



MAHARAJA SURAJMAL BRIJ UNIVERSITY

BHARATPUR

SYLLABUS

B. Sc. Part-II, Examination

Faculty of Science

1. Physics
2. Chemistry
3. Zoology
4. Botany
5. Mathematics
6. Economics
7. Geography
8. Psychology



अकादमिक प्रभारी
महाराजा सुरजमल बृज विश्वविद्यालय
भरतपुर (राज.)

CONTENTS

Scheme of Examination:

SYLLABUS

Optional Subject:

1. Physics
2. Chemistry
3. Zoology.....
4. Botany.....
5. Mathematics.....
6. Economics.....
7. Geography.....
8. Psychology.....

Syllabus B.Sc. Part-I :

DISTRIBUTION OF MARKS

Sr. No	Name of the Subject	No. of Paper	Duration	Max. Marks	Total Marks	Min. Pass Marks
9.	Physics	Paper I	3 hrs.	33	150	36
		Paper II	3 hrs.	33		
		Theory Paper III	3 hrs.	34		18
		Practical Paper III	5 hrs.	50		
10.	Chemistry	Paper I	3 hrs.	33	150	36
		Paper II	3 hrs.	33		
		Theory Paper III	3 hrs.	34		18
		Practical Paper III	5 hrs.	50		
11.	Zoology	Paper I	3 hrs.	33	150	36
		Paper II	3 hrs.	33		
		Theory Paper III	3 hrs.	34		18
		Practical Paper III	5 hrs.	50		
12.	Botany	Paper I	3 hrs.	33	150	36
		Paper II	3 hrs.	33		
		Theory Paper III	3 hrs.	34		18
		Practical Paper III	5 hrs.	50		

13.	Mathematics	Paper I	3 hrs.	40	150	54
		Paper II	3 hrs.	40		
		Theory Paper III	3 hrs.	40		
		Practical Paper III	2 hrs.	30		
14.	Economics	Paper I	3 hrs.	50	150	54
		Paper II	3 hrs.	50		
		Practical Paper III	3 hrs.	50		
15.	Geography	Paper I	3 hrs.	75	150	54
		Paper II	3 hrs.	75		
16.	Psychology	Paper I	3 hrs.	50		
		Paper II	3 hrs.	50		
		Practical Paper III	3 hrs.	50		

SCHEME OF EXAMINATION


B.Sc. (Pass Course) Part-I

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 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 prescribed at (a) part First Examination excluding those obtained in the Compulsory subject (b) part second Examination Taken together.

All the rest will be declared to have passed the examination, if they obtain a minimum pass mark in each subject viz. 36%. No division shall be awarded at the Part I and Part II Examinations.


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1. B.Sc. Part II 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: Five questions shall be set and all are compulsory. First question shall contain 12 short answer type questions (3 questions from each unit) of one mark each with answer to each question not exceeding 50 words. Candidates have to attempt any 9 questions out of these 12 questions. Remaining four questions will be of 6 marks each and will be set with one question from each unit. Second to fifth questions will have 100% 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 relation and their applications.

Unit-2

Production of low temperatures and applications: Joule Thomson expansion and JT 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, superfluidity, 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 equipartition of energy.

Unit -3

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

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

Unit – 4

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

Reference Books:

1. Treatise on heat by Shah & Srivastava
2. Thermodynamics by DP Khandelwal
3. Heat & Thermodynamics – Brijlal Subrahium

Paper- II: Mathematical Physics and Special Theory of Relativity

Work Load: 2 hrs. Lecture/week

Examination Duration: 3 Hrs.

Scheme of Examination: Five questions shall be set and all are compulsory. First question shall contain 12 short answer type questions (3 questions from each unit) of one mark each with answer to each question not exceeding 50 words. Candidates have to attempt any 9 questions out of these 12 questions. Remaining four questions will be of 6 marks each and will be set with one question from each unit. Second to fifth questions will have 100% 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, contravariant and mixed tensor; Addition, multiplication and contraction of tensors; Metric tensor and its use in transformation of tensors.

Dirac delta function and its properties.

UNIT-2

Lorentz transformation and rotation in space-time like and space like vector, world line, macro-causality

Four vector formulation, energy momentum four vector, relativistic equation of motion, invariance of rest mass, orthogonality of four force and four velocity. Lorentz force as an example of four force, transformation of four frequency vector, longitudinal and transverse Doppler's effect.

Transformation between laboratory and center of mass system, four momentum conservation, kinematics of decay products of unstable particles and reaction thresholds: Pair production, inelastic collision of two particles, Compton Effect.

UNIT - 3

(A) Transformation of electric and magnetic fields between two inertial frames.

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

UNIT-4

Techniques or 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.

Reference Books:

1. Mathematical Physics – Satyaprakash
2. Mathematics for physics & Engee. – Pipes & Horwill
3. Mathematical Physics – B.S. Rajput

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भरतपुर (राज.)

Paper III: Electronics and Solid State Devices

Work Load: 2 hrs. Lecture/week

Examination Duration: 3 Hrs.

Scheme of Examination: Five questions shall be set and all are compulsory. First question shall contain 12 short answer type questions (3 questions from each unit) of one mark each with answer to each question not exceeding 50 words. Candidates have to attempt any ten questions out of these 12 questions. Remaining four questions will be of 6 marks each and will be set with one question from each unit. Second to fifth questions will have 100% 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 impedance for an active four terminal network. Various circuit theorems: Superposition, Thevenin, Norton, reciprocity, Compensation, maximum power transfer and Miller theorems.

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

Unit 2

Rectifiers and transistors

Rectifiers: Half-wave, full wave and bridge rectifier calculation of ripple factor, efficiency and regulation; Filters: series inductor, shunt capacitor. L-section and T-section filters. Voltage regulation: Voltage regulation and voltage stabilization by Zener diode, voltage multiplier.

