University of Rajasthan
Jaipur

SYLLABUS

B.Sc. PART-II

Examination-2022

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

Scheme of Examination
B.Sc. (Pass Course) Part-II

The number of paper and the maximum marks for each paper together with the minimum marks required for a pass are shown in the scheme of examination against each subject separately. It will be necessary for a candidate to pass in the theory part as well as the practical part of a subject/paper. Wherever prescribed separately. Classification of successful candidates shall be as follows:

First Division 60% Second Division 48%	of the aggregate marks prescribed at (a) Part first Examination excluding those obtained in the compulsory subject (b) Part Second Examination (c) Part Third Examination taken together.

All the rest will be declared to have passed the Examination. If they obtain a minimum pass marks in each subject viz 36% No division shall be awarded at the Part First and Part Second Examinations :

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

Syllabus B.Sc. Part-II

Scheme of Examination
B.Sc. (Pass Course) Part-II

The number of paper and the maximum marks for each paper together with the minimum marks required for a pass are shown in the scheme of examination against each subject separately. It will be necessary for a candidate to pass in the theory part as well as the practical part of a subject/paper. Wherever prescribed separately. Classification of successful candidates shall be as follows:

First Division 60% / Second Division 48% of the aggregate marks prescribed at (a) Part first Examination excluding those obtained in the compulsory subject (b) Part Second Examination (c) Part Third Examination taken together.

All the rest will be declared to have passed the Examination. If they obtain a minimum pass marks in each subject viz 36% No division shall be awarded at the Part First and Part Second Examinations :

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

2

Syllabus B.Sc. Part-II

Scheme of Examination
B.Sc. (Pass Course) Part-II

The number of paper and the maximum marks for each paper together with the minimum marks required for a pass are shown in the scheme of examination against each subject separately. It will be necessary for a candidate to pass in the theory part as well as the practical part of a subject/paper. Wherever prescribed separately. Classification of successful candidates shall be as follows:

First Division 60% / Second Division 48% of the aggregate marks prescribed at (a) Part first Examination excluding those obtained in the compulsory subject (b) Part Second Examination (c) Part Third Examination taken together.

All the rest will be declared to have passed the Examination. If they obtain a minimum pass marks in each subject viz 36% No division shall be awarded at the Part First and Part Second Examinations :

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

2

Syllabus B.Sc. Part-II

Scheme of Examination
B.Sc. (Pass Course) Part-II

The number of paper and the maximum marks for each paper together with the minimum marks required for a pass are shown in the scheme of examination against each subject separately. It will be necessary for a candidate to pass in the theory part as well as the practical part of a subject/paper. Wherever prescribed separately. Classification of successful candidates shall be as follows:

First Division 60% / Second Division 48% of the aggregate marks prescribed at (a) Part first Examination excluding those obtained in the compulsory subject (b) Part Second Examination (c) Part Third Examination taken together.

All the rest will be declared to have passed the Examination. If they obtain a minimum pass marks in each subject viz 36% No division shall be awarded at the Part First and Part Second Examinations :

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

2

CONTENTS

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

B.Sc. Pt.-II

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

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

Unit-4

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

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, Length Contraction, Time Dilation, Mass variation, 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. Electric field measured in moving frames. Electric field of a point charge moving with constant velocity.

(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 and Leguerre functions (simple applications).

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

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 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: Basic idea of 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 (JFET) and metal oxide semiconductor filed effect transistor (MOSFET). Circuit symbols, biasing and volt-ampere characteristics, source follower operation of FET as variable voltage resistor

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.

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

Amplifiers: Analysis of transistor amplifiers using hybrid parameters and its gain-frequency response. Basic idea of Cascade amplifiers, direct coupled and R C coupled 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

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 Application, 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 Haikias, 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.

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

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

PRACTICAL

Teaching : 4 hrs/week
Practical One-Paper
Min Pass Marks : 18

5 hrs. duration
Max. Marks : 50

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

Section-A

1. Study of dependence of velocity of wave propagation on line parameter using torsional wave apparatus.
2. Study of variation of reflection coefficient of nature of termination using torsional wave apparatus.
3. Using platinum resistance thermometer find the melting point of agiven 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.

Dr. Registrar
Academic
University of Rajasthan, Jaipur

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 ($\cos\theta$) 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.

Dr. Registrar
Academic
University of Rajasthan, Jaipur

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 of chemistry of separation of Np, Pu and Am from U, electronic configuration, oxidation states, magnetic properties, complexation behavior, comparison of Lanthanides and Actinides with d-block elements.

Unit IV

Oxidation and Reduction:
Redox Potential, data, analyses of stability of redox stability in water, Frost, Latimer and Pourbaix diagrams. Application of redox principles in extraction of elements.

Dr. Registrar
Academic
University of Rajasthan, Jaipur

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 solvents 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, Gattermann synthesis, Hauben-Hoesch reaction, Lederer Manasse reaction and Reimer-Tiemann reaction.

Ethers and Epoxides
Methods of formation, physical properties, Chemical reactions - cleavage and autooxidation, Zeisel's method.
Synthesis of epoxides, Acid and base catalysed ring opening of epoxides, orientation of epoxide

Registrar
Academic
University of Rajasthan, Jaipur

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.

Dr. Registrar
Academic
University of Rajasthan, Jaipur

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 ($FeCl_3$-H_2O) System. Freezing mixtures, acetone-dry ice.

Liquid-Liquid mixtures - Ideal liquid mixtures, Raoult's and Henry's law. Non ideal systems, 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.

Dr. Registrar
Academic
of Rajasthan, Jaipur

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 milk as calcium oxalate by permanganometry

Dr. Registrar
Academic
University of Rajasthan, Jaipur

(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 ΔH 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.

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

a) 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.F. 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 Jr, Prentice Hall
10. Fundamentals of Organic Chemistry, Solomons, John Wiley

Dr Registrar
Academic
University of Rajasthan, Jaipur

11. Organic Chemistry Vol. I, II, 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, Macmillan
14. Physical Chemistry, G.M. Barrow, International Student Edition, McGraw Hill.
15. Basic Programming with Application, V.K. Jain, Tata McGraw Hill.
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. Deney, 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 I & 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, Tata McGraw Hill
8. Laboratory manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.
9. Voge'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.B. Yadav, Goel Publishing House.
13. Advanced Experimental Chemistry, Vol. 1-Physical, J.N. Gurtu 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.

