylic Acid Derivatives

Structure, nomenclature and synthesis of acid chlorides, esters, amides 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.

Amines: Structure, nomenclature and preparation of alkyl, and aryl amines (reduction of nitro compounds, nitriles), reductive amination of aldehydic and ketonic compounds. 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. Gabriel-phthalimide reaction and Hoffmann bromamide reaction with mechanism.

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

10

CH-203 Paper III : Physical Chemistry
(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. Thermodynamic 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 conditions 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 and entropy as a criteria of spontaneity 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 spontaneity, their advantage over entropy change. Variation of G and A with P, V and T.

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, applications.

UNIT-III

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 sulphur systems.

Phase equilibria of two component system - solid-liquid equilibria simple eutectic Bi-Cd, Pb-Ag systems, desilverization of lead.

Solid solutions - compound formation with. Congruent melting point (Mg-Zn) and incongruent melting point. ($NaCl-H_2O$) 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. Lower and upper consolute temperature, effect of impurity on consolute temperature. 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 's method and moving boundary method.

Applications of conductivity measurements:

Determination of degree of dissociation, determination of K_a of acids, determination of solubility product of a sparingly soluble salt. conductometric titrations.

UNIT-V

Electrochemistry –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 cells EMF. Calculation of thermodynamic quantities of cell reactions (ΔG, ΔH 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.

Suggested Books:

1. Principles of Physical Chemistry: B. R. Puri. Sharma and M. S. Pathania.
2. A Text Book of Physical Chemistry: A. S. Negi and S. C. Anand.
3. A Text Book of Physical Chemistry: Kundu and Jain.
4. The elements of Physical Chemistry, P.W. Atkins. Oxford.
5. University General Chemistry, C.N.R Rao. Mac Millan.

CH- 204 Chemistry Practical (Pass course), Laboratory Course-II

(4 hrs or 6 periods / week)

Inorganic Chemistry

(i) Preparation of Standard Solutions

Dilution – 0.1 M to 0.001 M solutions

(ii) Volumetric Analysis

(a) Determination of acetic acid in commercial vinegar using NaOH

(b) Determination of alkali content in 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

(iii) Gravimetric Analysis

(a) Cu as CuSCN
(b) Ni as Ni (dimethylglyoxime)

Organic Chemistry

(i) 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-dinitrophenylhydrazones of acetone, 2-butanone, hexan-2-one and hexan-3-one using toluene and light petroleum (40-60) solvent system.
(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 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.

(ii) Qualitative Analysis

Identification of two organic compounds (one solid and one liquid) through the functional group analysis, determination of melting point, boiling point and preparation of suitable derivatives.

Physical Chemistry

(i) Transition Temperature

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

(ii) Thermochemistry

a) To determine the solubility of benzoic acid at different temperatures and to determine $\triangle H$ of the dissolution process.
b) To determine the enthalpy of neutralization of a weak acid/ weak base versus strong base/ strong acid and determine the enthalpy of ionization of the weak acid / weak base.
c) 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.

(iii)Phase Equilibrium

a) 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.

13

Registrar (Acad-I)
University of Rajasthan
JAIPUR

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

(iv) Distribution law

a) To study the distribution of iodine between water and CCl_4.

b) To study the distribution of benzoic acid between benzene and water.

(Instructions to the Examiner)
B.Sc. Part II
CH- 204 Chemistry Practical (Pass course)

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

Inorganic Chemistry

Ex. 1 Volumetric Analysis
or
Gravimetric Analysis as mentioned in the syllabus **16**

Organic Chemistry

Ex. 2 Identification of two organic compounds (one solid and one liquid) through the functional group analysis, determination of melting point, boiling point and preparation of suitable derivatives.
or
Perform one experiment out of the experiments on thin layer and paper chromatography given in syllabus. **12**

Physical Chemistry

Ex. 3 Perform one of the physical chemistry experiments as mentioned in the syllabus. **12**

Ex. 4 **Viva-voce** **5**

Ex. 5 **Record** **5**

50

Books Suggested (Theory Course)

1. Basic Inorganic Chemistry F.A. Cotton. G. Wilkinson and P.L. Caus. Wiley.
2. Concise Inorganic Chemistry, J.D. Lee. ELBS
3. Concepts of Models of Inorganic Chemistry B. Douglas. D. McDaniel and J. Alexander, John Wiley.
4. Inorganic Chemistry, D.E. Shriver P.W. Atkins and C.H. Langford, Oxford.
5. Inorganic Chemistry, W.W. Porterfield Addison Wesley.
6. Inorganic Chemistry, A.G. Sharpe. ELBS
7. Inorganic Chemistry, G.L. Miessler and D.A. Tarr, Prentice Hall.
8. Organic Chemistry, Morrison and Boyd. Prentice Hall.
9. Organic Chemistry, L.G. Wade Ji. Prentice Hall.
10. Fundamentals of Organic Chemistry, Solomons. John Wiley.

11. Organic Chemistry Vol. 1, 11, III S.M. Mukherji, S.P. Singh and R.P. Kapoor, Wiley Eastern Ltd. (New Age International)
12. Organic Chemistry, F.A. Carey, McGraw Hill, Inc.
13. Introduction to Organic Chemistry. Streitwieser. Heathcock and Kosover. Macmilan.
14. Physical Chemistry, G.M. Barrow. International Student Edition, McGraw Hill.
15. Basic Programming with Application, V.K. Jain. Tata McGraw H ill.
16. Computers and Common Sense. R. Hunt and Shelly, Prentice Hall.
17. University General Chemistry, C.N.R. Rao, Macmillan.
18. Physical Chemistry, R.A. Alberty, Wiley Eastern Ltd.
19. The Elements of Physical Chemistry, P.W. Atkins, Oxford.
20. Physical Chemistry Through problems, S.K. Dogra and S. Dogra, Wiley Eastern Ltd.