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

Amplifiers: Analysis of transistor amplifiers using hybrid parameters and its gain-frequency response, Cascade amplifiers, basis idea of direct coupled and R.C. coupled amplifiers, Differential amplifiers, Amplifier with feedback: Concept of feedback, positive and negative

Unit 4

Oscillators and Logic Circuits

Oscillators: criteria for self-excited and self-sustained oscillation, circuit requirement for buildup of oscillation, basic transistor oscillator circuit and its analysis, Colpitt's and Hartely oscillator- R.C Oscillators, crystal oscillators and its advantages

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

Reference Books:

1. John D. Ryder, Electronic Fundamentals and Applications, Prentice Hall of India Pvt. Ltd. New Delhi.
2. John D. Ryder, Engineering Electronics, McGraw Hill Book Company, New Delhi.
3. Jacob Millman and Christose Hailkias, Integrated Electronics. Analog and Digital Circuits and systems: McGraw Hill Ltd:(1972)
4. Albert Paul Malvino, Digital Computer Electronics, TataMcGraw- 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.

अकादमिक प्रभारी

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PRACTICAL

Teaching: 4 hrs/week
Min Pass Marks: 18

Examination Duration : 5hrs.
Max Pass Marks: 50

Note: Total number of experiment 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 or reflection coefficient of nature of termination using-torsional wave apparatus.
3. Using platinum resistance thermometer: find the melting point of a given substance.
4. Using Newton's rings method: find out the wave length of a monochromatic source and find the refractive index of liquid.
5. Using Michelson's interferometer: find out the Wavelength of given monochromatic source (Sodium Light).
6. To determine dispersive power of prism.
7. To determine wavelength of sodium light using grating.
8. To determine wavelength of sodium light using Biprism.
9. Determine the thermodynamic constant $\gamma = C_p/C_v$ 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 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.
3. Study of half wave rectifier using single diode & application of L and π section filters.
4. To study characteristics of a given transistor PNP/NPN(common emitter, common base and common collector configurations)
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 Alderson's bridge.
11. Measurement of capacitance and dielectric constant of a liquid and gang condenser by de-Sauty bridge.

First question is compulsory and is of 9 marks. This question contains 12 short answer type questions of one mark each. Candidates have to attempt any 9 questions with answer not more than 50 words. Second to fifth questions are of six marks each with internal choice.

प्रथम प्रश्न अनिवार्य है और यह 9 अंक का है। इस प्रश्न के अन्तर्गत 12 लघुत्तरात्मक प्रश्न हैं, जिनमें से कोई भी 9 प्रश्न हल करने हैं, जिनका उत्तर 50 शब्दों से अधिक न हो। प्रश्न संख्या 2 से 5 तक प्रत्येक प्रश्न 6 अंक का है, जिसमें आन्तरिक विकल्प है।

1 पचास शब्द सीमा में नौ भागों के उत्तर दीजिए।

- | | | | |
|------|------|-------|--------|
| (i) | (ii) | (iii) | (iv) |
| (v) | (vi) | (vii) | (viii) |
| (ix) | (x) | (xi) | (xii) |

Unit – I प्रथम इकाई

- 2 (a)
(b)

Or / अथवा

- (a)
(b)

Unit – II द्वितीय इकाई

- 3 (a)
(b)

Or / अथवा

- (a)
(b)

Unit – III तृतीय इकाई

- 4 (a)
(b)

Or/ अथवा

- (a)
(b)

Unit – IV चतुर्थ इकाई

- 5 (a)
(b)

Or/ अथवा

- (a)
(b)

Blueprint for setting question paper III for B.Sc. part II Examination - 2018

First question is compulsory and is of ten marks. This question contains 12 short answer type questions of one mark each. Candidates have to attempt any 10 questions with answer not more than 50 words. Second to fifth questions are of six marks each with internal choice.

प्रथम प्रश्न अनिवार्य है और यह 10 अंक का है। इस प्रश्न के अन्तर्गत 12 लघुत्तरात्मक प्रश्न हैं, जिनमें से कोई भी 10 प्रश्न हल करने हैं, जिनका उत्तर 50 शब्दों से अधिक न हो। प्रश्न संख्या 2 से 5 तक प्रत्येक प्रश्न 6 अंक का है, जिसमें आन्तरिक विकल्प है।

1 पचास शब्द सीमा में दस भागों के उत्तर दीजिए।

- | | | | |
|------|------|-------|--------|
| (i) | (ii) | (iii) | (iv) |
| (v) | (vi) | (vii) | (viii) |
| (ix) | (x) | (xi) | (xii) |

Unit – I प्रथम इकाई

- 2 (a)
(b)

Or / अथवा

- (a)
(b)

Unit – II द्वितीय इकाई

- 3 (a)
(b)

Or / अथवा

- (a)
(b)

Unit – III तृतीय इकाई

- 4 (a)
(b)

Or/ अथवा

- (a)
(b)

Unit – IV चतुर्थ इकाई

- 5 (a)
(b)

Or/ अथवा

- (a)
(b)

B.Sc. Part II, Session 2018-19

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

CH-101 Paper I: Inorganic Chemistry

(2 hrs or 3 Periods/week)

Unit- I

Chemistry of Element 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 behavior , spectral properties and stereochemistry.

Unit-II

Coordination Compounds:

Werner's coordination theory and its experimental verification, effective atomic number concept chelates. Nomenclature of coordination compounds. Isomerism in coordination compounds. Valence bond theory of transition metal complexes.

Unit-III

Chemistry of Lanthanide and Actinide Elements:

Electronic structure. Oxidation states. Ionic radii and lanthanide contraction. Complex formation occurrence and isolation of lanthanide compounds.

General features. Chemistry of separation of Np, Pu and Am from Electronic configuration oxidation states magnetic properties. Complexation behavior, comparison of lanthanides and actinides. super heavy elements.

Unit IV

Oxidation and Reduction:

Uses of Redon Potential data. Analysis of redox cycle. Redox stability m water frost. Latimer and Pourbaix diagrams Application of redox data in the extraction of elements.

Unit -V

Acids and Bases:

Theories : Arrhenius. Bronsted- Lowry, Lux-Flood, Solvent system concept and Lewis concept of acids and bases.