Dr. Registrar
Academic
Univ... Rajasthan, Jaipur

3. ZOOLOGY

B. Sc. Part II - 2020

Scheme:

Max. Marks: 100

Min. Marks: 36

Paper I	**: 3 Hrs duration**	**33 Marks**
Paper II	**: 3 Hrs duration**	**33 Marks**
Paper III	**: 3 Hrs duration**	**34 Marks**
Practical	**: 4 Hrs duration**	**50 Marks**

NOTE:

1. There will be two parts of every theory question paper with a total duration of 3 hours. First part of question paper will comprise of question No. 1 containing 9 (Paper I & II) or 10 (Paper III) very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.
   Second part of question paper will be of long answer type questions 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 4 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 FUNCTION OF INVERTEBRATE TYPES

NOTE:

1. There will be two parts of this theory question paper with a total duration of 3 hours. First part of question paper will comprise of question No. 1 containing 9 very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.
   Second part of question paper will be of long answer type questions 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 4 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.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

Section – A

Habit, Habitat,Morphology,Structure, Organs and Systems (Locomotion, Digestive, Circulatory, Respiratory, Excretory, Nervous &Reproductive), Life Cycle,*Affinities and *Adaptations.

Note :* indicates whenever required.

Arthropoda:Palaemon(Indian Fresh water Prawn), Scorpion, Periplaneta,Grasshopper,Apis.
Onychophora :Peripatus.

Section – B

Habit, Habitat,Morphology,Structure, Organs and Systems (Locomotion, Digestive, Circulatory, Respiratory, Excretory, Nervous &Reproductive), Life Cycle,*Affinities and *Adaptations.

Note :* indicates whenever required.

Mollusca: Pila, Unio, Sepia
Echinodermata: Asterias,Echinus, Cucumaria.
Hemichordata: Balanglossus and its phylogenetic significance

Section - C

Invertebrate Adaptations

1. Salient features of Hemichordata.
2. Evolution of canal system of sponges.
3. Parasitic adaptations in Helminthes.
4. Social organization in termites and honey bees.
5. Direct and indirect development in insects.
6. Water vascular system of starfish.
7. Crustacean larvae & mouth parts of insects.
8. Parasitism in Crustacea.

PAPER – II: Z-202
ANIMAL PHYSIOLOGY AND BIOCHEMISTRY

NOTE:

1. There will be two parts of this theory question paper with a total duration of 3 hours. First part of question paper will comprise of question No. 1 containing 9 very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus. Second part of question paper will be of long answer type questions 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 4 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.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

Section - A

Animal Physiology with special reference to mammals

1. Physiology of digestion: Various types of digestive enzymes and their digestive action in the alimentary canal.
2. Physiology of blood circulation: Composition and functions of blood; mechanism of blood clotting; heart beat; cardiac cycle; blood pressure; body temperature regulation.
3. Physiology of respiration: Mechanism of breathing; exchange of gases: transportation of oxygen and carbon dioxide in blood; regulation of respiration.
4. Physiology of excretion: Kinds of nitrogenous excretory end products (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 (Homeostasis).

Section-B

Regulatory aspects of Animal Physiology

1. Physiology of nerve impulse and reflex action: Functional architecture of a neuron, origin and propagation of nerve impulse, synaptic transmission, reflex arc.
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, pancreas, testis and ovary.
4. Physiology of Reproduction: Hormonal control of male and female reproduction, implantation, parturition and lactation in mammals.
5. Preliminary idea of neurosecretion, hypothalamic control of pituitary function.

Section-C

Biochemistry

1. Carbohydrates: Structure, function and significance; oxidation of glucose through glycolysis, Kreb's cycle and oxidative phosphorylation; interconversion of glycogen and glucose in liver; role of insulin and glucagon.
2. Proteins : Structure, function and significance, essential and non-essential amino acids, transformation of amino acids: deamination, transmination, decarboxylation. 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.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

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

NOTE:

1. There will be two parts of this theory question paper with a total duration of 3 hours. First part of question paper will comprise of question No. 1 containing 10 very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus. Second part of question paper will be of long answer type questions 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 4 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, Organs of immune system.
2. Antigen and antibody: Antigenicity of molecules, haptens, antibody types.
3. Antigen-Antibody reactions: Precipitation reaction, agglutination reaction, neutralizing reaction, complement and lytic reactions and phagocytosis.
4. Immunity Regulating Cells: Macrophages, lymphocytes (B and T-Types) T-helper cells, T-Killer cells, plasma cells and memory cells.
5. Mechanism of humoral or antibody mediated immunity and cell mediated immunity.

Section - B

Microbiology

1. Brief introduction to the History of Microbiology: Work of Anatony Van Leeuwenhoek, theory of spontaneous generation, germ theory of fermentation and disease: Works of Louis Pasteur, John Tyndall, Robert Koch and Edward 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; mesosmes; cytoplasmic organization; cell projections: flagella and cilia.
3. Genetic material of Bacteria: Chromosome, replication of bacterial DNA.
4. Reproduction in Bacteria: Asexual reproduction, binary fission, budding, endospore formation, exospores and cyst formation; sexual reproduction, conjugation.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

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: *Gonnorhea, Meningitis*
      b. Bacilli: Diarrhoea
   (iii) Mycobacteria: Tuberculosis, Leprosy

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.
3. Basic concepts of animal cell, tissue, organ and embryo culture.
4. Genetic engineering (outline idea only): Applications of genetic engineering, hazards and regulations.
5. Protoplast fusion in prokaryotes and eukaryotes.
6. Recombinant DNA technology; hybridomas and their applications, PCR. DNA finger printing, DNA foot printing. RFLP, RAPD & AFLP, Human genome project.
7. Monoclonal antibodies and their applications.
8. Brief account of cloning: its advantages and disadvantages.
9. Biotechnology in medicine (outline idea only), antibiotics, vaccines, enzymes, vitamins, artificial blood.
10. Environmental Biotechnology (outline idea only): Metal and petroleum recovery, pest control, waste water treatment.
11. Food, drink and dairy biotechnology (outline idea only): Fermented food production; dairy products, wine, beer, vinegar and food preservation.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

Practical - Zoology

Min. Marks: 18 **4 Hrs. / Week** **Max. Marks: 50**

I. Study of Museum Specimens:

Onychophora	:	*Peripatus*
Arthropoda	:	*Limulus*, Spider, Scorpion, Centipede, Millipede, *Lepas,Balanus*, *Squilla,Eupagurus*, Crab, *Mantis*, Honey-bee, (queen, king, worker) Locust, Silkworm Moth, Beetle, White grub.
Mollusca	:	*Chiton*, *Aplysia*, *Cypraea*, *Mytilus*, Pearl*Oyster*, *Dentalium*, *Loligo*, *Nautilus*.
Echinodermata	:	*Pentaceros*, *Echinus*, *Ophiothrix*, *Cucumaria,Antendon*.
Hemichordata	:	*Balanoglossus*.