Books Suggested (Laboratory Courses)

1. Vogel's Qualitative inorganic Analysis, revised, Svehla, Orient Longman.
2. Vogel's Textbook of Quantitative Inorganic Analysis (revised), J. Bassett. R.C. Dene0y, G.H. Jeffery and J. Mendham. ELBS.
3. Standard Methods of Chemical Analysis. W.W. Scott. The Technical Press.
4. Experimental Inorganic Chemistry, W.G. Palmer, Cambridge.
5. Handbook of preparative Inorganic Chemistry. Vol [& II, Braver, Academic Press.
6. Inorganic Synthesis, McGraw Hill.
7. Experimental Organic Vol I & II, P.R. Singh, D.S. Gupta and K.S. Bajpai, 'rata McGraw Hill.
8. Laboratory manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.
9. Vogel's Textbook of Practical Organic Chemistry, RS. Furniss, Hannaford, V. Rogers, P.W.G. Smith and A.R. Tatchell, ELBS.
10. Experiments in General Chemistry, C.N.R. Rao and U.C. Agarwal, East-West Press.
11. Experiments in Physical Chemistry, R.C.Das and B. Behra. Tata McGraw Hill
12. Advanced Practical Physical Chemistry, J.I3. Yadav, Goel Publishing House.
13. Advanced Experimental Chemistry, Vol. 1-Physical, J.N. Gurtii and R. Kapoor, S. Chand & Co.
14. Selected Experiments in Physical Chemistry, N.G. Mukerjee. J.N. Ghjose& Sons.
15. Experiments in Physical Chemistry, J.C. Ghosh, Bharati Bhavan.

(15)

3. ZOOLOGY

Scheme :

Min. Marks : 36	Max. Marks : 100
3 1Irs. 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).

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); Parasitic (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.

(18)

SECTION OFFICER (Acad-I)
University of Rajasthan
JAIPUR-302 004

(17)

(19)

Asst. Registrar (Acad-I)
University of Rajasthan
JAIPUR

University of Rajasthan

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.-I 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.

18

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.

SECTION OFFICER (Acad-I)
University of Rajasthan
JAIPUR-302 004

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

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.

SECTION OFFICER (Acad.-I)
University of Rajasthan
JAIPUR-302 004

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

20

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.

SECTION OFFICER (Acad-I)
University of Rajasthan
JAIPUR-302 004

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

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.

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.

SECTION OFFICER (Acad-I)
University of Rajasthan
JAIPUR-302 004

24

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

4. BOTANY

B.Sc. Part II (Pass Course Syllabus)

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	4 hrs, duration	**Max. Marks 50**
Duration of examination of each theory paper-		**3 hours**
Duration of examination of practicals-		**4 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. 1 will have 18 very short answer type Questions (not more than 20 words) of half marks each 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.

25

PAPER-I

Molecular Biology and Biotechnology

(2 hrs /week)

Unit-1

Genetic Material: Biological, chemical and physical nature of heredity material, Structure of DNA and RNAs (mRNA, tRNA and rRNA). Watson and Crick model of DNA, Nucleosome model.

DNA replication: Meselson – Stahl experiment of semiconservative replication of DNA; RNA Primers, Okazaki-fragments, polymerases: DNA-Protein interactions.

Preliminary account of DNA damage and repair.

Unit-2

Central dogma of life, **Transcription** in eukaryotes: role of promoter, gene, pre mRNA synthesis, pre mRNA processing: capping, splicing and polyadenylation.

Translation : genetic code (codon). Initiation, elongation and termination.

Regulation of gene expression in prokaryotes and eukaryotes: Negative and positive control, attenuation and antitermination. Reverse transcriptase and its application.

Unit-3

Biotechnology: Functional definition. Basic aspects of Plant tissue culture, basal medium, media preparation and aseptic culture technique. Concept of cellular totipotency; Callusing; Differentiation and morphogenesis; Micropropagation; Tissue culture and its applications. Basic concept of Protoplast culture, Anther culture, Embryo culture and their applications.

Unit-4

Recombinant DNA technology : Tools and techniques used in rDNA technology - Restriction enzymes. Vectors for gene transfer. Bacteriophage, plasmids, cosmids and Artificial chromosome, cDNA technology, gene amplification, Polymerase chain reaction, Application of PCR technique, DNA fingerprinting and its uses. Application of Biotechnology and Transgenic plants.

Practical Exercises:

1. *Elementary knowledge of principles and uses of various instruments in molecular biology and biotechnology -Laminar air flow, Centrifuge, Autoclave, Incubator, Spectrophotometer, pH meter, Gel electrophoresis unit.*
2. *Media preparation*
3. *Aseptic culture technique*

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

2. *Media preparation*
3. *Aseptic culture technique*
4. *Explant culture-shoot tip, nodal segment*
5. *DNA isolation from plant parts.*
6. *Gel electrophoresis technique.*

Suggested Books :

1. *Gupta PK. (2012). Cell and Molecular Biology.* Rastogi Publicatios, Meerut.

2. *Gamborg OL. and Philips GC. (1995). Plant Cell, Tissue and Organ cultue.*

3. Dnyansagar, VR. (1986). Cytology and Genetics, Tata McGraw-Hill Pub. Co. Ltd. New Delhi.

4. Verma, PS. and Agarwal, VK. (2012). Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand and Co. Ltd. New Delhi.

5. Alberts, B., Bray, DJ, Raff, M., Roberts, K. and Wasson, LD. (2001). Molecular Biology of Cell, Garland Publishing Co., Inc., New York.

6. Micklos, DA. Freyer, GA. and Crotty, DA. (2003). DNA Science a first course (Second Ed.). Cold Spring Harbor Laboratory Press, NY., USA.

7. Razdan, MK. (1993). An Introduction to Plant Tissue Culture. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.

8. Mascarenhas, AF. (1988). Handbook of Plant tissue culture. Publication & Information Div., ICAR, New Delhi.

9. Purohit, SS. and Mathur, SK. (1996). Biotechnology fundamentals and applications. Agro Botanical Publishers, Bikaner.

10. Rana, SVS. (2012). Biotechniques theory & practice (Third Ed.). Rastogi Publicatios, Meerut.

27

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

Paper-II

PLANT PHYSIOLOGY AND BIOCHEMISTRY

(2 hrs /week)

Unit-1

Water: Structure, physico-chemical properties, importance to plant life, concept of water potential. Absorption and Transport of water: Ascent of sap, Transpiration, Guttation, stomatal movement, factors affecting transpiration. Guttation.

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

Photosynthesis: Pigments, Photosynthetic apparatus, light reaction, photo system I & II, Z scheme, photophosphorylation, C_3 (Calvin cycle), C_4 cycle, and factors affecting the photosynthesis.