Non-aqueous Solvents:

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

CH-202 Paper-II: Organic Chemistry

(2 hrs. or 3 periods/week)

Unit-I

Electromagnetic Spectrum : An introduction

Absorption Spectroscopy

Ultraviolet (UV) spectroscopy- Absorption laws (Beer- Lambert law , molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions. Effect of solvents on transitions, effect of conjugation shifts. UV spectra of conjugated 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 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 formations. Chemical reactions of vicinal glycols, oxidative ,Trihydric alcohols method 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 Mechanism of Fries rearrangement. Claisen rearrangement. Gatterman synthesis. Hauben reaction, Lederer-Manasse reaction and reamer- Tiemann reaction.

Ethers and Epoxides – Method of formation. Physical properties. Chemical reactions-cleavage and autooxidation Ziesel's method.

Synthesis of epoxides , Acid and base catalyzed ring opening of epoxides, orientation of epoxides ring opening reaction 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 reactions MPV (Meerwein– Ponnendorf –Verlay), Clemmensen, Wolf-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 formations and chemical reactions of halo acids. Hydroxy acids- malic tartaric and citric acids.

Dicarboxylic acids: Methods of formations 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 reaction, mechanisms of esterification and hydrolysis (acidic and basic)

Unit V

Organic compounds of Nitrogen

Preparation of nitroalkanes and nitroarenes. Chemical reaction of nitroalkanes. Mechanisms of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline media. Pieric 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. Amines salts as phase –transfer catalysis. Gabriel phthalimide reaction and Hoffmann bromamide reaction with mechanism.

Reactions of amines electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid diazotization and mechanism synthetic trans formations of aryl diazonium salts. a/o coupling and its applications.

CH-203 Paper III : Physical Chemistry

(2 hrs. or 3 periods/week)

Thermodynamics-I

Definition of Thermodynamic Terms : System surrounding 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 pressure and their relationship. Joule's law, Joule-Thomson coefficient and inversion temperature. Calculation of w.q. du & dh for the expansion of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy. Kirchoff'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 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 of 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 principal. 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, CO₂, and Sulphur systems.

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

Solid solutions- Compound formation with Congruent melting point (Mg-Zn)and incongruent melting point. (NaCl-H₂O) systems. Freezing mixture acetone- dry ice.

Liquid- Liquid mixtures: Ideal liquid mixture. Raoult's and Henry's Law, Non ideal system- azotropes HCl-H₂O and ethanol –water systems. Partially miscible liquids : phenol –water lower distribution law thermodynamic derivation. Application.

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 (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 sparingly soluble salt. Conductometric titrations.

Unit- V

Electrochemistry- II

Types of reversible electrodes : Gas- metal- ion, metal – insoluble salt anion and redox electrode, potential, standard hydrogen electrode, reference electrodes 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. Computations of cells EMF. Calculation of thermodynamic quantities of cell reactions ($\Delta G, \Delta H$ and K), Polarization, over potential and hydrogen over voltage .

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

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 acalic acid in commercial vinegar using NaOH
- (b) Determination of alkah content in antacid tablet using HCl
- (c) Estimation of calcium content in chalk as calcium oxalate by permanganometer
- (d) Estimation of hardness of water by EDTA
- (e) Estimation of ferrous and fenric 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_T values and identification of organic compounds.

- a) Separation of green leaf pigments (spinch lesves may be used).
- b) Preparation and separation of 2, 4-dinitrophenylhydrazones of acetone, 2-butanone hexan-2-one and hexon-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 asparitic acid. Leucine and glutamic acid. Spray reagent –ninahydrin.
- (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 ans 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 dilatometric method (e.g. $\text{MnCl}_2 \cdot 4\text{H}_2\text{O} / \text{SrBr}_2 \cdot 2\text{H}_2\text{O}$).

(ii) Thermo chemistry

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 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 liquid (e.g. phenol- water system) and to determine the concentration of that solute in the given phenol water system.

b) To construct the phase diagram of two components (e.g. diphenylamine benzophenone) systems 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.

Min. Pass Marks: 18

Inorganic Chemistry

Ex.1 Volumetric Analysis

Or

Giravimetric 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 Inorganic Chemistry B. Doughts. D. Me Danial and J. Alexander
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 EI BS
7. Inorganic Chemistry. G.I. Miessler and D.A. Tarr. Prentice Hall
8. Organic Chemistry. Morrison and Boyd. Prentice Hall
9. Organic Chemistry. L.G. Wade ji Prentice Hall
10. Fundamental of Organic Chemistry. Solomons. John Wiley.
11. Organic chemistry Vol. I,II,III S.M. Mukher ji, 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, Strectiwicscr. Heathcock and Kosover, Macmilan
14. Physical Chemistry.G.M. Barrow. International Student Edition, McGraw Hill
15. Basic Programming with Application, V.K. Jain Tata McGraw Hill

16. Computer 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 Course)

1. Vogel's Qualitative inorganic Analysis, Revised, Svehla, Orient Longman
2. Vogel's Textbook of quantitative inorganic Analysis (revised) J. Bassett. R.C. Deneoy, 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, Rata McGraw Hill
8. Laboratory Manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.
9. Vogel's Textbook of Practical Organic Chemistry, RS. Furniss. Hannaford, V.Rogers.
10. Experiments in General Chemistry, C.N.R. Rao and U. C. Agrawal. East –West Press
11. Experiments in Physical chemistry, R.C. Das and B. Behra. Tata McGraw Hill
12. Advanced Practical Physical Chemistry, J.13. Yadav, Goel Publishing House
13. Advanced Experimental Chemistry. Vol. 1- Physical. J.N. Gurtii and R. Kapoor. S.Chand & Co.
14. Selected Experiments in Physical Chemistry, N.G. Mukharjee. J.N. Ghjose & sons.
15. Experiments in Physical Chemistry, J.C. Ghosh, Bharti Bhavan.