II. Study of Microscopic Slides:

Arthropoda	:	V.S. of integument (cuticle): *Pediculus,* Bedbug, Termite and its castes, *Cyclops, Daphnia*, crustacean larvae (Nauplius, Metanauplius, Zoea, Mysis, Megalopa, Phyllosoma), statocyst of prawn.
Mollusca	:	V.S. of shell, T.S. gill of *Pila,* T.S of gill of Unio, Glochidium larva.
Echinodermata	:	Larval forms

III. Anatomy:

Prawn/Squilla	:	External features, appendages, alimentary canal and nervous system; Hastate Plate
Pila	:	External features,pallial organs and nervous system; osphradium, radula.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

IV. Study of the Following Through Permanent Slide Preparation:

(i) Study of different cell types -Blood smear (Wrights or Leishman stain).
(ii) Ospharadium, gill lamella and radula of pila.
(iii) Statocyst and Hastate plate of Prawn/Squilla

V. Microbiology Immunology and Biotechnology:

1. Preparation and use of culture media for microbes.
2. Study of microbes in food materials like curd,etc (Gram +ve& Gram-ve bacteria, Aspergillus, Mucor, Rhizopus, Penicillium, Alternaria and Fusarium).
3. Educational tour to any Microbiology laboratory/ Dairy/ Food processing factory/ Distillery. Collection of material may also be encouraged wherever possible. Candidates are required to submit a detailed report of the visit.
4. Antigen-antibody reactions-precipitation, agglutination.

VI. Animal Physiology:

1. Counting of red and white blood cells in the given blood sample.
2. Estimation of hemoglobin in the given blood sample.
3. Estimation of haematocrit value (PCV) in the given blood sample.
4. Demonstration of enzyme activity (catalase) in liver.
5. Study of salivary digestion of starch and the effect of heat and alcohol on salivary digestion of starch.
6. Study of histological structure of major endocrine glands of mammals.

VII. Biochemistry:

1. Detection of protein, carbohydrate and lipid in the animal tissue/food samples.
2. Identification of different kinds of mono-, di- and poly-saccharides in the given food samples.
3. Circular Paper chromatography of dyes/amino acids.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

B.Sc. Part - II

Scheme of Practical Examination Distribution of Marks

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

		Regular	Ex. /N.C. Students
1.	Anatomy (any system)	6	5
2.	Permanent Preparation	4	6
3.	Exercise in Microbiology/immunology/Biotechnology	4	6
4.	Exercise in Animal Physiology	5	6
5.	Exercise in Biochemistry	5	6
6.	Identification and comments on Spots (1 to 8)	16	16
7.	Viva Voce	5	5
8.	Class Record	5	-
		50	**50**

Notes:

1. Anatomy: Study of systems of the prescribed types with the help of dissection.
2. With reference tomicroscopic slides, in case of non-availability, the exercise should be **substituted with diagrams/ photographs.**
3. Candidates must keep a record of all work done in the practical class and submit the same for inspection at the time of the practical examination.
4. Mounting material for permanent preparations would be as per the syllabus or as available through collection and culture methods.
5. **It should be ensured that animals used in the practical exercises are not covered under the wild life act 1972 and amendments made subsequently.**

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

Recommended Books:

1. Barnes R. D: Invertebrate Zoology, W. B. Saunders, 1969.
2. Barrington EJW: Invertebrate Structure and Function. 2nd edition John Wiley & Sons, Inc., 1978.
3. Barrington EJW: The Biology of Hemichordata and Protochordata. Oliver & Boyd, London 1965.
4. Barrett KE, Barman SM, Boctano, S and Brooks HL. Ganongs: Review of Medical Physiology. 24th edition McGraw Hill Education India Pvt. Ltd., 2012.
5. Berril NJ: The Tunicates. The Roy Society, London.
6. Brusca RG and Brusca GJ: Invertebrates. 2nd edition Sinauer/Panima Books, 2003.
7. Cooper GM and Hausman RE: The Cell: A Molecular Approach. 6th edition ASM Press Washington, DC/ Sinauer/Panima Books, 2013.
8. Conn EE, Stumpf PK, Bruening G, Doi, RH: Outline of Biochemistry. 5th edition. John Wiley & Sons, 1987.
9. De Robertis EDP and De RobertisJr EMF: Cell and Molecular Biology. 8th edition Lippincot Williams & Wilkins, 2006.
10. David R, Burggren Wand French K: Eckert Animal Physiology. 5th edition W H Freeman & Company, New York, 2001.
11. Eckert R, Randall D. J. Burggen W, French K: Eckert Animal Physiology and Burggren WW & Co. Ltd., 1997.
12. Fox SI: Human Physiology. 8th edition McGraw Hill Education 2003.
13. Gardner EL, Simmons MJ and Snustad DP: Principles of Genetics 8th edition John Wiley & Sons, Inc., 2006.
14. Giese A. C: Cell Physiology. 4th Edition, Saunders, 1973.
15. Glick BR., Paeternak JJ: Molecular Biotechnology, 4th edition ASM Press, 2010.
16. Goldsby RA, Kindt TJ and Osborne BA: Kuby Immunology. WH Freeman and Co., New York, 2002.
17. Grant: Biology of Developmental System
18. Gupta PK. Genetics: Classical to Modern. Rastogi Publications,2007.
19. Hall JE: Guyton and Hall Textbook of Medical Physiology. 12th edition Saunders Publications, 2010.
20. Hill RW, Wyse GA, Anderson M: Animal Physiology. 3rd edition Sinauer Associates Inc.USA, 2012.
21. Hyman LH: The Invertebrates, Vol. 6, McGraw Hill.
22. Jordan EL and Verma PS: Invertebrate Zoology.S. Chand & Company Ltd., 2012.
23. Karp G: Cell & Molecular Biology: Concepts and Experiments.7th editionJohn Wiley & Sons, Inc., 2013.
24. Kotpal RL: Modern Text Book of Zoology:Invertebrates.Rastogi Publications, 2012.
25. Lal SS: Practical Zoology Invertebrate.11th revised editionRastogi Publications, 2014.
26. Lehninger AL: Biochemistry. 2nd edition Kalyani Publishers, 1991.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