Respiration: - Aerobic and anaerobic respiration; RQ (Respiratory Quotient), Kreb's cycle, electron transport system, oxidative phosphorylation, and factors affecting the process. Fermentation.

Unit-3

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

Proteins: Amino acids-structure, electrochemical properties, peptide bonds, chemical bonds and nomenclare, structure and classification of proteins, physical and chemical properties.

Enzymes: Structure, nomenclature & classification of enzyme. Characteristics of enzymes, mechanism of action, multi-enzyme system, regulation of enzyme activity.

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

Brief introduction and application of secondary metabolites.

Unit-4

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

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

Plant hormones: auxins, gibberellins, cytokinins, ethylene and ABA; discovery & physiological effects.

Suggested Readings:

1. Verma, S.K.: Textbook of plant physiology. S. Chand & Company, 1999.

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

2. Parashar, A. N. and Bhatia. K. N.: Plant physiology. Trueman Book Company, 1985.
3. Jain, V. K.: Fundamentals of plant physiology. S. Chand & Company Ltd., 2013.
4. Verma, S. K. and Verma. M.: A textbook of plant physiology, biochemistry and biotechnology. S. Chand Ltd., 2000.
5. Verma. V.: Textbook of plant physiology. ANE Books India. 2007.
6. Malik. C. P and Srivastava. A. K.: Textbook of plant physiology. Kalyani publication, 1982.

Practical 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 amylase.
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
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 respirometer
18. Measurement of growth using auxanometer.

29

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

Paper III
Pteridophytes, Gymnosperms & Palaeobotany
(2 hrs./week)

Unit-1

General characters of Pteridophytes. Classification (G.M. Smith). Distribution and alternation of generation. Stelar system in Pteridophytes. Eusporangiate and leptosporangiate development of Sporangia, Apogamy, and Apospory. Economic importance of Pteridophytes.

Unit-2

Morphology, anatomy and reproduction of *Psilotum, Selaginella, Equisetum* and *Marsilea.*

Characteristics of Gymnosperms, distribution and classification (K.R.Sporne).

Unit-3

Morphology, anatomy, reproduction and life cycle of *Cycas, Pinus* and *Ephedra.* Economic importance of Gymnosperms.

Unit-4

Process of fossilization, types of fossils, techniques of study of fossils. Geological time scale. Primitive land plant: *Rhynia*. Fossil Pteridophytes: reconstructed plants-Lepidodendron and Calamites. Fossil Gymnosperm- *Williamsonia.*

Suggested Laboratory Exercises:

1. Study of external morphology, anatomy of vegetative and reproductive parts of *Psilotum, Selaginella, Equisetum* and *Marsilea.*
2. Study of external morphology, anatomy of vegetative and reproductive parts of *Cycas, Pinus* and *Ephedra.*
3. Study of fossils and slides of fossils.
4. Preparation of charts of Geological time scale

Suggested Readings

Bold, H.C., Alexopolous, C.J. and Delevoryas, T. 1987 Morphology of Plant and Fungi (5th). Harper and Foul Co., New York.

Gifford, E.M. and Foster, A.S. 1988. Morphology and Evolution of Vascular Plants. W.H. Freeman and Company, New York.

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

Sharma, O.P. Pteridophytes. 2000. Today and Tomorrow Publications.

Sarabhai, R.C. and Saxena, R.C.1990. A text book of Botany. Rastogi Publications, Meerut.

Sporne, K.R. 2002.The Morphology of Gymnosperms. B.I. Pub. Pvt. Ltd., Mumbai, Kolkata, Delhi.

Vashishta, P.C. 2002. Pteridophytes. S. Chand & Co.New Delhi.

Wilson, N.S. and Rothewall, G.W. 1993. Palaeobotany and Evolution of Plants. (2nd Ed.). Cambridge University Press, U.K.

Singh, V. Pandey, P.C. & Jain, D.K.2013. A Text book of Botany (IV Ed). Rastogi Publications, Meerut.

BOTANY PRACTICAL EXAMINATION B. Sc PART-II

SKELETON PAPER

M.M. 50 **TIME: 4 Hours**

S. No.	Practical	Regular	Ex NC
1(a)	Comment on the Tissue culture or Biotechnology technique	5	5
1(b)	Exercise based on molecular biology	5	5
2	Perform the given physiological experiment and write the principle, procedure, results based on observations and precautions involved.	7	7
3	Perform the bio-chemical test of the given sample and discuss the observation giving reasons.	3	3
4	Make a suitable preparation of material "A" (Pteridophyte) (vegetative/reproductive part). Draw a labelled sketch. Identify giving reasons.	5	5
5	Make a suitable preparation of material "B"(Gymnosperm) (vegetative/reproductive part). Draw a labelled sketch. Identify giving reasons.	5	5
6	Comment upon spots (1-5)	10	15
7	Viva-Voce	5	5
8	Practical record	5	-
	TOTAL	50	50

5. GEOLOGY

Scheme **Max. Marks : 100**

Min. Pass Marks : 36

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

SECTION OFFICER (Acad-I),
University of Rajasthan
JAIPUR-302 004

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, Ganlatites, 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. Gambridge 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.

37

SECTION OFFICER (Acad-I)
University of Rajasthan
JAIPUR-302 004

36

38

Addl. Registrar (Acad.)
University of Rajasthan
JAIPUR

6 · MATHEMATICS

Appendix -II

B.A./B.Sc. Part – II – 2016

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**
Paper – I	**Real Analysis and Metric Space**	**3 hrs.**	**50 (Science)** **66 (Arts)**
Paper – II	**Differential Equations**	**3 hrs.**	**50 (Science)** **66 (Arts)**
Paper – III	**Numerical Analysis**	**Theory : 2½ hrs.**	**32 (Science)** **44 (Arts)**
		Practical: 2 hrs.	**18 (Science)** **24 (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 Science and Science. However, the marks obtained by the candidate in the case of Faculty of Social Science 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 University and internal 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 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.

(38) ~~40~~

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/the 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, 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, Derivations of general quadrature formulas, Trapazoidal rule. Simpson's one-third, Simpson's three-eighth and Gauss's quadrature formulae.