3. Zoology

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:

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

PAPER - I: Z-201**STRUCTURE AND FUNCTION OF INVERTEBRATE TYPES****NOTE**

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

Section-A**Structure and Function-I**

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

- Locomotion: Pseudopodial (*Amoeba*), ciliary (*Paramecium*), flagellar (*Euglena*), parapodial (*Nereis*), pedal-muscular foot (*Pila*) and tube-feet (*Asterias*).
- Skeleton: Endoskeleton (spicules of *Sycon*); exoskeleton, chitinous (*Palaemon*), calcareous (Corals, *Pila*, *Lamellidens* and *Asterias*), siliceous (*Radiolaria*).
- Nervous System: Sensory and nerve cells (*Obelia*); brain ring and longitudinal nerves (*Fasciola* and *Taenia*); brain and ventral nerve cord (*Nereis* and *Palaemon*); nervous system of *Pila* and *Lamellidens*.
- Sense-organs: Statocyst and ospharidium (*Lamellidens* and *Pila*), compound eye (*Palaemon*) and simple eye (*Nereis*, *Pila*); tactile and olfactory organs (*Palaemon*); nuchal organs (*Nereis*).

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Section - B

Structure and Function - II

1. Food feeding, digestive structures and digestion: Autotrophic (Euglena) : heterotrophic through food vacuole (Paramecium) and in hydroid and medusoid zooids (Obelia) : Parasitic (Fasciola, Taenia, Hirudinaria): Predatory (Nereis, Palaemon, Asterias) : filter-feeding (Lamellidens)
2. Respiration: Aquatic general body surface (Euglena), Nereis, Hirudinaria): dermal bronchial (Asterias) parapodia (Nereis), gills (Palaemon, Lemellidens, Pila): aerial: pulmonary sac (pila), trachea (insect); anaerobic (fasciola, Taenia).
3. Excretion: General body surface (protozoa, Sycon, Obelia): Protonephridial system and flame cells (Fasciola, Taenia); nephridia (Nereis, Hirudinaria); malpighian tubules (insect); organ of Bojanus (Lamellidens, Pila).
4. Circulation: Cyclosis (Euglena, Paramecium); diffusion (Sycon, Obedia, Fasciola, Taenia); open circulatory system (Hirudinaria, Palaemon, Lamellidens, Pila, Asterias); closed circulatory system (Nereis).
5. Reproduction: Asexual (paramecium, Euglena, Sycon); alternation of generation (obelia); sexual (Fasciola, Taenia, Nereis, Lamellidens, Pila, Hirudinaria, Asterias).

Section- C

Invertebrate 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.
8. Parasitism in Crustacea.

PAPER - II: Z-202

ANIMAL PHYSIOLOGY AND BIOCHEMISTRY

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.

Section-A

Animal Physiology with special reference to mammals

1. Osmoregulation in mammals.
2. Physiology of digestion: Various types of digestive enzymes and their digestive action in the alimentary canal.
3. Physiology of blood circulation: Composition and functions of blood; mechanism of blood clotting; heart beat; cardiac cycle; blood pressure; body temperature regulation.
4. Physiology of respiration: Mechanism of breathing; exchange of gases: transportation of oxygen and carbon dioxide in blood; regulation of respiration.
5. Physiology of excretion: Kinds of nitrogenous excretory 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 relation of muscle fibers.
3. Types of endocrine glands, their secretions and function Pituitary, adrenal, thyroid, islets of Langerhan's, testis and ovary.
4. Physiology of Reproduction: Hormonal control of male and female reproduction, implantation, parturition and lactation in mammals. Menopause in human.
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; elementary knowledge of 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, transamination, decarboxylation. Synthesis of protein and urea, fate of ammonia (Ornithine cycle), fate of carbon skeleton.
3. Enzymes: Types and mechanism of action.
4. Lipids: Structure, function and significance; Beta oxidative pathway of fatty acids; brief account of biosynthesis of triglycerides. Cholesterol and its metabolism.
5. Catabolism and biosynthesis of nucleotides.
6. Mineral metabolism: Iodine, iron, calcium and zinc.

Paper - III: Z-203

Immunology, Microbiology & Biotechnology

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.

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, happens, 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.


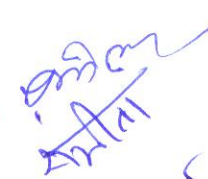



5. Mechanism of humoral or antibody mediated immunity and cell mediated immunity.
6. MHC: Structure and function of class I, II and III MHC molecules, regulation of MHC expression.

Section- B

Microbiology

1. Brief introduction to the History of Microbiology: Work of Anatomy 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; Mesosomes; 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.
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: *Diphtheria, Tetanus.*
 - (ii) Gram-Negative
 - a. Cocci: *Gonorrhoea Meningitis*
 - b. Bacilli: *Diarrhoea*
 - (iii) Mycobacteria: *Tuberculosis, Leprosy*
7. AIDS and hepatitis. The causative agents, transmission, pathogenicity, laboratory diagnosis, treatment and prevention (elementary idea only).

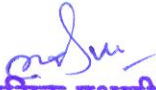

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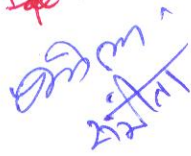





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Section - C

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


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23.12.17

Syllabus: B.Sc. Part - II (Pass Course)
Zoology Practical
(2016-2017)

Min. Marks: 18

4 Hrs./ Week

Max. Marks: 50

I. Study of Museum Specimens:


Annelida	: Neanthes, Heteronereis, Aphrodite, Chaetopterus, Arenicola, Glossiphonia, Pontobdella, Polygordins.
Onychophora	: Peripatus
Arthropoda	: <i>Limulus</i> , Spider, Scorpion, Centipede, Millipede, Lepas, Balanus, Squilla, Eupagurus, Crab, <i>Mantis</i> , 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, Antedon.
Hemichordata	: Balanoglossus

II. Study of Microscopic Slides:

Annelida	: T.S. body of Nereis through various regions.
Arthropoda	: V.S. of integument (cuticle): Pediculus, Bedbug, Termite and its castes, Cyclops, Daphnia, crustacean larvae (Nauplius, Zoea, Mysis, Megalopa). Statocyst of prawn.
Mollusca	: V.S.Shell. T.S gill of pila: Glochidium larva

III. Study of the Following Through Permanent Slide Preparation:

- (i) Trachea, Mosquito larva, Lice, Termites.
- (ii) Differential staining and identification of various types of blood cells. \ 01


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23.12.17

IV. Anatomy:

Prawn/Squilla

:Study of External features, appendages, alimentary canal and nervous system; Hastate Plate

Cockroach/Grasshopper

: Study of External features, Appendages, Alimentary canal, Nervous system and Mouthparts.