27. Lal SS: Practical Zoology Invertebrate. 11th revised edition, Rastogi Publications, 2014.
28. Lehninger AL: Biochemistry. Kalyani Publisher, 2008.
29. Lodish H, Berk A, Kaiser CA, Krieger M, Bertscher A, Ploegh H, Amon A, Scott M P. Molecular Cell Biology. 7th edition. Mac Millian High Education (International edition) England, 2013.
30. Meyers R. A: Molecular Biology and Biotechnology (A comprehensive Desk References John Wiley & Sons, 1995.
31. Murphy K: Janeway's Immunology. Garland Science; 8th edition, 2011.
32. Nelson DL and Cox MM: .Lehninger Principles of Biochemistry. 5th edition W. H. Freeman, 2008.
33. Nelson DL and Cox MM: Lehninger Principles of Biochemistry. 6th edition W. H. Freeman, 2013.
34. Owen J, Punt J, Stranford S: Kuby Immunology. 7th edition WH Freeman & Co. Ltd., 2013.
35. Old RW and Primrose SB: Principles of Gene Manipulation: An Introduction to Genetic Engineering. University of California, 1980.
36. Sastry KV: Animal Physiology and Biochemistry. 2nd edition Rastogi Publications, 2014-15.
37. Vander AJ, Sheerman J, Liciano D: Human Physiology: The Mechanics of Body Function. McGraw Hill Co., New York, 1998.
38. Verma PS and Jordan EL: Invertebrate Zoology. S Chand &Co. Ltd, New Delhi, 2001.
39. Verma PS, Tyagi BS, Agarwal VK: Animal Physiology. 6th edition S. Chand& Co., 2004.
40. Voet D and Voet JG: Biochemistry. 4th edition, John Wiley & Sons, Inc., 2011.
41. Voet D and Voet JG: Biochemistry. John Wiley & Sons, New York, 1990.
42. Verma PS: A Manual of Practical Zoology: Invertebrates. S.Chand &Co. Ltd.New Delhi, 1971.
43. Voet D and Voet JG: Biochemistry. 4th edition, John Wiley & SonsInc., 2011.
44. Wake MH: Hyman's Comparative Vertebrate Anatomy. 3rdedition University of Chicago Press Ltd., London, 1992.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

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. Marks34**
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. Allquestions 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 questionfrom each unit.These Q.No. 2 to 5 will have internal choice.

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

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.

RJ Jain
Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

Practical Exercises:

1. *Elementary knowledge of principles and uses of various instruments in molecular biology and biotechnology -Laminarair flow, Centrifuge, Autoclave, Incubator, Spectrophotometer, pH meter, Gel electrophoresis unit.*
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. andPhilips 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.

Dy. Registrar
(Academic)
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 andABA;discovery& physiological effects.

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

Suggested Readings:

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

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

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

Unit-i

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.

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

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

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.

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

BOTANY PRACTICAL EXAMINATION B.Sc PART-II

SKELETON PAPER

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

S.No.	Practical	Regular	ExNC
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

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

5. GEOLOGY

Scheme

Min. Pass Marks : 36

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

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, Naulilus, Ganlatites, Ceratites,

Dr. Registrar
Academic
University of Rajasthan

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.

Dr. Registrar
Academic
University of Rajasthan, Jaipur

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, Petrography 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.

Raj / Jaw

Dr. Registrar
Academic
University of Rajasthan, Jaipur

6. MATHEMATICS

B.Sc. Part-II 2020

Teaching : 3 Hours per Week per Theory Paper.
2 Hours per Week per Batch for Practical

Examination Scheme:

	Min.Pass Marks		Max. Marks
	Science – 54		150
	Arts – 72		200
		Duration	Max. Marks
Paper – I	Real Analysis	3 hrs.	40 (Science) 53 (Arts)
Paper – II	Differential Equations	3 hrs.	40 (Science) 53 (Arts)
Paper – III	Numerical Analysis	3 hrs.	40 (Science) 54 (Arts)
Practical		2 hrs.	30 (Science) 40 (Arts)

Note:

1. 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.
2. 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.
3. An Internal/external examiner can conduct Practical Examination of not more than **100 (Hundred)** Candidates.
4. Each candidate has to pass in Theory and Practical examinations separately.

Raj / Tau

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

Paper – I: Real Analysis

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks:** **40 (Science)**
53 (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. Concept of compactness and connectedness. Heine-Borel theorem. Holder inequality & Minkowski inequality, Metric space – Definition and examples, Open and Closed sets, Interior and Closure of a set, Limit point of a set in metric space.

Unit 2: Real sequences- Limit and Convergence of a sequence, Monotonic sequences. Cauchy's sequences, Subsequences, Cauchy's general principle of convergence. Properties of continuous functions on closed intervals.

Unit 3: Properties of derivable functions, Darboux's and Rolle's theorem. Notion of limit, continuity and differentiability for functions of several variables. The directional derivative, the total derivative, expression of total derivative in terms of partial derivatives.

Unit 4: Riemann integration – Lower and Upper Riemann integrals, Riemann integrability, Mean value theorem of integral calculus, Fundamental theorem of integral calculus. Functions of bounded variations. Introduction, properties of functions of bounded variations, total variation.

Unit 5: 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.

Reference Books :

1. K.A. Ross, Elementary Analysis: The Theory of Calculus, Undergraduate Texts in Mathematics, Springer (SIE), Indian reprint, 2004.
2. R.G. Bartle D.R. Sherbert, Introduction to Real Analysis (3rd edition), John Wiley and Sons (Asia) Pvt. Ltd.., Singapore, 2002.
3. Charles G. Denlinger, Elements of Real Analysis, Jones and Bartlett (Student Edition),2011.
4. S. Kumaresan, Topology of Metric Spaces, Narosa Publishing House, Second Edition 2011.
5. G. F. Simmons, Introduction to Topology and Modern Analysis, Mcgraw-Hill, Edition 2004.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

Paper – II: Differential Equations

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks:** **40 (Science)**
53 (Arts)

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

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

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

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

Unit 4 : Linear differential equations of second order. Linear independence of solutions. Solution by transformation of the equation by changing the dependent variable/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.

Reference Books :

1. R.S. Senger, Ordinary Differential Equations with Integration, Prayal Publ. 2000.
2. D.A. Murray, Introductory Course in Differential Equations, Orient Longman (India), 1967.
3. E.A. Codington, An Introduction to Ordinary Differential Equations, Prentice Hall of India, 1961.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

Paper – III: Numerical Analysis and Vector Calculus

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks:** **40 (Science)**
54 (Arts)

Note: (i) 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.
(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: Relation between the roots and coefficients of general polynomial equation in one variable, transformation of equations, Descarte's rule of signs, solution of cubic equations by Cardon's method, biquadratic equations by Ferari's method.
Numerical solution of Algebraic and Transcendental equations, Bisection method, Secant method, Regula-Falsi method, Iteration method, Newton- Raphson Method (derivation of formulae and rate of convergence only).

Unit 4: Gauss elimination and Iterative methods (Jacobi and Gauss Seidal) for solving system of linear algebraic equations. Partial Pivoting method, ill conditioned systems, Numerical solutions of ordinary differential equations of first order with initial condition using Picard's, Euler and modified Euler's method.