Unit 3: Process of Gauss elimination and Iterative methods (Jacobi and Gauss Seidal) for solving system of linear algebraic simultaneous equations. Partial Pivoting method, ill conditioned systems,.Solutions of ordinary differential equations of first order with initial condition using Picard's Euler and modified Euler's method.

Unit 4: Scalar and Vector point functions. 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.

39 ~~11~~

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

Group A: Numerical integration using Trapezoidal and Simpson's rules.Numerical solution of Algebraic and Transcendental equations using
)i) Bisection method, (ii) Regula-Falsi method. (iii) Iteration method (iv) Newton-Raphson Method.
Group B: Numerical Solution of system of linear equations by Gauss elimination, Jacobi and Guass-Seidel methods. Solution of linear differential equations of first order and first degree with initial and boundary condition using modified Euler's method. Runge-Kutta Fourth order 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.

40

12

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

Appendix- I

7- Economics

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

Each paper shall be of three hour duration and of 100 marks for Arts students and of 75 marks for Science students.

Paper – I Introductory Macro Economics

Paper – II (a) Elements of Statistics and Mathematics

(b) History of Economic Thought

Note: There will be two papers of Economics. Each paper shall consist of three parts. Part A shall contain question No 1 consisting of very short type X (Ten) questions. The candidate is required to answer each question in 20 words. Part B shall contain question No 2 consisting of V (five) questions. The candidate is required to answer each question in 100 words. Part C shall contain three essay type questions (one from each section) with internal choice.

A candidate will be required to attempt five questions in all. All questions of Part A and Part B are compulsory while rest 3 questions are to be attempted from parts C selecting one question from each section. All questions carry equal marks. Each question will carry 20 marks for Arts students and 15 marks for Science students.

B.A. Part-II Paper-I

Introductory Macro Economics

Section-A

Macroeconomics: Meaning, Subject matter and Importance, Basic tenets of Classical, Keynesian, New-Classical and New-Keynesian economics, Macroeconomic variables, Circular flow of Income, National Income: Basic concepts, Measurement, Sectoral Accounts, Nominal and Real Aggregates.

Registrar (Acad.-I)
University of Rajasthan
JAIPUR

Professor & Head
Department of Economics
University of Rajasthan, Jaipur

Money: Functions, Demand and Supply. Quantity Theory of Money: Transaction Approach, Cash Balance Approach, Keynes' reformulation of the Quantity Theory of Money. Inflation: Meaning and Impact, Theories of Inflation- Demand Pull (Keynesian and Monetarist), Cost Push, Structural Theories of Inflation.

Section-B

Income and Employment Determination: Classical Model and Keynesian Model, Consumption Function: Psychological Law of Consumption, Determinants of Consumption, Paradox of Thrift, Investment Function: Determinants of Investment, Marginal Efficiency of Capital and Marginal Efficiency of Investment, Concept of Multiplier and Accelerator.

Section-C

Central Bank: Organizational set-up and functions of Central Bank (with special reference to RBI). Commercial Bank: Functions, Modern trends of Commercial Banking. Quantitative and Qualitative credit control by RBI. Money Supply: Meaning & Definition, four measures (M_1,M_2,M_3, and M_4). Monetary Policy: Objectives, Targets and Indicators. Transmission Mechanism, Fiscal Policy: Objectives and Instruments.

Recommended Books:

1. G.S. Gupta, Macro Economics, Theory and Application, 4th Ed, McGraw Hill, New Delhi.
2. Dornbusch, Fisher and Startz: Macroeconomics, XI Edition, Indian Reprint, Tata McGraw-Hill, Publishing Company Ltd. New Delhi
3. N. Gregory Mankiw, Macroeconomics, Worth Publishers (Latest Edition).
4. H.L Ahuja. (Hindi and English edition) Macro Economics, Theory and Policy; S. Chand & Co. Ltd., New Delhi.
5. Suraj B. Gupta: Monetary Economics, S. Chand and Co. Ltd.
6. L. N. Nathuramka, Prarambhik Samashti Arthshastra, Ramesh Book Publishing House, Jaipur
7. Rana and Verma: Macroeconomic Analysis, Vishal Publications.
8. Richard T. Froyen, Macroeconomics, Theories and Policies, (X Edition), Adapted by Pearson Education.

42

Professor & Head
Department of Economics
University of Rajasthan, Jaipur

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

B.A. Part-II Paper-II(a)

Elements of Statistics and Mathematics

Section-A

Surds, Indices, Quadratic equations, Logarithms, AP, GP, HP, Matrices and Determinants, Solution of simultaneous equations by Cramer's rule and Matrix inverse method. Differentiation: simple and partial (involving two independent variables), Applications in Economics (Elasticity, average, marginal concepts)

Section-B

Statistics: Definition, Nature and Importance. Use and Relevance of Statistical Methods. Census and Sample survey, Methods of Data Collection and Tabulation, Diagrammatic and Graphical Representation of data, Measures of Central Tendency: Arithmetic Mean, Mode, Median. Concepts of Dispersion, Skewness and Kurtosis.

Section-C

Simple Correlation: Karl Pearson and Rank Correlation Coefficient. Linear Regression, Fitting of Lines of Regression by the Least Square method, Analysis of Time Series, Determination of Trend by Straight Line trend equation. Interpolation (Binomial Expansion and Newton's method) Index Numbers.

Recommended Books:

1. M. R. Speigal, Theory and Problems of Statistics, McGraw Hill Book, London.
2. S.P. Gupta, Statistical Methods, Sultan Chand and Sons, New Delhi.
3. S.C Gupta and V.K. Kapoor, Fundamentals of Applied Statistics, S. Chand and sons, New Delhi.
4. A.L Nagar and R.K. Das, Basic Statistics. Oxford University Press, Bombay.
5. B.C. Mehta and G.M.K. Madnani, Elementary Mathematics for use in Economics; Laxmi Narain Agarwal, Agra.
6. Salvatore, D. Mathematics and Statistics, Schaum's Series, Tata McGraw Hill
7. G.S. Monga, Mathematics and Statistics for Economics, Vikas Publishing House, New Delhi.

43

Professor & Head
Department of Economics
University of Rajasthan,

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

B.A. Part-II Paper-II (b)

History of Economic Thought

Section-A

Mercantilism: Views on Trade, Money, Prices, Wages and Employment. Physiocracy: Natural Order; Primacy of Agriculture, Net product and Circulation of Wealth, Theory of taxation and Role of Government.