V. Microbiology Immunology and Biotechnology:

1. Preparation and use of culture media for microbes.
2. Study of microbes in food materials like curd, etc (Lactobacillus Aspergillums, Mucor, Penicillium).
3. Educational tour to any Microbiology Laboratory, Dairy, Food processing factory and Distillery for first hand study. Collection of material may also be encouraged wherever possible. Candidates are expected to submit a detailed report of such visit.
4. Antigen-antibody reactions-precipitation, agglutination
5. A brief practical idea of fermentation of food, food preservation.

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.
7. Demonstration of blind spot in Human-eye.

VII. Biochemistry:

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

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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)	3	3
2. Permanent Preparation Exercise in	4	6
3. Microbiology/ Immunology /Biotechnology	5	6
4. Exercise in Animal Physiology	6	7
5. Exercise in Biochemistry	6	7
6. Identification and comments on Spots (1 to 8)	16	16
7. Viva voce	5	5
8. Class Record	5	-
	50	50

Notes:

1. With reference to Anatomy, study of prescribed types (charts/models) candidates must be well versed in the study of various systems. CD ROMs multimedia computer based simulations including computer assisted learning (CAL) and other soft wares may be used.
2. With reference to permanent preparations and microscopic slides, the exercise should be substituted with diagrams, photographs, models, charts, etc.
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. The candidates may be asked to write detailed methodology wherever necessary and separate marks may be allocated for the same.
5. Mounting material for permanent preparations would be as per the syllabus or as available through collection and culture methods.
6. It should be ensured that animals used in the practical exercises are not covered under the wild life act 1972 and amendments made subsequently or Necessary permission from chief wildlife warden be sought.

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 Me Graw 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/Panama Books, 2003.
7. Cooper GM and Hausman RE: The Cell: A Molecular Approach. 6th edition ASM Press Washington, DCI Sinauer/Panama 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 Robertis Jr 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 11: 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, Mc Graw Hill.
 22. Jordan EL and Verma PS: Invertebrate Zoology. S. Chand & Company Ltd., 2012.
 23. Karp G: Cell & Molecular Biology: Concepts and Experiments. 7th edition John Wiley & Sons, Inc., 2013.
 24. Kotpal RL: Modern Text Book of Zoology: Invertebrates. Rastogi Publications, 2012.
 25. Lal SS: Practical Zoology Invertebrate. 11th revised edition Rastogi Publications, 2014.
 26. Lehninger AL: Biochemistry. 2nd edition Kalyani Publishers, 1991.
 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. Mc Graw 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 & Sons Inc., 2011.
 44. Wake MH: Hyman's Comparative Vertebrate Anatomy. 3rd edition University of Chicago Press Ltd. London, 1992.

45. Trigunayat, M.M : A Manual of Practical Entomology. Scientific Publisher, Jodhpur (Raj.)
46. Trigunayat, M.M and Kritika Trigunayat: Prayogic Manual Part-2 Scientific publishers,
Jodhpur, Rajasthan.

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कौशिक
अनीता

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अनीता

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M.S. BRLJ UNIVERSITY

4. BOTANY

B.Sc. Part- II

Scheme

Min Pass Marks: 36

Max Marks: 100

Paper I

3 Hrs duration

Max.Marks 33

Paper II

3 Hrs duration

Max Marks 33

Paper III

3 Hrs duration

Max. Marks 34

Practical Min. Marks: 18

4 Hrs. duration

Max. Marks 50

3 hours

4 hours

Duration of examination of each theory paper-

Duration of examination of practicals -

Note:

1. There will be 5 question in each paper all questions are compulsory. Candidate has to answer all questions in the main answer book only.
2. Q.No. will have 20 very short answer type Questions (not more than 20 words) of half marks each covering entire syllabus.
3. Each paper is divided into four units. There will be one question from each unit. These Q.No. 2 to 5 will have internal choice.



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B.SC. PART-II
Paper I : Molecular Biology and Biotechnology

UNIT- 1

Genetic Material: Biological, chemical and physical nature of hereditary 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 nad 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.



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B.Sc. Part II
Paper- II (Pass Course Syllabus)
Plant Physiology and Biochemistry

(2 Hrs/week) Max. Marks 33; Duration of examination of theory paper: 3hours

Unit-1

Water: Structure, physio-chemical properties, importance to plant life, concept of water potential. Absorption and transport of water; Ascent of sap. Transpiration, stomatal 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, C3 (Calvin cycle), C4 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 nomenclature, structure and classification of proteins, physical and chemical properties.

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

Lipids: Importance of fatty acids (Saturated and unsaturated), Alpha and Beta Oxidation. Brief introduction and application of secondary metabolites.

Unit- 4

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

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

Plant Hormones: Auxins, Gibberellins, Cytokinins, Ethylene and ABA: discovery & Physiological effects.





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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, gibberellins.
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 photometers.
15. Photosynthesis by inverted funnel method. Moll's experiment.
16. To demonstration anaerobic and aerobic respiration.
17. R.Q. by Ganong's respirometer.
18. Measurement of growth using auxanometer.





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B.Sc. Part II
Paper- III : Pteridophytes, Gymnosperms And Palaeobotany

Exam Duration : 3 Hrs.

Maximum Marks : 34

Unit-I

General characters of pteridophytes, classification by (G.M.Smith). Distribution and alternation of generation. Stellar system in pteridophytes. Eusporangiate and Leptosporangiate development of Sporangia, Apogamy and Apospory. Economic importance of pteridophytes.

Unit-II

Morphology, anatomy and reproduction of Psilotum, Lycopodium, Selaginella, Equisetum and Marsilea. Characteristics of Gymnosperms, distribution and classification (K.R.Sporne)

Unit-III

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

Unit-IV

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.