Unit 5: 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.

Reference Books :

1. B. Bradie, A Friendly Introduction to Numerical Analysis, Pearson Education, India, 2007.
2. C. F. Gerald and P. O. Wheatley, App;ied Numerical Analysis, Pearson Education, India,7th edition, 2008.
3. C.F. Gerald, P.O. Wheatley, Applied Numerical Analysis, Addison-Wesley, 1998.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

Practical

Teaching: 2 hours per week per batch not more than 20 students.

Examination Scheme: **Duration: 2 Hours**

	Science	Arts
Max.Marks	30	40
Min.Pass Marks	11	15

Distribution of Marks:

Two Practicals one from each group

10 Marks each	=	20 Marks (13 Marks each)	26
Practical Record	=	05 Marks	07
Viva-voce	=	05 Marks	07
Total Marks	=	30 Marks	40

The paper will contain TWO practical. The candidates are required to attempt both practical.

Practicals with Computer Programming in C Language.

Programming languages and problem solving on computers, Algorithm, Flow chart, Programming in C- Constants, Variables, Arithmetic and logical expressions, Input-Output, Conditional statements, Implementing loops in Programs, Defining and manipulation arrays and functions.

Group A:

1. Printing n terms of Fibonacci sequence.
2. Finding $n!$, $\sum n, \sum n^2$ etc.
3. Defining a function and finding sum of n terms of a series/sequence whose general term is given (e.g. $a_n = \frac{n^2+3}{n+1}$).
4. Printing Pascal's triangle.
5. Finding gcd and lcm of two numbers by Euclid's algorithm.
6. Checking prime/composite number.
7. Finding number of primes less than n, $n \in Z$.
8. Finding mean, standard deviation and ${}^nP_r$, ${}^nC_r$ for different n and r.

Group B:

1. Numerical integration using Trapezoidal, Simpson's 1/3, 3/8 and Waddle rules.

Note:

1. Each Candidate (Regular/non-Collegiate) has to prepare his/her practical record.
2. Each Candidate has to pass in Practical and Theory examinations separately.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

7. Economics

B.Sc. Part-II 2020

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 I 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) question. 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.

Paper-I

Introductory Macro Economics

Section- A

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

Money function. 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 modern), Demand Push. Structural Theories of Inflation.

Raj Nath
Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

Section-B

Income and Employment Determination : Classical Modal 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.

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. Nathuranmka, 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.

Paper –II (a): Elements of statistics and Mathematics

Duration: 3 hrs **Max Marks: 100**

Section- A

Surds, Indices, Quadratic Equation, Logarithms, Permutation and Combination, Binomial Theorem, Arithmetic progression, Geometric Progression and Harmonic Progression, Analytical Geometry: Straight Line, Parabola and Hyperbola, Matrices and Determinants, solution of Simultaneous equations by Cramer's rule and Matrix Inverse. Simple differentiation, Partial differentiation (involving two independent variables). Maxima, minima point of inflexion. Simple Integration involving one independent variable, Application in Economics (Elasticity, Average, Marginal Concepts)

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

Section – B

Statistics-definition, nature and importance, Uses 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, Geometric Mean, Harmonic Mean. Concept and Measures of Dispersion and Skewness.

Section – C

Simple Correlation: karl Pearson's and Rank Correlation, Regression analysis, Fitting of Linear Regression lines using Least Square Method, Analysis of Time Series, Determination of trend by straight line trend equation, Index numbers, Interpolation (Binomial Expansion and Newton's method), Association of Attributes.

(**Note:** Use of non-programmable calculator is permitted)

Books Recommended :

1 B.C. Mahta and G.M.K Madanani Elementary Mathematics for use in Economics Laxmi Narain Agarwal, Agra

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

3 Murray R. Spiegel Theory and Problems of Statistics McGraw Hill Book London

4 S.C. Gupta and V.K. kapoor Fundamentals of Applied Statistics. S Chand and New Delhi

5 Salvatore. D Mathematies and Statistics. Schaum's Series. Tata McGraw Hill

6 G.S. Monga Mathematics and Statistics for Economics, Vikas Publishing House. New Delhi

7 बी सी मेहता एंव जी एम के मदनानी अर्थशास्त्र में प्रारम्भिक गणित लक्ष्मीनारायण अग्रवाल आगरा।

8 कैलाशनाथनागर सांख्यिकी के मूलतत्व मीनाक्षीप्रकाशन मेंरठ।

Paper- II (b) History of Economic Thought

Section –A

Mercantilism Views on Trade Money, Prices. Wages and Employment Physiocracy:Natutal 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 Valve and Distribution. Foreign Trade, Economic Development and Theory of Rent

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

Section-B

Crítities 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: Economics Rent and Profit

Section C

Economic of Kautilya, Economic thought of Dadabhai Naroji, Mahatma Gandhi, G.K. Mehta, Deendayal Upadhayaya.

Books Recommended :

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

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

8. Geography

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.

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

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.
कौशिक, एस.डी. 2010: संसाधन भूगोल। रस्तोगी पब्लिकेशन्स, मेरठ।
माथुर, वी. 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

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

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.
Husain, M. 2012: Human Geography. Rawat Publications, Jaipur.
सरन, एस. 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.वे. 2008: मानव भूगोल। वसुन्धरा प्रकाशन, 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	

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

N.B. I. 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

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR

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

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

Dr. Registrar
Academic
University of Rajasthan

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 Lehmann 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, adhoo 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

Dr. Registrar
Academic

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.

Dr. Registrar
Academic
University of Rajasthan, Jaip

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.

Dr. Registrar
Academic
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

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

Dr. Registrar
Academic
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. Use of averages, Simple aggregative and Weighted average

Dr. Registrar
Academic
University of Rajasthan Jaipur

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 score, 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. Gowden 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.

Dr. Registrar
Academic
University of Rajasthan, Jaipur

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

Dr. Registrar
Academic
Univer... ...aja than, 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	Abnormal Psychology	3 Hrs.	75	50
II	Psychological Statistics	3 Hrs.	75	50
	Practical	3 Hrs.	50	50

NOTE:-

1. There will be three papers in Psychology. Each paper will be of 3 hours. There will be a common paper for Arts and Science. In I and II Papers there will be 3 Sections A, B and C and will cover 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 be of 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.

Dy. Registrar (Academic-I)
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 - Abnormal Psychology

Section: A

1. Mental Disorder : Definition, Indicators of Abnormality, DS M - 5 and ICD - 10 Classification Systems, Mental Health Professionals .
2. Causal Factors and View points : Risk Factors and Causes; Necessary, Sufficient and Contributory causes; Diathesis - Stress Models, Biological, Psychological and Social perspectives .
3. Clinical Assessment and Diagnosis : Basic elements in Assessment, Physical and Psychosocial Assessment .