Classical School: Adam Smith- Views on Division of Labour, Theory of value, Capital accumulation, Distribution, International Trade, Economic Development, Critiques of Adam Smith,T.R. Malthus- Theory of Population, Theory of gluts, David Ricardo -Theory of Value and Distribution, Foreign trade, Economic development and Theory of Rent

Section-B

Critics of the Classical School: Sismondi, Robert Owen, Friedrich List.

J. S. Mill: Theory of Value, Views on Production and Distribution. Karl Marx: Efforts at Scientific Socialism, Theory of Money, Labor Theory of Value, Theory of Capital Accumulation and Crisis, Distribution German Historical School and the development of Marginalism, Neo-Classical School: Marshall-Price Determination and Elasticity, Consumer Surplus, Costs and Economies, Rent and Profit.

Section-C

Economic ideas of Kautilya in the field of Consumption, Production, Exchange, Distribution and Public Finance. Economic thought of Dadabhai Naoroji, Mahatma Gandhi, J.K Mehta, and Deendayal Upadhayaya.

Recommended Books:

1. Louise Haney, History of Economic Thought, Surjit publication, New Delhi.
2. M. R Blaug, Economic Theory in Retrospect: History of Economic Thought from Adam Smith to J.M. Keynes, (5th Edition), Cambridge University Press, Cambridge.
3. T N Hajela, History of Economic Thought, Ane's Student Edition, Daryaganj, New Delhi.
4. B.N. Ganguli, Indian Economic Thought: A 19th Century Perspective, Tata McGraw Hill, New Delhi.
5. Eric Roll, History of Economic Thought, Faber and Faber (Rupa).
6. J. A. Schumpter, History of Economic Thought, Oxford University Press.

44

Professor & Head
Department of Economics
University of Rajasthan

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

8. B.A./B.Sc. (Pass Course) Part-II Geography Examination 2016 onwards

Scheme of Examination

Faculty	Min. Pass Marks	Max. Marks
Arts/Social Science	72	200
Science	54	150
Paper I	Resources Geography	Arts 75 Science 50
Paper II	Human Geography	Arts 75 Science 50
Practical	18	Arts 50 Science 50

Notes

1. Students are permitted to use the stencils, simple calculator and log tables wherever needed in both theory and practical examinations.
2. There will be a common paper for Arts and Science.
3. Q.1 will be compulsory and will cover the entire course of the paper.

   Q. No. 1 of 20% marks of the maximum marks be set in two parts.

   (a) Part (a) will have ten items for locating on a map (to be supplied by examination centre) carrying 10% marks of the maximum marks and candidates shall attempt any five items.

   (b) Part (b) will have 10 short answer questions carrying 10% marks of the maximum marks and candidates shall attempt any five items.
4. Remaining 9 questions carrying equal marks will be set with three questions from each section of the syllabus.
5. Candidate will attempt 5 questions in all including question No. 1 selecting at least one question from each section.
6. Practical examination will be conducted by the board of examiners.
7. The candidate will have to pass in theory and practical separately.
8. The non-collegiate candidates will have to attend a practical training camp of 48 hours at a college affiliated to the University of Rajasthan, Jaipur notified by the University from time to time in which Geography subject is taught on payment of fee fixed by the University. The candidates appearing at examination from any examination centre located in Jaipur City will attend the practical camp at the University Post Graduate Department on payment of fee fixed by the University. The candidate will procure Certificate of successful completion of practical training camp from the College/Department of Geography and produce the same at the time of practical examinations.

5

Registrar (Acad.)
University of Rajasthan
JAIPUR

SYLLABUS

Paper I: Resources Geography

Section A

Nature, scope and significance of resources geography, definition and classification of resources: renewable and non renewable resources, resource classification of Zimmerman. Natural Resources: Distribution, exploitation, uses and conservation of forest, water, soils, fisheries, mineral resources, energy resources (coal, petroleum, natural gas and non-conventional energy resources).

Section B

Human resources: Population growth, distribution and density, causes of inequalities, population-resources relationship and problems, Agricultural resources: fisheries and cereal crops: rice, wheat, maize and barley; beverages: tea, coffee and tobacco, commercial crops: cotton, rubber, jute, sugarcane, silk and artificial fibres. Agricultural regions of the world.

Section C

Concepts of Resources utilization, their conservation. environmental and cultural constraints in resource utilization, water conservation and rainwater harvesting, soil and forest resources conservation, land capability classes, resources regions of the world, resources regions of the India, economic regions of the India, sustainable development.

Recommended Readings:

Alexander, E.W. 1988: Economic Geography. Prentice Hall India, New Delhi.
Bunting B.C., 1987: The Geography of Soil. Prentice hall, New York.
गुर्जर, आर.के. एवं जाट, बी.सी. 2013: संसाधन भूगोल। पंचशील प्रकाशन, जयपुर।
कौशिक, एस.डी. 2010: संसाधन भूगोल। रस्तोगी पब्लिकेशन्स, मेरठ।
माथुर, बी. 1998: संसाधन भूगोल। रस्तोगी प्रकाशन, मेरठ।
Mitchell, Bruce. 1979: Geography and Resource Analysis. Longmans, London.
Park, C.C. 2001: The Environment-Principles and applicatons. Routledge, London.
Robinson, G.W. 1932 : *Soils*, *their Origin*, *Constitution* and *Classification*. London.
Shafi, M. 2004: Agricultural Geography. Pearson India.

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 man-environment relations: determinism possibilism and neo determinism.

Section B

Human races: evolution and migration, zone-strata theory, classification of races: types, characteristics and distribution. human races in India, tribes of the world: eskimos, bushman, pigmy, masai, badduien and khirgiz; tribes in India: bhils, nagas, santhal, gond, gujjar of Jammu and Kashmir and toda. Population growth and theories, distribution and density of world population.

Section C

Migration of population: causes, types and impact; population regions and population policies in India. Rural settlements: factors affecting development of rural settlement, types and patterns of rural settlements, building materials and house types, urban settlements: process of urbanization, urban problems in India, impact of human activities on environment.

Recommended Readings:

Chandna, R.C. 2000: Geography of Population. Kalyani Publishers; New Delhi.
Dohrs, F.E. and Summners, L.W. (eds.) 1967: Introduction to Geography. Thomas Crowell Co. , New York.
Dear, M.J. and Flusty, S. (ed.) 2002: The spaces of Post modernity, Readings in Human Geography. Blackwell Publishers Ltd., Oxford.
Fellmen, Getis and Getis, J. 1998: Human Geography-Landscape of human activities. Longman, London.
गुर्जर, आर.के. एवं जाट, बी.सी. 2014: मानव भूगोल। पंचशील प्रकाशन, जयपुर।
Husain, M. 2012: Human Geography. Rawat Publications, Jaipur.
हारून, एम. 2006: संसाधन भूगोल। वसुन्धरा प्रकाशन, गोरखपुर।
Leong, G.C. and Morgan, E.C. 1982: Human and Economic Geography. Oxford University Press, Oxford 2nd Edition.
कौशिक, एस.डी. 2012: मानव भूगोल। रस्तोगी पब्लिकेशन्स, मेरठ।
मौर्य, एस.डी. 2005: जनसंख्या भूगोल। शारदा पुस्तक भवन, एलाहबाद।
पण्डा, बी.पी. 2001: जनसंख्या भूगोल। मध्यप्रदेश हिन्दी ग्रन्थ अकादमी, भोपाल।
राव, बी.पी. एवं श्रीवास्तव, बी.के. 2008: मानव भूगोल। वसुन्धरा प्रकाशन, जयपुर।
प्रसाद, रामा एवं मीना, जे. 2013: जनसंख्या भूगोल। रीतु पब्लिकेशन, जयपुर।
Singh, R.L. 2005: Fundamentals of Human Geography. Sharda Pustak Bhawan, Allahabad.

Practicals

Scheme of examination

Min. Pass Marks: 18 Max. Marks: 50

	Bifurcation of Marks	Time
Written test	24	3 hrs.
Field survey and viva voce	10+04	2½ hrs.
Record and viva voce	08+04	

N.B. 1. There shall be 6 questions in written paper selecting at least two questions from each section. Candidates are required to attempt 3 questions selecting 1 question from each section. All question carry equal marks.

Section A

Definition of cartography, types of cartographic symbols and their uses, drawing instruments and materials, classification and representation of data with the help of squares, rectangles, circles, spheres, ring, pyramids, wheel diagrams, traffic flow diagram , isochronic chart.

Section B

Classification and uses of maps, drawing of isopleth, choropleth, chorochromatic, choroschematic and dot maps (simple, multiple and multi colour), measures of central tendency and dispersion: mean, median, mode, quartiles, standard deviation.

Section C

Elements of map reading. History of topographical maps in India, Scheme of topographical mapping in India as per National Map Policy, 2005. Conventional symbols and interpretation of physical and cultural features on topographical maps.
Prismatic Compass survey: equipments, methods of measurement of bearings, correction of bearings, record of survey closing error and its corrections.

Recommended Readings:

Monkhouse, F. J. and Wilkinson, F.J. 1985: Maps and Diagrams. Methuen, London
Mahmood, A. 1998: Statistical Methods in Geographical Studies. Rajesh Publication, New Delhi (fourth revised edition).
Raisz, E. 1962: General Cartography. John Wiley and Sons, New York. 5th edition.
Singh, R.L. and Singh, Rana, P.B., 1991: Elements of Practical Geography. Kalayani Publishers, New Delhi.
Sarkar, A. K. 1997: Practical Geography: A Systematic Approach. Orient Longman, Kolkata.
शर्मा, जे.पी. 2011: प्रयोगात्मक भूगोल की रूपरेखा। रस्तोगी पब्लिकेशन्से, मेरठ।
Singh, L.R 2006: Fundamentals of Practical Geography. Sharda Pustak Bhawan, Allahabad.
Venkatrameiah, C., 1997: A Text book of Surveying. University Press, Hyderabad.

48

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

53

SECTION OFFICER (Acad.)
University of Rajasthan
JAIPUR-302 004

Asstt. Registrar (Acad.)
University of Rajasthan
JAIPUR

55

54

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, 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**

SECTION OFFICER (Acad-I)
University of Rajasthan
JAIPUR-302 004

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

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. Dudewiez 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.

58

SECTION OFFICER (Acad-I)
University of Rajasthan
JAIPUR-302 004

51

56

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

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.

SECTION OFFICER (Acad-I)
University of Rajasthan
JAIPUR-302 004

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

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, Fisher'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 $\bar{X}$, R, np, p and C-Charts.

SECTION OFFICER (Acad-I)
University of Rajasthan
JAIPUR-302 004

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

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

SECTION OFFICER (Acad.-II)
University of Rajasthan
JAIPUR-302 004

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

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**

SECTION OFFICER (Acad.)
University of Rajasthan
JAIPUR-302 004

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

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. Uso 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.

SECTION OFFICER (Acad.)
University of Rajasthan
JAIPUR-302 004

57

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, Fisher'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 $\bar{X}$, R, np, p and C-Charts.

SECTION OFFICER (Acad.-I)
University of Rajasthan
JAIPUR-302 004

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

11. PSYCHOLOGY

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

SCHEME OF EXAMINATION :

Faculty	Max. Marks	Min. Passing Marks
Arts	200	72 (Th.54 Pr.18)
Science	150	54 (Th.36 Pr.18)

Paper	Nomenclature	Duration	Max. Marks	
			Arts	Science
I	Psychopathology	3 Hrs.	75	50
II	Psychological Statistics	3 Hrs.	75	50
III	Practicals	3 Hrs.	50	50

NOTE :-

1. There will be three papers in Psychology. It will be common for Arts and Science. Each paper will be of 3 hours and would contain the entire course content of the paper.

Section-A will contain 10 questions of 20 words each. Each question will be of 1.5 marks for Arts students and 1 mark for Science students. Thus, Part-A will be of 15 marks for Arts students and of 10 marks for Science students.

Section-B will contain 7 questions of 50 words each, out of which students are required to attempt 5 questions. Each question will beof 3 marks for Arts students and of 2 marks for Science students. Thus, Part-B will be of 15 marks for Arts student and of 10 marks for Science students.

Section-C will contain 3 long questions each with internal choice. Each question will be of 15 marks for Arts students and 10 marks for Science students. Thus, Part-C will be of 45 marks for Arts students and 30 marks for Science students.

59

Asstt. Registrar (Acad.)
University of Rajasthan
JAIPUR

For clarification the distribution of marks is tabulated as below:-

ARTS			
Section	**No. of Questions**	**Marks**	**Total**
A	10	1.5	15
B	5 (Out of 7)	03	15
C	3 (with internal choice)	15	45
		Total Marks	**75**

SCIENCE			
Section	**No. of Questions**	**Marks**	**Total**
A	10	01	10
B	5 (Out of 7)	02	10
C	3 (with internal choice)	10	30
		Total Marks	**50**

2. Use of simple calculator will be allowed for statistical portions of all papers.

Paper-I

Psychopathology

Section-A

1. Introduction: Meaning of Normality and Abnormality, Characteristics of Abnormal Behaviour; Latest ICD and DSM Classification Systems.

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.

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

Section-B

4. Anxiety Disorders : Nature, Clinical Picture and Types: Generalized Anxiety and Panic disorder, Phobias and Obsessive Compulsive Disorder.

5. Somatoform and Mood Disorders : Nature, Clinical Picture 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/Anxiolytics-Related Disorders.

Section-C

7. Schizophrenia : Nature, Clinical Picture and Types.

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.

Books Recommended:

- Sarason, I.G. and Sarason, B.R. (2005) Abnormal Psychology. Delhi, Pearson Education
- Lamm, A. (1997) Introduction to Psychopathology N.Y. Sage.
- Buss, A.H. (1999) Psychopathology, N.Y. John Wiley.
- अरूण कुमार सिंह (2002) आधुनिक असामान्य मनोविज्ञान, दिल्ली, मोतीलाल बनारसीदास।

61

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

Paper-II

Psychological Statistics

Section-A

1. Introduction : Nature and Scope of Statistics and Psychological Data; Application of Statistics in Psychology; Nature and Levels of Measurement - Categorical and Continuous Variables.

2. Frequency Distribution : Drawing of Frequency Distribution. Bivariate Frequency Distribution, Graphical Representation of Grouped Data-Histogram, Polygon.

3. Measurement of Central Tendency : Purpose and Types; Characteristics and Computation of Mean, Median and Mode.

Section-B

4. Measures of Variability : Concept and Uses; Characteristics and Computation of Range, Quartile Deviation, Average Deviation and Standard Deviation.

5. Correlation : Concept and Types- Pearson's Product Moment Correlation (for Ungrouped Data by Assumed Mean and Actual Mean); Spearman's Rank Order Correlation.

6. Hypothesis Testing and Inferences Making : Population and Sample, Types of Sampling, Standard error of Mean, 't' test (Independent group), Interpretation of 't' values, levels of Significance.

Section-C

7. Non Parametric Tests: Nature and Assumptions of Distribution-free Statistics; Chi-Square; Equal Probability, 2 x 2 Contingency Table; Median Tests.

8. ANOVA: Purpose and Assumptions of ANOVA. One way ANOVA

9. Computer Analysis: Preparation of Data, Uses of SPSS.

Books Recommended:

- Broota K.D. (1992): Experimental design in behavioural research, Wiley Eastern, New Delhi.
- Minimum E.W, King B.M. and Bear. G. (1993): Statistical Reasoning in Psychology and Education, New York, John Wiley.
- Siegel. S. (1994): Non-parametric Statistics, New York, MCGraw Hill.
- कपिल एच.के. : सांख्यिकी के मूलतत्व, आगरा, विनोदपुस्तकमन्दिर।

Paper-III:

Practicals

1. Assessment of Mental Health.
2. Assessment of State and Trait Anxiety.
3. Measurement of Depression.
4. Measurement of Coping – Styles.
5. Assessment of Family Pathology.
6. Word – Association Test
7. Eight-State Questionnaire.
8. Neuropsychological Assessment.
9. Stress: Measurement and Analysis of Group Data (Mean and Median)
10. Stress: Measurement and Analysis of Group Data (t' test)

Anx - I

(1)

\2. TEXTILE-CRAFT

SCHEME: B.A PART-II

		Duration	Max mark	Min mark
1. **Theory:**	Paper-I	3Hrs	30	
	Paper-II	3Hrs	30	22
2. **Practical:**	Paper-I	6Hrs	35	
	Paper-II	6Hrs	35	25
3. **Submission:**	Paper-I		35	
	Paper-II		35	25

Syllabus (Theory):

Paper-I : Weaving Theory :

Yarn numbering system (Indirect and Direct)

Yarn Twist, Balance of fabric

Methods of fabric construction

Types of loom- Shuttle & Shuttle less

Preparation of Warp and Weft for weaving

Draft, Peg plan, Weave, Repeat, Design

Derivatives of Plain weave- Rib and Basket

Derivative of twill weave- Regular, Irregular, Left hand, Right hand,

Pointed and curved twill

Fabric defects, Selvedge, Types of Selvedge's

(64)

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

Paper-II : Dyeing Theory:

Types of fabric finishes: Mechanical & Chemical

Stages of Dyeing (fibre, yarn & fabric)

Wool dyeing and silk dyeing

Dyeing machines- Jigger and Winch dyeing machine

Difference between dyeing and printing

Steps of printing- preparation of cloth & colour

Methods of Direct printing- Block & Roller printing

Thickeners and types of thickeners

Practical (Paper-I&II)

1. Batik (samples)
2. Weaves samples using coloured paper stripes
3. Block printing (samples)
4. Stencil printing (spray)
5. Concept of resist and discharge printing

Design development for practical:

Table cover, pillow cover, using block printing.

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

13. BIO-TECHNOLOGY

Scheme :

Min. Pass Marks : 36

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

65

SECTION OFFICER (Acad.)
University of Rajasthan
JAIPUR-302 004

66

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

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.

70

SECTION OFFICER (Acad.)
University of Rajasthan
JAIPUR-302 004

67

71

Asstt. Registrar (Acad.)
University of Rajasthan

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

SECTION OFFICER (Acad-I)
University of Rajasthan
JAIPUR-302 004

68

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

ANNEXURE – I

(3)

14. CPEM

B.A./B.COM./B.SC. PART-II

THEORY PAPER-I

Fashion and Apparel Design

B.A./B.COM. MM- 30 **HRS-3**

B.SC. MM- 50

SECTION -A

TRADITIONAL COSTUMES

1. Study of traditional costumes of various regions of india.
2. History of costumes of Indian civilization.
3. Brief knowledge of world costumes : French , german ,greek , European .

SECTION -B

TECHNIQUES IN PATTERN MAKING

4. Eight head theory- principles and advantages.
5. Pattern making techniques – drafting , draping , flat pattern .
6. Colour and colour schemes, psychological effects of colour on clothes.
7. Fitting – principles of fitting, factors to be considerd while fitting, common fitting problems, remedying fitting defects of bodice, sleeves , and skirts.

SECTION -C

DESIGN

8. Classification of design – structural and decorative

9.Elements and principles of design .

10.layout of design of fabric in cutting- ,floral,checks,plaids,lines.

References:

1.Erwin,kinchen-clothing for moderns :macmillan publishing,new York.

2. Mathews mary –practical clothing construction I&II cosmic press,madras.

3. Doonga ji S.and deshpandey R. –basic process of clothing construction.

(69)

6/4/15

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

B.SC./B.A./B.COM. PART –II

PAPER-II

ELEMENTS OF MARKETING AND FINANCE

B.A./B.COM. –M.M 50 HRS.-3

B.SC.-M.M. 60

SECTION A

1.Market structure –Types of market, market survey, elements of cost.

2.History of readymade garment industry. Problem and prospects in global market.

3.Branded vs nonbranded market.

4.Types of garments exported.

SECTION B

5.Elementary knowledge of working capital, factors affecting working capital, operating cycle.

6.Sources of finance.

7.Letter of credit

8.Methods of payment in foreign trade.

9.Various types of bills.

10.Insurance

SECTION C

Brief study of:

11.ECGC (export credit and guarantee corporation)

12.EIC (export inspection council)

13.IIP (Indian institute of packaging)

14.ICA (Indian council of arbitration)

6/4/15

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

70

Referances:

1.srivastav and aggarwal:vipdan prabandh.

2.mamoria joshi:salesmanship&practice of marketing in india.

3.satya narayan:sales management.

4.daver,R.S.:salesmanship and publicity.

B.SC./B.A./B.COM. PART –II

PRACTICAL – I

APPAREL DESIGNING

B.A./B.COM. –M.M 60 HRS.-4

B.SC.-M.M. 25

1.Colour wheel and colour scheme .

2.Introduction to eight head theory and stick figure 9.5",10.5".

3.Developing an adult croquis from block figure.

4.Draping of garments on croquis (at least 8 sheets) using different colours schemes and occasions.

5. Preparation of a portfolio.

.B.SC./B.A./B.COM. PART –II

PRACTICAL – II

CLOTHING CONSTRUCTION

B.A./B.COM. –M.M 60 HRS.-4

B.SC.-M.M. - 25

1. Pattern making:

i)childs basic block and sleeve block.

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

ii) .sleeve variations: slash and spread method-puff ,bell,legomutton bishops sleeves.

iii). sleeve bodice combination:Magyar,raglan,dolman sleeves.

iv).different types of collars.

v.) different types of yokes.

2.Stitching of each sleeve ,collar, and yokes on bodice block.

3.Fashion designing (5 each) on sheet :baby frocks, a-line frocks, rompers, sunsuits, skirts and tops, bu-shirts with shorts.

4.**Redesigning of old garment using the idea such as:** to consider factors such as :money , creativity, individuality, skills, needs,

i). piecing or patchwork

ii).use of special fabric.

iii)use of decorative embroidaries

iv)trims

v)paints and dyes

5..Introduction of fashion designing in fashion shows.

References:

1.kallal mary jo,construction.

2.mitchell Beazley, the sewing book of a complete practical guide.

3.ireland fashion designing drawing and presentation.

4.renee weiss chase, CAD for fashion design.

72

6/4/15

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

Part I: Geology and Mining

Scheme:

Theory: Max Marks 100 Minimum Pass marks: 36

Paper I: Petrology 3 hrs duration Max Marks 50

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

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. H.S. Kabra)

73

78

Asstt. Registrar (Conf.-I)
University of Rajasthan
JAIPUR

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

74

Asstt. Registrar (Acad.)
University of Rajasthan
JAIPUR

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.

75

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 hydrollos, safo yields, ground water collection system).

80

SECTION OFFICER (Acad.)
University of Rajasthan
JAIPUR-302 004

76

81

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

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 Techaiques Environmental Biotechnology and Microbiology

Section-A

1. Environmental Computer programming (Introduction to FORTAN

SECTION OFFICER (Acad-I)
University of Rajasthan
JAIPUR-302 004

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

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, G.M., old Camp bell, J 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. Eik 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 8 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.

SECTION OFFICER (Acad-I)
University of Rajasthan
JAIPUR-302 004

78

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

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	50	70
On the Job training (4 Weeks)		

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.

Relational databases 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 design 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

SECTION OFFICER
University of Rajasthan
JAIPUR-302 004

Asstt. Registrar (Acad.)
University of Rajasthan
JAIPUR

18

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.

SECTION OFFICER (Acad-I)
University of Rajasthan
JAIPUR-302 004

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

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.

87

SECTION OFFICER (Acad.)
University of Rajasthan
JAIPUR-302 004

83

88

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

Unit-2

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

Barkhausen Criterion for maintained oscillations, grid bi-asing and self sustained oscillations, Tuned grid, Tuned emit-ters oscillator (Mainly transistor type), crystal controlled oscil-lators, 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 differen-tiating 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, Fundamen-tal sweep voltage generator, Transistor constant current sweep generator.

88

SECTION OFFICER (Acad.)
University of Rajasthan
JAIPUR-302 004

84

84

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

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.

89

SECTION OFFICER (Ac.-I)
University of Rajasthan
JAIPUR-302 004

85

90

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

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'.

90

SECTION OFFICER (Acad.)
University of Rajasthan
JAIPUR-302 004

86 91

Asstt. Registrar (Acad-I)
University of Rajasthan
JAIPUR

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.

SECTION OFFICER
University of R. J.
JAIPUR-302

87

Asstt. Registrar (Acad.-I)
University of Rajasthan
JAIPUR

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.

❖❖❖