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B. A./B. Sc. Part II Examination-2019

5. MATHEMATICS

Teaching : 3 hours per week per theory paper

2 hours per week per batch for practical

(20 candidates in each batch)

Examination Scheme :

	Min. Pass Marks	Max. Pass 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 and Optimization Techniques	3 hrs	40 (Science) 54 (Arts)
Practicals	2 hrs	30 (Science) 40 (Arts)

Note :-

01. Syllabus of each of the three papers is divided into FIVE units .
02. Each paper is divided into THREE sections A, B, & C.
03. **Section-A** : TEN short answer type questions will be set taking two questions from each unit. Each question will carry 1 mark for Science and 1.5 mark for Arts. All questions will be compulsory .
04. **Section-B** : TEN questions will be set taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt ONE question from each unit.

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05. **Section-C** : FIVE questions will be set taking one questions from each unit. Each question will carry 5 marks for Science in all three papers and 6 marks for Arts in paper I & II and 6.33marks in paper III. Student has to attempt ANY THREE Questions.
06. Common paper will set for Faculty of Science and Faculty of Social Science . 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 the head, department of Mathematics in the college.
08. An internal/external examiner can conduct practical examination of not more than 100 (one hundred) candidates(20 candidates in each batch).
09. Each candidate has to pass in theory and practical examinations separately.

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 THREE Sections A, B, & C. **Section-A** consists TEN short answer type questions. Each question is of 1 mark for Science and 1.5 mark for Arts. All questions are compulsory. **Section-B** consists TEN questions taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt FIVE questions selecting ONE question from each unit. **Section-C** consists FIVE questions taking one questions from each unit. Each question will carry 5 marks for Science and 6 marks for Arts. Student has to attempt ANY THREE questions .

Unit – I : The set of real numbers as a complete ordered field, Incompleteness of \mathbb{Q} , Archimedean and dense properties of \mathbb{R} , Absolute value of real numbers, Intervals, Limit point of a set, Bolzano-Weierstrass theorem, open and closed sets, Compact sets, Heine Borel Theorem, Connected sets. Equivalent sets, Finite and infinite sets, Denumerable sets, Countable and uncountable sets.

Unit – II : Real sequences, Bounded and unbounded sequences, Monotonic sequence, Limit point and limit of a sequence, Convergence of sequences, Necessary and sufficient condition for convergence, Sub sequence, Cauchy sequence, Cauchy's general principal of convergence. Continuity of a function, Cauchy's and Heine's definition of continuity, Types of discontinuity, Properties of continuous functions on closed intervals, Uniform Continuity.

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Unit – III: Differentiability- Darboux theorem, Rolle's theorem, Algebraic and geometric interpretation of Rolle's theorem, Lagrange's and Cauchy's mean value theorems, Taylor's theorem with various forms of remainders. Limits and Continuity for the functions of two variables. Improper Integrals and their convergence, Comparison test, μ -test, Abel's test and Dirichlet's test.

Unit – IV: Reimann Integration – partition of an interval, Darboux sums, Lower and Upper Reimann Integrals, Definition of Reimann Integration, Integrability of continuous, discontinuous and monotonic functions, Fundamental theorem of integral calculus, Mean value theorems, Reimann Steiltze's integrals. Differentiation and Integration under the sign of Integration.

Unit – V : Uniform convergence of sequence and series of functions, Cauchy's criterion for uniform convergence, M_n - test, Weierstrass M-test, Abel and Dirichlet's tests, Uniform convergence and continuity, Term by term integration, and term by term differentiation. Fourier Series – Periodic functions, Dirichlet's conditions, Fourier series in the interval $(\alpha, \alpha+2\pi)$ and particular cases in the interval $(0, 2\pi)$, $(-\pi, \pi)$, Half range Fourier series.

Paper – II Differential Equation

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours

Max. Marks 40 (Science)

53 (Arts)

Note: This paper is divided into THREE Sections A, B, & C. **Section-A** consists TEN short answer type questions. Each question is of 1 mark for Science and 1.5 mark for Arts. All questions are compulsory. **Section-B** consists TEN questions taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt FIVE questions selecting ONE question from each unit. **Section-C** consists FIVE questions taking one questions from each unit. Each question will carry 5 marks for Science and 6 marks for Arts. Student has to attempt ANY THREE questions .

Unit – I : Order and degree of differential equations, Differential equations of first and first degree, Method of separation of variables, Homogeneous differential equation, and equations reducible to homogeneous forms, Linear differential equation and equations reducible to linear forms. Exact differential equation and equations which can be made exact. Differential equations of first order but not of first degree- Differential equations solvable for x, y and p.

Unit – II : Clairaut's form and Singular Solutions with extraneous locii. Linear differential equations with constant coefficients, Complimentary functions and Particular integrals.




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Unit – III : Homogeneous linear differential equations, Differential equations reducible to homogeneous linear differential equations. Simultaneous differential equations, Differential equations of the form $dx/P = dy/Q = dz/R$: geometric interpretation and method of solution. Exact differential equations of n^{th} order, Existence and uniqueness theorem.

Unit – IV : Linear differential equations of second order- Solution by finding a part of complimentary function, Solution by transformation into Normal form and by changing the independent variable, Factorisation of operators, Method of variation of parameters, Method of undetermined coefficient.

Unit – V : Partial differential equation of first order and first degree, Lagrange's linear equations. Non-Linear partial differential equations of order one: Standard form I, II, III, and IV, Charpit's method. Linear partial differential equations with constant coefficient, Homogeneous and Non-homogeneous linear partial differential equations.

Paper – III Numerical Analysis and Optimization Techniques

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours

Max. Marks 40 (Science)

54 (Arts)

Note: This paper is divided into THREE Sections A, B, & C. **Section-A** consists TEN short answer type questions. Each question is of 1 mark for Science and 1.5 mark for Arts. All questions are compulsory. **Section-B** consists TEN questions taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt FIVE questions selecting ONE question from each unit. **Section-C** consists FIVE questions taking one questions from each unit. Each question will carry 5 marks for Science and 6.33 marks for Arts. Student has to attempt ANY THREE questions.

Unit – I : Calculus of Finite Differences- Introduction, Difference Operators, Differences of Polynomials, Factorial notation, Relation between difference and derivative, Separation of symbols. Newton-Gregory's formulae for Forward and Backward interpolation with equal intervals, Newton's divided difference interpolation formula, Lagrange's interpolation formula.

Unit – II : Central differences- Gauss's central difference interpolation formulae, Stirling and Bessel's interpolation formulae. Numerical differentiation. Numerical integration – General quadrature formula, Trapezoidal rule, Simpson's one-third rule, Simpson's three-eighth rule, Weddle rule, Newton-Cote's quadrature formula, Gauss's quadrature formula.


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Unit – III : Numerical solution of algebraic and transcendental equations - Graphical method, Iterative method, Regula-Falsi method, Newton-Raphson method and their convergences. Solution of system of linear equations – Gauss’s elimination method, Gauss-Jordan’s elimination method, method of triangularisation of matrices, Relaxation method. Numerical solution of ordinary differential equations – Picard’s successive approximation method, Euler’s method and Euler’s modified method.

Unit – IV : Linear programming problem - feasible solution, optimal solution, Basic solution, Degenerate and non-degenerate basic solution, Convex sets and their properties, Extreme point of a set, Theory of Simplex method, Optimality criterion, Simplex algorithm.

Unit – V : Duality in linear programming problem – Dual of l. p. p., properties of the dual, Fundamental theorem of l. p. p. , use of duality to solve l. p. p. . Transportation problem – Basic feasible solution and methods to find it, North-west corner rule, least-cost method, Vogel’s approximation method, Optimality criterion, Travelling Salesman problem.

Practicals

Teaching : 2 Hours per Week

Examination Scheme:

Duration - 2 Hours

	Science	Arts
Maximum Marks	30	40
Minimum Pass Marks	11	14

Distribution of Marks:

Two Exercises one from each group

10 marks each	=	20 marks	13 marks each	=	26 marks
Practical record	=	05 marks			07 marks
Viva-voce	=	05 marks			07 marks
Total Marks	=	30 marks			40 marks

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Group – A : Numerical solution of algebraic and transcendental equations using Bisection method, Secant method, Newton-Raphson method.

Jacobi's method and Gauss-Seidal method to solve system of linear equations.

Numerical solution of differential equations using Runge-Kutta methods .

Group – B : Modelling of industrial and engineering problem into linear programming problem , its dual and their solution by simplex method, Modelling of industrial and engineering problems into Assignment problem and their solutions.

Note :-1. Each candidate (Regular/Non-collegiate) has to prepare his/her record.

2. Students can use Non-programmable scientific calculators.

3. Student must know about all functions and operations of scientific calculator.



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B. A. Part – II
6. ECONOMICS

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

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

Paper - I : Micro Economic Theory

Paper - II : (a) Elements of Statistics and Mathematics

(b) History of Economic Thought

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

A candidate will be required to attempt five questions in all. All questions of part A and part B are compulsory while rest 3 questions are to be attempted from, Part 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.

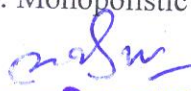
Paper – I : Micro Economic Theory


Section – A

Micro and Macro Economics. Static, Dynamic and Comparative Static Analysis. Positive and Normative Economics. Theory of Consumer's behavior: Utility Analysis. Indifference Curve Analysis, Consumer's Equilibrium, Price, Substitution and Income Effects. Normal, inferior and Giffen goods. Price Consumption Curve and Derivation of Demand Curve. Elasticity of Demand. Arc and Point Elasticity. Relationship between Elasticity, AR, MR, TR. Factors Affecting Price Elasticity of Demand. Substitute and Complementary Goods, Concept of Consumer's Surplus.

Section – B

Production Function : Law of Variable Proportions. Three stages of production function. Iso-quant and Iso- cost, optimum factor combination. Law of returns and returns to scale. Theory of cost- short run and long run cost curves. Different market structures : perfect competition : determination of price and output in the short and long run. Monopoly : determination of price and output in the short and long run. Discriminating monopoly. Monopolistic competition- short and long run equilibrium of the firm excess capacity.


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Section – C

Marginal productivity theory of distribution, factor pricing under perfect and imperfect competition in labour market. Recardian theory of rent and quasi- rent. Classical theory of interest. Liquidity preference theory of interest. Risk and uncertainty theory of profit.

Recommended Books: (latest edition)

1. Hal R. Varian : Intermediate Microeconomics, W W Norton and Co. U.S.A.
2. D. Salbotrore : Principles of Micro Economics, Ocford University Press. U.K.
3. H.L. Ahuja : Advanced Economic theory (microeconomic analysis), S. chand and company, New Delhi.
4. Micro Economic theory, laxminarain Nathuramaka, Ramesh Book Depot, Jaipur. (Hindi Edition)

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

Section – A

Surds, Indices, Quadratic Equation, Logrithms, 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 Cramers rule and matrix Inverse. Simple differentiation, Partial differentiation (involving two independent variables). Maxima, Minima, Point of Inflexion. Simple intregation involving one independent variable) Maxima, Minima, Point of Inflexion. Simple Intregation involving one independent variable, application in economics (Elasticity, average, marginal concepts).

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 dta; measures of central tendency : arithmetic mean, mode, median, geometric mean, harmonic mean. Concept and measures of dispersion and skewness.

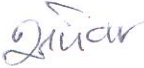
Section – C

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)

Recommended Books: (latest edition)


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1. B.C. Mehta and G.M.K. madnani, Elementary Mathematics for use in economics, Laxmi Nayaran Agarwal, Agra. (Hindi edition)
2. S.P. Gupta, Statistical Methods, S. Chand and Sons.
3. S.C. Gupta and V.K. Kapoor, Funamentals of Applied Statistics, S. Chand and Sons, New Delhi.
4. Kailash Nath Nagar, Sankhiyiki ke mool tatva, Meenakshi Prakashan, Meerut. (Hindi edition)

Paper –II : (b) History of Economic Thought

Section – A

Mercantilism : Views on Trade, Money, Prices, Wages and employment. Physiocracy : natural order, primacy of agriculture. Net product and circulation of wealth. Theory of taction 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. Theoryof gluts. David Ricardo-theory of value and distribution. Foreign trade. Economic development and theory of rent.

Section – B

Crititics 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 theory of money. Labour theory of value. Theory of capital accumulation and crisis distribution. German historical school and the development of marginalism. Neo-classical school: marshall- price determination and elasticity. Consumer surplus. Costs and economies profit. Rent and.

Section – C

Economic Ideas of Kautilya. Economic thought of Dadabhai Noroji, mahatma Ghandhi. J.K. Mehta, B.R. Ambedkar and Deendayal Upadhayaya.

Recommended Books: (latest edition)

1. Louise Haney – History of Economic Thought, Surjit publication New Delhi.
2. Eric Roll : History of Economic Thought. Faber and Faber (Rupa)
3. Aarthik Vicharon ka Itihaas, M.L. Chheepa and Shankar Lal Sharma, college book house, Jaipur
4. T.N. Hajela: History of Economic Thought. Ane's Student edition Daryagang
5. B.N. Ganguli : Indian Economic Thought, A 19 century perspective.


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2/1/2020

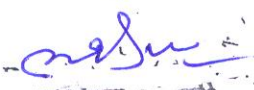
7. Geography

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

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.


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SYLLABUS

Paper I: Resources Geography

Section A

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

Section B

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

Section C

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

Recommended Readings:

- Alexander, E.W. 1988: Economic Geography. Prentice Hall India, New Delhi.
Bunting B.C., 1987: The Geography of Soil. Prentice hall, New York.
गुर्जर, आर.के. एवं जाट, बी.सी. 2013: संसाधन भूगोल। पंचशील प्रकाशन, जयपुर।
कौशिक, एस.डी. 2010: संसाधन भूगोल। रस्तोगी पब्लिकेशन्स, मेरठ।
माथुर, बी. 1998: संसाधन भूगोल। रस्तोगी प्रकाशन, मेरठ।
Mitchell, Bruce. 1979: Geography and Resource Analysis. Longmans, London.
Park, C.C. 2001: The Environment-Principles and applications. 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

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according to Brunhes and Huntington, schools of man-environment relations: determinism possibilism and neo determinism.

Section B

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

Section C

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

Recommended Readings:

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

Practicals

Scheme of examination

Min. Pass Marks: 18

Max. Marks: 50

	Bifurcation of Marks	Time
Written test	24	3 hrs.
Field survey and viva voce	10+04	2 1/2 hrs.
Viva voce	08+04	

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

Section A

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

Section B

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


Section C

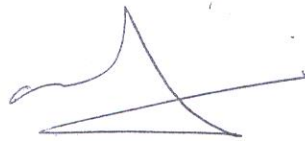
Elements of map reading. History of topographical maps in India. Scheme of topographical mapping in India as per National Map Policy, 2005. Conventional symbols and interpretation of physical and cultural features on topographical maps.

Prismatic Compass survey: equipments, methods of measurement of bearings, correction of bearings, record of survey closing error and its corrections.

Recommended Readings:

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


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

8. PSYCHOLOGY

Scheme of Examination –

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

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

NOTE –

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

Section A - will contain 10 questions of 20 marks each. Each question will be 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 of 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 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.

Shanku

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1. 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.
3. Various norm tables of F ratio, correlation, t test, χ^2 (Chi-square) etc. will be supplied by examination centre.

Paper – I

Psychopathology –

Section-A

1. **Introduction** – Meaning of Normality and Abnormality, Characteristics of Abnormal Behaviour; Latest ICD and DSM Classification System.
2. **Psychological Assessment**– Clinical Interview, Diagnostic Tests Intelligence, Neuropsychological, Personality; Behavioural and odily Assessment.
3. **Symptomatology and Etiology of Abnormal Behavior**: Cognitive, Conative and Affective Symptoms; Biological, Psycho-Social, Socio-Cultural, Causes.

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Shanku

Section-B

4. **Anxiety Disorders** – Nature, Clinical Picture and Types: Generalized Anxiety and Panic disorder, Phobias and Obsessive Compulsive Disorder
5. **Somatoform and Mood Disorders:** Nature, Clinical Picture and Types of Somatoform Disorders: Conversion Disorders and Hypochondriasis; Mood Disorders: Depression and Bipolar Disorder.
6. **Substance-Related Disorders:** Substance-Use and Substance-Induced Disorders; Alcohol-Related, Nicotine-Related and Sedative-Hypnotic / Anxiolytics-Related Disorders.

Section-C

7. **Schizophrenia**– Nature, Clinical Picture and Types
8. **Clinical Intervention**– Psychoanalytic and Psychody Therapy, Cognitive and Behaviour Therapy and Client Centered Therapy.
9. **Mental Health** – Meaning and Components, Factors Influencing Mental Health, Measures for Promoting Mental Health.

Books Recommended:

- Sarasan, I.G. and Sarasan, B.R. (2005) Abnormal Psychology, New Delhi: Pearson Education
- Lamm, A. (197). Introduction to Psychopathology N.Y. Sage.
- Buss, A.H. (1999). Psychopathology, N.Y. John Wiley.
- अरुण कुमार सिंह (2002) : आधुनिक असामान्य मनोविज्ञान, दिल्ली, मोतीलाल बनारसीदास।

B

Shankar

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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 Variable.
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 Inference 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 Assumptions of Distribution-free Statistics; Chi Square; Equal Probability, 2x2 Contingency Table; Median Tests.
8. **ANOVA**– Purpose and Assumptions of ANOVA, One way ANOVA.
9. **Computer Analysis:** Preparation of Data, Uses of SPSS.

Books Recommended:

- Broota K.D. (1992): Experimental design in behavioural research, Wiley Eastern, New Delhi.
- Minimum E.W., King B.M. and Bear G. (1993): Statistical Reasoning in Psychology and Education, New York, John Wiley.
- Siegel. S. (1994): Non-parametric Statistics, New York, MC Graw Hill.
- कपिल एच.के.: साँख्यिकी के मूल तत्व, आगरा, विनोद पुस्तक मन्दिर।
- भार्गव महेश, द्वारका प्रसाद एवं लाभ सिंह, मनोविज्ञान एवं शिक्षा में साँख्यिकी, हरप्रसाद भार्गव, कचहरी घाट, आगरा।

Paper-III

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. Moudsley Personality Inventory (MPI)
8. Measurement of Adjustment
9. Stress : Measurement and Analysis of Group Data (t-test)
10. Sentence Completion Test

Shankh

A

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