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

	Section: B
4.	Anxiety, Obsession Compulsion and Trauma and Stress or Related Disorders :
	Types, Clinical Picture and Causal Factors.
5.	Mood Disorders and Suicide : Types, Clinical Picture and Causal Fact ors .

6 . Somatic Symptoms and Dissociative Disorders : Types, Clinical Picture and Causal Factors

Section: C

7 . Feeding and Eating Disorders : Types, Clinical Picture and Causal Factors

8.	Schizophrenia and Other	Psychotic	Disorders : Types, Clinical	picture and
	Causal Factors.			
9.	Psychological Treatment /	Therapies : Behavioral Therapy, Cognitive and		
	Cognitive - Behavioral	Therapy,	Humanistic - Existential	Therapies ,
	Psychodynamic Therapies.			

Books Recommended:

- Butcher, J. N., Hooley, J .M. & Mineka, S. (2017). *Abnormal Psychology.* Noida : Pearson India Education.
- Oltmanns, T . F. & Emery, R . E . (2017) . *Abnormal Psychology* . Noida : Pearson India Education.
- David, B. H. & Durand V. M. (2007). *Abnormal Psychology : An Integrated Approach.* New Delhi: Thomson.
- Ray, W. J. (2015). *Abnormal Psychology.* New Delhi : Sage.

Dy. Registrar (Academic-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*. New Delhi: Wiley Eastern.
- Garrett, H. (1981). *Statistics in psychology and education*. Mumbai: Vakil Febber and Simons.
- Mininum, E.W., King, B.M. & Bear. G. (1993). *Statistical Reasoning in Psychology and Education*. New York: John Wiley.
- Siegel. S. (1994). *Non-parametric Statistics*. New York: McGraw Hill.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

Practical

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)

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

12.

ELECTRONICS

Scheme :

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

Paper-I- Amplifier Circuits

Max. Marks-33

Time : 3 Hours

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

Unit-1

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

Unit-2

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

Unit-3

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

Dy. Registrar
(Academic)
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 T.V. 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.

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

Unit-3

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

Unit-4

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

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

Unit-5

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

References

1. Electron tube circuits J. Seeley
2. Engineering Electronics- Ryder
3. Hand book of Electronics-Gupta & Kumar
4. Applied Electronics - G.K. Mithal
5. Electronics - V.P. Arora

Paper-III- Digital Computer and Programming

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

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

Unit-1

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

Unit-2

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

DY. Registrar
Academic
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'.

Dy. Registrar
Academic
Rajasthan

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.

Dy. Registrar
Academic
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 inverter.
7. To study OP Amp as a non-inverter.
8. To study push-pull amplifier using transistor.
9. To study emitter follower and its frequency response.

❖❖❖

13. Textile Craft

B.Sc. Part-II 2020

SCHEME : B.A/B.Com/B.Sc. PART-II

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

Paper-I : _Weaving Theory-I

UNIT-I

Yarn numbering system –Indirect (cotton, metric, woollen and worsted count) and Direct (Tex and Denier)

Yarn Twist and their types, Balance of fabric

Methods of fabric construction: Braiding &Lacing, knitting, felting and weaving

UNIT-II

Types of loom- Shuttle & Shuttle less; introduction to shuttleless looms- airjet, waterjet, projectile and rapier loom

Preparation of Warp and Weft for weaving

Draft, Peg plan, Weave, Repeat, Design

UNIT-III

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

Paper-II: Dyeing Theory –I

UNIT-I

Difference between dyeing and printing
Mechanical finishes- basic process of beating, singeing, napping, calendaring and embossing.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

UNIT-II

Stages of Dyeing (fibre, yarn & fabric)
Wool dyeing and silk dyeing
Dyeing machines- Jigger and Winch dyeing machine

UNIT-III

Steps of printing- preparation of cloth & colour
Methods of Direct printing- Block & Roller printing
Thickeners and types of thickeners

Practical (Paper-I)

1. Thread count and Balance of the cloth
2. Weave samples of derivatives of plain and twill weave

Practical (Paper-II)

1. Introduction to motif, repeat and layout
2. Block printing- samples preparation
3. Batik-spot, crack, scratch and painting (samples)

Submission (Paper-I)

1. Assessment of samples
2. Preparation of weave samples

Submission (Paper-II)

1. Any one article using block
2. Any one article using batik

Examination Scheme:

One Major Problem: 20 Marks
One Minor Problem: 15 Marks

Reference books :

Sahnai, V.A. (1989) Theory of Dyeing, Sevak publications. Mumbai

Trotman, E.R. (1985) Technology of Dyeing, John wiley & sons Inc London. London

Pryag, R.S. (1994) Technology of Printing, India publisher.

Pryag, R.S. (1995) Technology of Finishing, India publisher.

Bucker, (1998) Textiles, Abhishek spublications.

Kulkarni, M.M., Weaving technology, Virindra publication, Jalgon

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

14. Garment Production & Export Management
B.Sc. Part-II 2020

B.A/B.Com.– Maxmium Marks 40 Hrs.3
B.Sc. Maxmium Marks 50

THEORY PAPER – 1
Fashion and Apparel Design

OBJECTIVES : -

1. To Develop Sensitivity & Understanding towards Historical World Costumes.
2. To Focus on Design Elements & Principles and their Details on Garments.
3. To Create Awareness About the Techniques of Pattern Making & Principle of Fittings.

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.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

References :

1. Erwin, M. D., Kinchen, L.A. & Peters, A. (1979). Clothing for moderns. Macmillan publishing new York.
2. Jo, K. M. (1985). Clothing construction I&II. Prentice Hall.
3. Mathews, M. (1974). Practical clothing construction part I & II. Chennai,Cosmic press.
4. Doogaji, & Deshpandey, R. (1988). Basic process and clothing construction. Raaj Prakashan.

THEORY PAPER – 1I

ELEMENTS OF MARKETING AND FINANCE

B.A./B.Com.-Maxmium Marks 40 Hrs. – 3

B.Sc. – Maxmium Marks 50

OBJECTIVES :

1. To create awareness about the procedures to select, proceed & start the Small Scale Industry.
2. To guide the process of product development according to the market needs.
3. To become familiar with the methods of payment in foreign trades & about types or bills.

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 versus non -branded 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 typed of bills.
10. Insurance

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

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 of arbitration)

References :

1. Srivastav, & Aggarwal. (). Vipdan prabandh.
2. Mamoria, C.B., Joshi, R. L. & Mulla, N.I. (2003). Principles & practice of marketing in india. Kitab Mahal distributers.
3. Satya narayan; Sales management.
4. Daver R.S. (2009). Salesmanship and Publicity. Vikas publishing house Pvt Limited.

PRACTICAL- 1
APPAREL DESIGNING

B.A/B.Com.–Maxmium Marks 60 Hrs.- 4

B.Sc. – Maxmium Marks 25

OBJECTIVES :

To familiarize with basics of color

To develop expertise in drawing croquis and draping dresses on them.

Contents:

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.

Raj Jain

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

Examination Scheme :

B.A.\B.COM:-Max Marks:-60
1. Major Problems-30
2. Minor Problems:-20
Internal:-10

B.SC:-Max Marks:-25
1. Major Problem:-10
2. Minor Problems:-10
Internal:-5

PRACTICAL – II

CLOTHING CONSTRUCTION

B.A./B.Com.–Maxmium Marks 60 Hrs- 4

B.Sc. – Maxmium Marks - 25

OBJECTIVES :

1. To be able to make basic drafts of bodice, sleeve and collar.
2. To learn the knowhow of stitching and all basic processes and ornamentation techniques.

Contents :

1. Pattern making
    1. Child basic block and sleeve block.
    2. Sleeve variations; slash and spread method-puff, bell, legomutton, bishops sleeves.
    3. Sleeve bodice combination; Magyar, raglan, dolman sleeves.
    4. Different types of collars.
    5. 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. sun suits skirts and tops, bush -shirts with shorts.
4. Redesigning of old garment using the idea such as; to consider factors such as money, creativity, individuality, skills, needs,
    (i) Patchwork
    (ii) Ornamental fabric.
    (iii) Decorative embroideries
    (iv) Trims
    (v) Paints and dyes
    (vi) Introduction of fashion designing in fashion shows.
5. Introduction fashion designing in fashion shows.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

References :

1. Jo, K.M. & Beazley. (1985).The sewing book of a complete guide. Prentice Hall.
2. Ireland, P. J. (1982). Fashion designing drawing and presentation. Batsford Ltd. 4th Revised edition.
3. Chase, R.W. (1997). CAD for fashion design. Prentice Hall; Pap/DSKT edition.

Examination Scheme :

B.A.\B.Com.-Max Marks:-60
1. Major Problems-30
2. Minor Problems:-20
Internal:-10

B.Sc:-Max Marks:-25
1. Major Problem:-10
2. Minor Problems:-10
Internal:-5

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

15. 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

DY. Registrar
Academic
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

DY. Registrar
Academic
University of Rajasthan

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.

Dy. Registrar
Academic
University of Rajasthan, Jaipur

16. ENVIRONMENT SCIENCE

B.Sc. Pt II- 2020

Scheme:

Theory			
Max Marks: 100			Min. Marks:36
Paper 1	3 hours duration		Max Marks:50
Paper 2	3 hours duration		Max Marks:50
Practical	4 hours duration	Min. Marks:18	Max Marks:50

Note:

1. Two types of Question papers for each theory paper will be applicable. Total duration of 3 hours for each paper. One question paper will comprise of the objective questions and the other will be of descriptive type question.
2. Descriptive type question paper (to be given during 1st 2 hours of examination) will have 9 questions from each section out of which a student is supposed to attempt 4 questions selection at least 1 from each section. This portion of the paper will carry maximum 30 marks. Each descriptive question will be of 7.5 marks.
3. The objective question paper will be given after 2 hours of commencement of descriptive type paper and will have 35 questions of the objective type. This portion of the paper will carry 20 marks. The objective type questions will be of the following types:
    a. Multiple choice type questions:20 questions of ½ marks each.
    b. Fill in the blanks/one word/true or false type questions:10 questions of ½ mark each.
    c. Very short answer type questions:5 questions of 1 mark each

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

Paper I: Environmental Pollution

Section-A

1. Sources and Classification of Air pollutants; aerosols, gases, vapors.
2. Meteorological Aspects; Factors affecting Air Pollution, wind roses, plume behavior, estimation of plume rise.
3. Air Pollution modeling; Dispersion models, Pasquill model, ASME model, Gaussian plume model, assumption, limitation applications.
4. Effects of Air Pollution; effects on economics, effects on environment and effects on human beings.
5. Global effects of Air Pollution, Greenhouse effect, Global warming, climate change, Acid rains, Ozone depletion.
6. Air Pollution due to automobile; Vehicular emissions, Motor fuel combustion, automobile emission mechanism from various vehicles.

Section-B

1. Classification of water pollutants.
2. Different types of sources of water pollution.
3. Types of wastewater and its quantum.
4. Effects of water pollution on Environment(Soil, organisms, vegetation, crop plants)
5. Effects of water pollution on human beings.
6. Pollution of water by Industries and power plants.
7. Marine pollution; quantum, types of pollutants, effects on water quality, organisms and ultimate effects on human beings.

Section-C

1. Various sources of Noise Pollution.
2. Methods of measurements of Noise Pollution.
3. Temporary effects of Noise Pollution on human beings.
4. Permanent effects of Noise Pollution on human beings.
5. Land pollution due to Municipal solid waste.
6. Pollution due to agricultural chemicals on land and crop plants.

Suggested Readings:

- Banerjee, B.N. 1987, Environmental Pollution and Bhopal Killings, Gian Publishing House, New Delhi.
- Environmental Radiation and Thermal Pollution and their control, Acol Publication, New Delhi.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

- Katyal, T. and Satake, M. 2001. Environmental Pollution. Anmole Publications Pvt. Ltd. New Delhi.
- Liu, D.H.F. and Liptak, B.G. 2000. Air Pollution. Washington. D.C.
- Nath, P. and Nath, S. 1990. Environmental Pollution conservation and Planning, Chng Publication, Allahabad.
- S.A. 1991, Environmental Impacts on Water Resources Project, Discovery Publishing Home, New Delhi.
- Santara, S.C. 2001. Environmental science. New Central Book Agency (P) Ltd. Calcutta.
- Sharma, P.D. 2005. Ecology and Environment. Rastogi Publications, Meerut.
- Sinha, U.K. 1986, Ganga Pollution and Health Hazards, Alka Enterprises, New Delhi.
- Tebbntt, T.H.Y.1983, Principles of water quality control, Pragmon Press, Oxford.

Paper II: Computer Techniques, Environmental Biotechnology and Environmental Microbiology

Section A

1. Biotechnology and its possible role in Environmental conservation.
2. Oil Slicks, oil spills, pesticide, tannery food industries and applications of biotechnology.
3. Bioremediation: Bioremediation of polluted soil.
4. Hazardous wastes in environment and use of Biotechnology.
5. Air Pollution abatement and Biotechnology (Bio scrubbers, Bio beds, Bio trickling filters).
6. Biotechnology and Wastewater treatment.

Section B

1. Microbiology and its possible role in solution of Environmental Challenges.
2. Air borne diseases and causal organisms.
3. Water borne diseases and causal organisms.
4. Role of microbes in metal recovery.
5. Role of microbes in pest control.
6. Degradation of pesticides in environment and soil.
7. Vermitechnology and waste treatment.

Section C

1. Software MS Word and its possible role in environmental challenges.
2. Software XP and environmental Challenges.
3. Role of Websites and internet in environmental conservation.
4. Wind rose formation and its application in environmental monitoring.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

Suggested readings:

- Allen, M.J. and Geldreich, E.F. 1975.Bacteriological criteria for groundwater. Groundwater .13: 45-52.
- Alvares, Claude, ed.1996. The Organic Farming Source book, Goa.The other India Press
- Annan, Kaffi, A. 2002. Towards a sustainable Future. 44(7): 10-15.
- Bonde, G.J.1977. Bacterial indicator of Water Pollution. Adv.Aqua.Microbial. 1: 273-364.
- Border, R. and Winter, J. 1978. Microbial methods for monitoring the environment – water and waste. USEPA, Cincinnati, USA
- Brown, C.M., old Camp bell, Priest, F.G. 1987.Introduction to Biotechnology, Blackwell Scientific Publishers, London.
- Cabelli, V.J. 1982. Microbial indicator systems for assessing water quality. Anton Von Leeuwenhock. 48: 613-618.
- Carson, Rachel.1962.Silent Spring. Indian Edition. Goa : Other Indian Press.
- Cass, A.E.G.1990. Biosensors: A practical approach, Oxford University Press, New York.
- Chakraverty, A.1989. Biotechnology and other Alternative Technologies. Oxford and IBH Publishing CO.Pvt. Ltd.New Delhi
- Chatterjee, A.K. and Alam, B .1998. Aquatic plants in heavy metal pollution abatement and monitoring .pp 191-205. In: Sood, P.P and Prakash .R. (eds). Heavy metal pollution, Toxication and Chelation. M.D.Publications, New Delhi.
- Chatterjee, D.K., Kellog, S.T., Furukawa, K., Kilbanes, J.J. and Chakraborty, A.M.1991. Genetic approach to the problems of toxic chemical pollution. PP: 199-212. Walton, A.G. (ed.). Recombination DNA. Elsevier.Amsterdam.
- Davis, B.D., Dulbecco, R., Einsen, H.N. and Ginnsberg, H.S. 1990. Microbiology. Harper and Row Publication. Singapore.
- FikSel, J. and Covello, V.T.1986. Biotechnology, Risk assessment. Pergamon Press, New York.
- Forsteb, C.F.1985. 1986. Biotechnology and Wastewater treatment. Cambridge University Press, London.
- Forster, C.F. and Warse, D.A.J.1987. Environmental Biotechnology. Ellis Horwood Ltd. U.K.
- Gandey, A.E. and Gandy, E.T.1981. Microbiology for Environmental Scientists and Engineers. McGraw – Hill, New York.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

- James, A. and Evison, L. 1979. Biological indicators of Water quality. John Wiley and sons.
- Lowries, P. and Wells, S. 1991. Microorganisms, Biotechnology and Disease, Cambridge University Press. Cambridge.
- Mc Carthy, J.F. and Roch, M. 1983. Biomarkers of Environmental Contamination.CRC Press, Boca Raton, California.
- Mitchell, R. 1974. Introduction to Environmental Biotechnology. Prentice – Hall, London.
- Prentis, S. 1984. Biotechnology. A new Industrial Revolution. Orbis Publishing, London.
- Primose, S.B. 1987. Modern Biotechnology. Blackwell Oxford.
- Rana, S.V.S.1986. Recent trends in Biotechnology and Biosciences.Pragati Press. Muzzafarnagar.
- Rehm, H.J. and Redd, G. 1986. Biotechnology, Vol I to B VCH Nemheim, FRG
- Sanunders, V.A. and sanders, J.R. 1987. Microbial Genetics applied to Biotechnology, Cromm, Helm, and London.
- Stoner, D. 1994. Biotechnology for the treatment of Hazardous wastes. Lewis Publishers. Boca Raton, California.
- Walker, J.M. and Ginford, E.B. 1985. Molecular Biology and Biotechnology Dorset Press, Dorset.
- Yoken, E. and Dimartino, V. 1989. Biotechnology in future Society Grower Publishing Co. USA.

Suggested Field and Laboratory Exercises

1. Estimation of SPM (Suspended Particulate Matter) from heavy traffic and busy areas.
2. Estimation of CO_2.
3. Estimation of SO_x.
4. Estimation of NO_x.
5. Preparation of pollution roses.
6. Estimation of Noise Levels from busy areas.
7. Estimation of Noise Levels from Silence zone (Hospital area, sanctuaries, National Parks)
8. Estimation of pH of water.
9. Estimation of EC of water.
10. Estimation of TDS of water.
11. Estimation of Chlorides.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

12. Visit to various water harvesting structures (traditional water harvesting structures), ponds, bawries, kunds, kacchatanka, puccatanka.
13. Collection of water from surface water sources, tankas etc.
14. Estimation of pH, EC, TDS, Chlorides, Oxygen, alkalinity etc. from surface water sources of different locations.
15. Estimation of pH, EC, TDS, Chlorides, Oxygen and fluoride determination of ground water collected from different sources.
16. Visit to sewerage treatment plants. Collection and analysis of water from sewerage plants.
17. E-coil count and other microbe identification.

Dy. Registrar (Academic-I)
University of Rajasthan
Jaipur

17.

17 BIO-TECHNOLOGY

Scheme :

Min. Pass Marks : 36 Max. Marks : 100

Paper-I 3 hrs.duration Max. Marks : 50

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. Spectrophotometry 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 aids.

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.

Dy. Registrar
Academic
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

Paper-II : Immunology Animal Cell Culture 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.

DY. Registrar
Academic
University of Rajasthan, Jaipur

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 : Plasmids and bacteriophages, available phagemids, cosmids, viruses.
Purification of DNA from bacteria, plant and animal cells.
Manipulation of purified DNA, Introduction of DNA into living cells. Cloning vector 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.

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

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

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

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

Relational databases - advanced concepts. Introduction to ORACLE/INGRES or a similar RDBMS on a multiuser environment. Structured query language. Form design on a advanced RDBMS. Report generator, Query by example and Report by form. Accessing RDBMS using programming languages.

Dy. Registrar (Academic) University of Rajasthan JAIPUR

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. Wordperfect, 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 to 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.

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR