**B.Sc. Mathematics-Part I**

**Outlines of Tests, Syllabi and Courses of Reading**

**Session 2014-15**

**Semester-I**

Paper-I Calculus-I

Paper-II Differential Equations

Paper-III Co-ordinate Geometry

**Semester-II**

Paper-IV Algebra- I

Paper-V Partial Differential Equation

Paper-VI Analytic Geometry

**In addition to the above papers the students in Semester II are also required to qualify the paper of Drug Abuse: Problem, Management and Prevention. The syllabus of this paper can be obtained from the web site www.punjabiuniversity.ac.in**

**B.A./ B.Sc .-Ist Year (Ist Semester)**

**MATHEMATICS**

**Paper I: Calculus-I**

**For Regular Students Maximum Time: 3 Hrs.**

**Maximum Marks: 50 Marks Teaching Hours : 50**

**External Marks: 40**

**Internal Assessment: 10**

**Pass Marks: 35 %**

**For Distance Education Students /Private Students**

**Maximum Marks: 50 Marks**

**INSTRUCTIONS FOR THE PAPER-SETTER**

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

**Section-A**

Successive differentiation Asymptotes, Multiple points, Tests for concavity and convexity, points of inflexion, Tracing of curves in Cartesian, parametric and polar forms. Curvature, radius of curvature, centre of curvature.

**Section-B**

Integration of hyperbolic and inverse hyperbolic functions, Reduction Formulae, application of definite integral to find quadrature, length of an arc, Improper integrals and their convergence, Comparison tests, Absolute and conditional convergence, Abel’s and Dirichlet’s tests. Frullani integral. Integral as a function of a parameter. Beta – Gamma Functions and their convergence.

**Books Recommended:**

1. Calculus and Analytic Geometry, Thomas and Finney, Ninth Edition.
2. Mathematical Analysis, Malik and Arora.

**B.A./ B.Sc.-Ist Year ( Ist Semester)**

**MATHEMATICS**

**PAPER-II:** **DIFFERENTIAL EQUATIONS**

**For Regular Students Maximum Time: 3 Hrs.**

**Maximum Marks: 50 Marks Teaching Hours: 50**

**External Marks: 40**

**Internal Assessment: 10**

**Pass Marks: 35 %**

**For Distance Education Students /Private students**

**Maximum Marks: 60 Marks**

**INSTRUCTIONS FOR THE PAPER-SETTER**

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

**Section - A**

**First order differential equations :** Order and degree of a differential equation, separable differential equations, Homogeneous differential equations, equations reducible to Homogenous differential equations Exact differential equations.Linear differential equations and equations reducible to linear differential equations.

**Higher order differential equations :** Solution of Linear homogeneous and non-homogeneous differential equations of higher order with constant coefficients and with variable coefficients. method of Variation of Parameters.

**Section - B**

Differential operator method. Linear non-homogeneous differential equations with variable coefficients, Euler's Cauchy method.

**Series solution of Differential equation:** Regular point, ordiary point**,** Power Seriesmethod, forbinious method, Bessel, Legendre and Bessel Equations, Legendre and Bessel functions and their properties , recurrence relations, orthogonality, Rodrigue’s formula**.**

**BOOKS RECOMMENDED**

1. H.T.H. Piaggio : An Elementry Treatise on Differential equations : Barman Press.

2. R. K. Jain and S.R.K. Iyengar:Advanced Engineering Mathematics,Narosa Publishing House.

3. Zafar Ahsan: Differential Equations and Their Applications, Prentice-Hall of India Pvt. Ltd.

New Delhi-Second edition

4 Rai Singhania : Ordinary and Partial Differential Equations” , S.Chand &Company,New

Delhi.

**B.A./B.Sc .-Ist Year (Ist Semester)**

**MATHEMATICS**

**PAPER-III: COORDINATE GEOMETRY**

**For Regular Students Maximum Time: 3 Hrs.**

**Maximum Marks: 50 Marks Teaching Hours : 50**

**External Marks: 40**

**Internal Assessment: 10**

**Pass Marks: 35 %**

**For Distance Education Students /Private Students**

**Maximum Marks: 50 Marks**

**INSTRUCTIONS FOR THE PAPER-SETTER**

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

**Section-A**

Review of General Equation of 2nd degree.

**Parabola**: Pole and polar, pair of tangents from a point, chord of contact, equation of chord in terms of midpoints and diameter of conic, Subtangent and Subnormal and its geometrical properties.

**Section-B**

**Ellipse**: Properties of ellipse, parametric representation of ellipse, tangents, normals, equation of chord joining two points on ellipse. Director circle of ellipse, chord of contact, conjugate lines and conjugate diameter, Conormal Points and its geometrical properties.

**Hyperbola:** Properties of hyperbola, fundamental rectangle, parametric representation of hyperbola, asymptotes of hyperbola, Conjugate hyperbola, rectangular hyperbola, tangents and normals.

**Text Books**

1. S.L. Loney : The Elements of Coordinate Geometry, Macmillan and Company, London.

2. Gorakh Prasad and H.C.Gupta:Text Book on Coordinate Geometry, Pothishala Pvt. Ltd., Allahabad.

3. P.K. Jain and Khalil Ahmad:A Text Book of Analytical Geometry of two Dimensions, Wiley Eastern Ltd. 1994.

4. N.Saran and R.S. Gupta, : Analytical Geometry of Three Dimensions,Pothishala Pvt. Ltd. Allahabad.

**RECOMMENDED READINGS**

1. R. J.T. Bell : Elementary Treatise on Coordinate Geometry of Three Dimesions, Macmillan India Ltd., 1994

**B.A./B.Sc -Ist Year (IInd Semester)**

**MATHEMATICS**

**PAPER-IV**: **Algebra-I**

**For Regular Students Maximum Time: 3 Hrs.**

**Maximum Marks: 50 Marks Teaching Hours : 50**

**External Marks: 40**

**Internal Assessment: 10**

**Pass Marks: 35 %**

**For Distance Education Students /Private Students**

**Maximum Marks: 50 Marks**

**INSTRUCTIONS FOR THE PAPER-SETTER**

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

**Section - A**

Hermitian, Skew-Hermitian, Orthogonal and Unitary matrices, .Elementary operation on matrices. Inverse of a matrix using Gauss Jordan Method. Linear independence of row and column vectors, Row rank, Colum rank and their equivalence. Eigen values, Eigen vectors and the characteristic equation of a matrix, Properties of eigen values for special type of matrices, Diagonalization, Cayley-Hamilton theorem. Consistency of a system of linear equations.

**Section-B**

Relations between roots and coefficients of a general polynomial, Tranformation of equation.Descartes’ rule of signs, Solution of cubic equations, Biquadratic equations and their solution. De Moivre's theorem and its application, Direct and inverse circular functions, hyperbolic and logarithmic functions. Summation of series.

**Books Recommended:**

1. Linear Algebra by Scham outline Series.
2. Trigonometry by S.L. Loney. Macmilan and Company London.
3. Text Book of Algebra by Chandrika Prasad.
4. Algebra-I by Sharma and Shah Pearson Ed.

**B.A./** **B.Sc -Ist Year (IInd Semester)**

**MATHEMATICS**

**PAPER-V**: **Partial Differential Equation**

**For Regular Students Maximum Time: 3 Hrs.**

**Maximum Marks: 50 Marks Teaching Hours : 50**

**External Marks: 40**

**Internal Assessment: 10**

**Pass Marks: 35 %**

**For Distance Education Students/Private Students**

**Maximum Marks: 50 Marks**

**INSTRUCTIONS FOR THE PAPER-SETTER**

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

**Section -A**

**Partial differential equations :** Partial differential equation of first order, Lagrange’s solution,, Integral surfaces passing through a given curve, surfaces orthogonal to a given system of surfaces, Partial differential equation of first order but of any degree , Charpit’s general method of solution.

**Partial differential equations of second and higher order :** Partial differential equations of the second order and their classification into hyperbolic, elliptic and parabolic types, canonical forms.

**Section –B**

Homogeneous and non-homogeneous partial differential equations with constant coefficients. One dimention Wave and Heat Equation. Two dimentional Laplace equation by separation of variable method and D’Alembert’s solution of wave equation.

**BOOKS RECOMMENDED**

1. H.T.H. Piaggio : An Elementry Treatise on Differential equations, Barman Press.

2. R.K.Jain and S.R.K.Iyengar : Advanced Engineering Mathematics,Narosa Publishing House.

3. Zafar Ahsan: Differential Equations and Their Applications, Prentice-Hall of India Pvt. Ltd. New Delhi-Second edition

4. I. N. Sneddon : Elements of Partial Differential Equations, Mc Graw Hill Book Co.

5 Rai Singhania : Ordinary and Partial Differential Equations” , S.Chand &Company,New Delhi

**B.A./B.Sc -Ist Year (IInd Semester)**

**MATHEMATICS**

**PAPER-VI: Analytic Geometry**

**For Regular Students Maximum Time: 3 Hrs.**

**Maximum Marks: 50 Marks Teaching Hours : 50**

**External Marks: 40**

**Internal Assessment: 10**

**Pass Marks: 35 %**

**For Distance Education Students /Private Students**

**Maximum Marks: 50 Marks**

**INSTRUCTIONS FOR THE PAPER-SETTER**

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

**Section – A**

**The plane:** General form, Normal form, Intercept form, Reduction of the general form to normal

form , Equation of plane through three points, Angle between two planes, Parallel planes,

Perpendicular distance of a point from the planes, Pair of the planes, Area of a triangle and

Volume of a tetrahedron.

**The straight line:** Equation of a line in general form, Symmetric form, two point form, Reduction of the general equation to the symmetrical form, Straight line and the planes, Conditions of parallelism and perpendicularity of a line and a plane, Plane through a given line,

Perpendicular distance formula for the line, Projection of a line on a given plane containing them, Condition of intersection of two lines, Shortest distance between two lines, intersection of three planes.

**Section – B**

**Sphere:** General equation of a sphere, Plane section of a sphere, Intersection of two spheres,

Sphere through a given circle, Intersection of a straight line and a sphere, Equation of a tangent

plane to sphere, Condition of tangency. Plane of contact, Orthogonal Spheres, Angle of intersection of two spheres, Length of tangent, Radical plane, Coaxial system of spheres.

**Cone:** Equation of a cone whose vertex is at origin, Equation of a cone with a given vertex and a

given conic as base, Condition that general equation of second degree represent a cone, Equation

of a tangent plane, Condition of tangency of a plane and a cone, Reciprocal cone, Right circular

cone

**Text Books**

1. S.L. Loney : The Elements of Coordinate Geometry, Macmillan and Company, London.

2. Gorakh Prasad and H.C.Gupta:Text Book on Coordinate Geometry, Pothishala Pvt. Ltd., Allahabad.

3. P.K. Jain and Khalil Ahmad:A Text Book of Analytical Geometry of two Dimensions, Wiley Eastern Ltd. 1994.

4. N.Saran and R.S. Gupta, : Analytical Geometry of Three Dimensions,Pothishala Pvt. Ltd. Allahabad.

**RECOMMENDED READINGS**

1. R. J.T. Bell : Elementary Treatise on Coordinate Geometry of Three Dimesions, Macmillan India Ltd., 1994

**B.Sc. (Physics) Part-I ( Ist and Second Semester)**

**SCHEME**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Code** | **Title of Paper** | **No of**  **Lectures** | **Max Marks** | | | **Examination**  **Time (Hours)** | |
| **Semester -I** | |  | **Total** | **Ext.** | **Int.** |  | |
| Paper A | Mechanics-I | 40 | 40 | 30 | 10 | 03 hrs. | |
| Paper B | Vibrations and Waves-I | 40 | 40 | 30 | 10 | 03 hrs. | |
| Paper C | Electricity and Magnetism-I | 40 | 40 | 30 | 10 | 03 hrs. | |
|  | Practicals | 80 | 30 | 22 | 08 | 03 hrs. | |
| **SEMESTER –II** | |  |  |  |  |  | |
| Paper A | Mechanics-II | 40 | 40 | 30 | 10 | 03 hrs. | |
| Paper B | Vibrations and Waves-II | 40 | 40 | 30 | 10 | 03 hrs. | |
| Paper C | Electricity and Magnetism-II | 40 | 40 | 30 | 10 | 03 hrs. | |
|  | Practicals | 80 | 30 | 22 | 08 | 03 hrs. | |
|  | | | | | | |

# General Instructions

|  |  |
| --- | --- |
| 1) | There will be three papers of theory and one laboratory (practical) course. |
| 2) | The number of lectures per week will be three for each theory paper. |
| 3) | The number of lectures per week will be six for practicals. |
| 4) | The examination time for each theory will be 3 hours. |
| 5) | The examination time for practical will also be 3 hours. |
| 6) | The use of non programmable calculator will be allowed in the examination centre but this will not be provided by the University/College. |
| 7) | Each theory paper will consist of three sections A,B and C . Section C is compulsory |
| 8) | Use of scientific non programmable caculator is allowed in practicals also. |

SECTION A

There will be four questions . Each question will carry five marks. Two question are to be attempted

SECTION B

There will be four questions . Each question will carry five marks. Two question are to be attempted.

SECTION C

There will be seven questions of short answer type covering the whole syllabi. Each question will carry two mark. Any five question to be attempted.

**Semester -I**

**PAPER A:**  **MECHANICS-I**

Maximum Marks : External 30 Time Allowed: 3 Hours

Internal 10 Total Teaching hours: 40

Total 40 Pass Marks: 35 %

Out of 40 Marks, internal assessment (based on two mid-semester tests/ internal examination, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

# Instruction for the Paper Setter

# The question paper will consist of three sections A, B and C . Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candiate is to attempt any five questions), which will cover the entire syllabus uniformaly. Each question of sections A and B carry 05 marks. Section C will carry 10 marks of 2 marks each.

# 

# Instruction for the candidates

1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and Consist of seven questions (Candidate is to attempt any five questions).

2) Use of non programmable calculator is allowed in the examination centre but this will not be provided by the University/College.

**SECTION A**

Cartesian and spherical polar co-ordinate systems, area, volume, displacement, velocity and acceleration in these systems, Solid angle, Various forces in Nature(brief introduction), Centre of mass, Equivalent one body problem, Central forces, Equation of motion under central force, Equation of orbit in inverse square, Force field and turning points, Kepler laws and their derivations.

**SECTION B**

Relationship of conservation laws and symmetries of space and time. Inertial frame of reference. Coriolis force and its applications. Variation of acceleration due to gravity with latitude. Focault pendulum (qualitative). Elastic collision in Laboratory and C.M.system, velocities, angels and energies, Cross section of elastic scattering . Rutherford scattering (qualitative).

**Text Books:**

1. Mechanics : Berkeley Physics Course, vol. I by C.Kittel, W.D.Knight and M.A.Ruderman, Mc Graw-Hill Publication

2. Mechanics : H.S.Hans and S.P.Puri, Tata McGraw Hill, New Delhi

**Semester –I**

**PAPER B:**  **VIBRATIONS AND WAVES-I**

Maximum Marks : External 30 Time Allowed: 3 Hours

Internal 10 Total Teaching hours: 40

Total 40 Pass Marks: 35 %

Out of 40 Marks, internal assessment (based on two mid-semester tests/ internal examination, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

# Instruction for the Paper Setter

# The question paper will consist of three sections A, B and C . Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candiate is to attempt any five questions), which will cover the entire syllabus uniformaly. Each question of sections A and B carry 05 marks. Section C will carry 10 marks of 2 marks each.

# 

# Instruction for the candidates

1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and Consist of seven questions (Candidate is to attempt any five questions).

2) Use of non programmable calculator is allowed in the examination centre but this will not be provided by the University/College.

**SECTION A**

Simple harmonic motion, energy of a Simple Harmonic Oscillation (SHO). Compound pendulum, Electrical oscillations. Transverse vibrations of a mass on a string, composition of two perpendicular SHM of same period and of period ratio 1 : 2. Anharmonic oscillations. Decay of free vibrations due to damping. Differential equation of motion, types of damping. Determination of damping co-efficient-logarithmic decrement, relaxation time and Q-Factor. Electromagnetic damping (Electrical oscillator).

**SECTION B**

Differential equation for forced mechanical and electrical oscillators. Transient and steady state oscillation. Displacement and velocity variation with driving force frequency, variation of phase with frequency resonance, Power supplied to an oscillator and its variation with frequency, Q value of a forced oscillator and band width. Q-value as an amplication factor of low frequency response.

**Text Books:**

1. Physics of Vibrations and Waves by H.J.Pain, Wiley & Sons, New Delhi

2. Fundamentals of Vibrations and Waves by S.P.Puri, Tata McGraw Hill, New Delhi.

3. Waves and Oscillations, by E.Crawford, Berkeley Physics Course, McGraw-Hill Publications.

**Semester-I**

**PAPER C:**  **ELECTRICITY AND MAGNETISM-I**

Maximum Marks: External 30 Time Allowed: 3 Hours

Internal 10 Total Teaching hours: 40

Total 40 Pass Marks: 35 %

Out of 40 Marks, internal assessment (based on two mid-semester tests/ internal examination, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

# Instruction for the Paper Setter

# The question paper will consist of three sections A, B and C . Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candiate is to attempt any five questions), which will cover the entire syllabus uniformaly. Each question of sections A and B carry 05 marks. Section C will carry 10 marks of 2 marks each.

# 

# Instruction for the candidates

1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and Consist of seven questions (Candidate is to attempt any five questions).

2) Use of non programmable calculator is allowed in the examination centre but this will not be provided by the University/College.

**SECTION A**

Basic ideas of vector calculus,Gradient, Divergence, curl and their physical significance, Coulomb’s law in vector form, long uniformly charged wire, Charged disc. Stokes's theorem and its applications in electrostatic field, curl E= 0. Electric field as gradient of scalar potential. Calculation of E due to a point charge and dipole from potential. Potential due to arbitrary charge distribution and multipole moments. Poission and Laplace's equations and their solutions in Cartesian and concept of electrical images.

**SECTION B**

Calculation of electric potential and field due a point charge placed near an infinitely conducting sheet. Current and current density, equation of continuity. Microscopic form of Ohm's Law. (J=σE) and conductivity. Failure of Ohm's Law. Invariance of charge. E in different frames of reference. Field of a point charge moving with constant velocity. Interaction between moving charges and force between parallel currents.

**Text Books:**

1. Electricity and Magnetism. Berkeley Physics Course. Vol.II by E.M.Purcell, McGraw-Hill, 1965.

2. Fundamentals of Electricity and Magnetism by Author F.Kip.Mc Graw Hill (1969)

3. Introduction to Classical Electrodynamics by David Griffith. Prentice Hall of India, New Delhi.

4. EM Waves and Radiating Systems by Edward C.Jordan and K.G.Balmain. Prentice Hall of India, New Delhi.

**B.Sc. (Physics)**

**General Guidelines for Physics Practical Examinaiton**

Maximum Marks : External 22

Internal 08

Total 30

1. The student will be asked to perform one experiment out of the experiments mentioned in syllabus.

2. The distribution of marks is as follows :

(i) One full experiment requiring the student to take some data, analyse it and draw conclusions-(candidates are expected to state their results with limits of error. (10)

(ii) Brief theory (04)

(iii) Viva-Voce (04)

(iv) Record(Practical File) (04)

3 There will be one session of 03 hours duration. The paper will consist of 06 experiments out of which an examinee will mark 04 experiments and one of these is to be alloted by the external examiner.

4 Number of candidates in a group for practical examination should not exceed 12.

5. In a single group no experiment be allotted to more than three students in any group.

6. The student should determined Standard Deviations and probable error in the calculations whereas needed.

**Semester- I (80 Hours)**

1. Analysis of experimental data by :

i) Fitting of given data to a straight line. ii) Calcution of probable error.

1. To establish relationship between torque and angular acceteration using fly wheel and hence to find inertia of flywheel.
2. To determine the Young's Modulus by bending of beam.
3. To study one-dimensional collision using two hanging spheres of different materials.
4. Determination of Poisson's ratio for rubber.
5. Study the dependance of moment of inertia on distribution of mass (by noting time periods of oscillations) using objects of various geometrical shapes but of same mass.
6. To set up CRO for Sine and Square wave and to find their frequency and amplitude.
7. Study the depedence of solenoidal field on number of turns and current.
8. To study the magnetic field produced by a current carrying solenoid using a search coil and to find the value of permeability of air.
9. To determine the value of air capacitance by de-Sauty method and to find the permitivity of air and also to determine the dielectric constant of medium.
10. To study the efficiency of an electric kettle/heater element with varying input voltages.
11. To study the working of energy meter.

**Text and Reference Books:**

1. B.Sc. Practical Physics, By C.L.Arora, S.Chand & Co.

2. A Laboratory Manual of Physics for undergraduate classes by D.P.Khandelwal

**Semester –II**

**PAPER A:**  **MECHANICS-II**

Maximum Marks : External 30 Time Allowed: 3 Hours

Internal 10 Total Teaching hours: 40

Total 40 Pass Marks: 35 %

Out of 40 Marks, internal assessment (based on two mid-semester tests/ internal examination, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

# Instruction for the Paper Setter

# The question paper will consist of three sections A, B and C . Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candiate is to attempt any five questions), which will cover the entire syllabus uniformaly. Each question of sections A and B carry 05 marks. Section C will carry 10 marks of 2 marks each.

# 

# Instruction for the candidates

1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and Consist of seven questions (Candidate is to attempt any five questions).

2) Use of non programmable calculator is allowed in the examination centre but this will not be provided by the University/College.

**SECTION A**

Rigid body motion: Rotational motion, principal moments and axes. Euler's equations; precession and elementary gyroscope. Galilean transformation and Invariance, Non-Inertial frames, concept of stationary universal frame of reference and ether. Michelson-Morley experiment and its result.

**SECTION B**

Postulates of special theory of relativity. Lorentz transformations, Observer and viewer in relativity. Relativity of simultaneity. Length, Time, Velocities,Relativistic Doppler effect. Variation of mass with velocity, mass-energy equivalence, rest mass in an inelatic collision, Relativistic momentum and energy, their transformation, concepts of Minkowski space, four vector formulation.

**Text Books:**

1. Mechanics : Berkeley Physics Course, vol. I by C.Kittel, W.D.Knight and M.A.Ruderman, Mc Graw-Hill Publication

2. Mechanics : H.S.Hans and S.P.Puri, Tata Mc Graw Hill Publication, New Delhi

.

**Semester -II**

**PAPER B:**  **VIBRATIONS AND WAVES-II**

Maximum Marks : External 30 Time Allowed: 3 Hours

Internal 10 Total Teaching hours: 40

Total 40 Pass Marks: 35 %

Out of 40 Marks, internal assessment (based on two mid-semester tests/ internal examination, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

# Instruction for the Paper Setter

# The question paper will consist of three sections A, B and C . Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candiate is to attempt any five questions), which will cover the entire syllabus uniformaly. Each question of sections A and B carry 05 marks. Section C will carry 10 marks of 2 marks each.

# 

# Instruction for the candidates

1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and Consist of seven questions (Candidate is to attempt any five questions).

2) Use of non programmable calculator is allowed in the examination centre but this will not be provided by the University/College.

**SECTION A**

Stiffness coupled oscillators. Normal co-ordinates and normal modes of vibration. Inductance coupling of electrical oscillators, Types of waves, Wave equation (transverse) and its solution, The string as a forced oscillator, Characteristic impedance of a string. Impedance matching. Reflection and transmission of energy, Reflection and Transmission Energy, Reflection and transmission of string, wave and group velocity. Standing waves on a string of fixed length. Energy of vibrating energy string,wave and group velocity.

**SECTION B**

Physical interpretation of Maxwell's equations. Electromagnetic waves and wave equation in a medium having finite permeability and permittvity but with conductivity σ=0. Pointing vector. Impedance of a dielectric to EM waves, EM waves in a conducting medium and skin depth. EM waves velocity in a conductor an anomalous dispersion. Response of a conducting medium of EM waves. Reflection and transmission of EM waves at a boundary of two dielectric media for normal incidence. Reflection of EM waves from the surface of a conductor at normal incidence.

**Text Books:**

1. Fundamentals of Vibrations and Waves by S.P.Puri, Tata McGraw Hill, New Delhi.

2. Physics of Vibrations and Waves by H.J.Pain, Wiley & Sons, New Delhi

3. Waves and Oscillations, by E.Crawford, Berkeley Physics Course, McGraw-Hill Publications, New Delhi.

4. EM Waves and Radiating Systems by Edward C.Jordan and K.G.Balmain, Prentice Hall of India, New Delhi.

**Semester-II**

**PAPER C:**  **ELECTRICITY AND MAGNETISM-II**

Maximum Marks: External 30 Time Allowed: 3 Hours

Internal 10 Total Teaching hours: 40

Total 40 Pass Marks: 35 %

Out of 40 Marks, internal assessment (based on two mid-semester tests/ internal examination, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

# Instruction for the Paper Setter

# The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candiate is to attempt any five questions), which will cover the entire syllabus uniformaly. Each question of sections A and B carry 05 marks. Section C will carry 10 marks of 2 marks each.

# 

# Instruction for the candidates

1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and Consist of seven questions (Candidate is to attempt any five questions).

2) Use of non programmable calculator is allowed in the examination centre but this will not be provided by the University/College.

**SECTION A**

Behaviour of various substances in magnetic field. Definition of **M** and **H** and their relation to free and bound currents. Permeability and susceptibilities and their inter-relationship. Orbital motion of electrons and diamagetism. Electron spin and paramagnetism. Ferromagnetism. Domain theory of Ferromagnetism. Hysteresis Loss. Magnetisation curve Ferrites**.** Lorentz's force. Definition of B, Biot Savart's Law and its applications to long straight wire, circular current loop and solenoid. Ampere's Circuital law and its applications.

**SECTION B**

Divergence and curl of **B**. Hall effect, expression and co-efficient. Vector potential, Definition and derivation of current density and its use in calulation of change in magnetic field at a current sheet. Transformation equations for **E** and **B** from one frame to another. Faraday's Law and EM induction. Displacement current. Maxwell's equations. Mutual inductance and reciprocity theorem. Self inductance L for solenoid. Coupling of Electrical circuits. Analysis of LCR series and parallel resvonant circuits. Q-factor. Power consumed Power factor.

**Text Books:**

1. Electricity and Magnetism. Berkeley Physics Course. Vol.II by E.M.Purcell, McGraw-Hill, 1965.

2. Fundamentals of Electricity and Magnetism by Author F.Kip, McGraw Hill (1969).

3. Introduction to Classical Electrodynamics by David Griffith, Prentice Hall of India, New Delhi.

4. EM Waves and Radiating Systems by Edward C.Jordan and K.G.Balmain. Prentice Hall of India, New Delhi.

**B.Sc. (Physics)**

**General Guidelines for Physics Practical Examinaiton**

Maximum Marks : External 22

Internal 08

Total 30

1. The student will be asked to perform one experiment out of the experiments mentioned in syllabus.

2. The distribution of marks is as follows :

(i) One full experiment requiring the student to take some data, analyse it and draw conclusions-(candidates are expected to state their results with limits of error. (10)

(ii) Brief theory (04)

(iii) Viva-Voce (04)

(iv) Record(Practical File) (04)

3 There will be one session of 03 hours duration. The paper will consist of 08 experiments out of which an examinee will mark 06 experiments and one of these is to be alloted by the external examiner.

4 Number of candidates in a group for practical examination should not exceed 12.

5. In a single group no experiment be allotted to more than three students in any group.

6. The student should determined Standard Deviations and probable error in the calculations whereas needed.

**Practical Semester II (80 hours)**

1. To study the variation of time period with distance between centre of suspension and centre of gravity for a bar pendulum and to determine

i) Radius of gyration of bar pendulum about an axis through its Centre of Gravity and perpendicular to its length.

ii) Value of Centre of Gravity, g.

1. Determination of g by Kater's pendulum.
2. Determination of modulus of rigidity of material of a wire using Maxwell's needle.
3. Measurement for logarithmic decrement, co-efficient of damping, relaxation time and quality factor of a damped simple pendulum.
4. To determine the frequency of AC mains using a sonometer and an electro magnet.
5. To determine the low resistance using Carey Foster Bridge.
6. Determination of unknown capacitance by flashing and quenching of neon lamp.
7. Study the phase relationships between voltage and current using impedence triangle.
8. To study the resonance in series and parallel LCR cicuits for different resistances and calculate Q-value.
9. To determine the given inductance by Anderson's bridge.
10. Verify laws of electromagnetic induction.
11. To study the induced emf as function of velocity.

**Text and Reference Books:**

1. B.Sc. Practical Physics, By C.L.Arora, S.Chand & Co.

2. A Laboratory Manual of Physics for undergraduate classes by D.P.Khandelwal

**B.Sc. (Chemistry) Part-I**

**SEMESTER I**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper** | **Title** | **Max. Marks** | **Sem. Paper Int. Asstt.** |
| I | INORGANIC CHEMISTRY | 35 | 26 09 |
| II | ORGANIC CHEMISTRY | 35 | 26 09 |
| III | PHYSICAL CHEMISTRY | 35 | 26 09 |
| I | PRACTICAL CHEMISTRY | 45 | 16 (Pass Marks) |

**SEMESTER II**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper** | **Title** | **Max. Marks** | **Sem. Paper Int. Asstt.** |
| I | INORGANIC CHEMISTRY | 35 | 26 09 |
| II | ORGANIC CHEMISTRY | 35 | 26 09 |
| III | PHYSICAL CHEMISTRY | 35 | 26 09 |
| II | PRACTICAL CHEMISTRY | 45 | 16 (Pass Marks) |

**Drug Abuse Problem, Management and Prevention\* 100 (MM) 70 (SP) 30(IA)**

**Qualifying Paper**: Session 2016-17, 2017-18 and 2018-19

\*As per University Letter No.13831/SM-6 Dated: 12.10.2016

**PAPER-I**

**INORGANIC CHEMISTRY**

**Max Marks : 35 30 hours**

**Semester Paper : 26 Time allowed - 3 hrs**

**Internal Assessment: 9 3 period/week**

**Pass Marks : 35%**

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions (Section C 9th question being compulsory) selecting two questions from each of A & B Sections.

**Section - A**

**1. Atomic Structure** 7 hrs

Idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrodinger wave equation, significance of, Ψ and , Ψ 2, quantum numbers, radial and angular wave functions and probability distribution curve, shapes of s, p, d orbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rule. Electronic configurations of the elements and ions.

**2. Periodic Properties** 5 hrs.

Position of element in the periodic table effective nuclear charge and its calculations. Atomic and ionic radii, ionization energy, electronic affinity and electronegativity-definition, methods of determination or evaluation, trends in periodic table and applications in predicting and explaining the chemical behavious.

**3. Chemistry of Noble gases** 3 hrs.

Chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds.

**Section - B**

**1. Chemical Bonding - I** 15 hrs.

Covalent Bond-Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions. BeF2 , BF3 , CH4, PF 5, SF 6, IF 7, Sncl2 , XeF 4, BF4-, PF 6-, Sncl6-2.

**2. Chemical Bonding - II**

Valence shell electron pair repulsion (VSEPR) theory to NH3, H3O+, SF4, CIF3, ICI2, and H2O. MO theory, homonuclear (elements and ions of 1st and 2nd row), and heteronuclear (BO, CN, CO+, NO+, CO, CN), diatomic molecules, multicenter bonding in electron deficient molecule (Boranes) percentage ionic character from dipole moment and eIectronegativity difference.

**SEMESTER I**

**PAPER-II**

**ORGANIC CHEMISTRY**

**Max Marks : 35 30 hours**

**Semester Paper : 26 Time allowed - 3 hrs**

**Internal Assessment: 9 3 period/week**

**Pass Marks : 35%**

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions (Section C 9th question being compulsory) selecting two questions from each of A & B Sections.

**Section - A**

**I. Structure and Bonding** 5 Hrs.

Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bond, Van der Walls interactions, resonance, hyperconjugation, aromaticity, inductive and field effects, hydrogen bonding.

**II . Mechanism of Organic Reactions** 7 Hrs

Curved arrow notation, drawing electron movements with half- headed and double headed arrows, homolytic and heterolytic bond breaking. Types of reagents of organic reaction. Energy considerations. Reactive intermediates-bocations, carbanions, free radicals, carbenes, arynes and nitrenes (with examples). Assigning formal charges on intermediates and other ionic species.

Methods of determination of reaction mechanism (product analysis, intermediates, isotope effect, kinetic and stereo-chemical studies).

**III. Alkanes**  4 Hrs.

Isomerism in alkanes, sources, methods offormation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids), physical properties and Mechanism of free radical halogenation of alkanes: orientation, reactivity and selectivity.

**Section – B**

**1. Cyclo alkanes** 3 Hrs.

Cycloalkanes--nomenclature, chemical reactions, Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strain less rings. The case of cyclopropane ring: banana bonds.

**2. Alkcnes, Cycloalkenes** 6 Hrs.

Nomenclature of alkenes-methods of formation, mechanisms and dehydration of alcohols and dehydrohalogenation of alkyl halides regioselectivity in alcohol dehydration. The Saytzeffrule, Hofmanr elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes-mechanisms involved in hydrogenation, electrophilic and free radical additions Markownikoff's rule, hydroboration-oxidation, oxymercuration reduction. Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with KMnO4. Polymerization ofalkenes. Substitution and the allylic and vinylic positions of alkenes. Industrial application of ethylene and propene.

Methods or fonnation, conformation and chemical reactions of Cycloalkenes.

**3**. **Dienes And Alkynes** 6 Hrs.

Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes. Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions-I,2 and l,4 additions, Diels-Alder reaction.

Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidityn of alkynes. Mechanism of electrophilic and nucleophilic addition reactions hydroboration-oxidation. metal-ammonia reductions, oxidation and polymerization.

**SEMESTER I**

**PAPER-III**

**PHYSICAL CHEMISTRY**

**Max Marks : 35 30 hours**

**Semester Paper : 26 Time allowed - 3 hrs**

**Internal Assessment: 9 3 period/week**

**Pass Marks : 35%**

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions (Section C 9th question being compulsory) selecting two questions from each of A & B Sections.

**Section - A**

1. **Mathematical Concepts** 8 Hrs.

Logarithmic relations. curve sketching, linear graphs and calculation of slopes, differentiation of functions like kx, ex, xn, sin x, log x, maxima and minima, partial differentiation and reciprocity relations. Integration of some useful/relevant functions permutations and combinations. Factorials. Probability .

1. **Evaluation of Analytical Data** 6 Hrs.

Terms of mean and median, precision and accuracy in chemical analysis, determining accuracy of methods, improving accuracy of analysis, data treatment for series involving relatively few measurements, linear least squares curve fitting, types of errors, standard deviation, confidence limits, rejection of measurements (F-test and Q-test) numerical problems related to evaluation of analytical data.

**Section - B**

1. **Liquid State** 4 Hrs.

Intermolecular forces, structure of liquids (a qualitative description) Structural differences between solids, liquids and gases.

Liquid crystals: Difference between liquid crystal, solid and liquid, Classification, structure of nematic and eholestric phases. Thermography and seven segment cell.

1. **Gaseous State** 8 Hrs

Postulates of kinetic theory of gases, deviation from ideal behaviour, van der Waals equation of states, the isotherms of van der Waals equation, relationship between critical constants and van der Waals constants, the law of corresponding states, reduced equation of state.

Molecular velocities: Root mean square, average and most probable velocities. Qualitative discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter, Liquifacation of gases (based on Joule-Thomson effect).

1. **Physical Properties and Molecular Structure** 4 Hrs.

Optical activity, polarization-(Clausius-Mossotti equation), orientation of dipoles in an electric field, dipole moment. Induced dipole moment, measurement of dipole moment temperature method and refractivity method. Dipole moment and structure of molecules, magnetic properties-paramagnetism, diamagnetism and ferromagnetism.

**PRACTICAL CHEMISTRY - I**

**SEMESTER I**

Max Marks : 45 6 Periods / week

Passing Marks : 35%

INSTRUCTIONS FOR THE

PAPER SETTERS EXAMINERS/CANDIDATES

The Practical Examinations will be held in morning (one day) and morning session will be of 3 hours duration. During this session students will perform semi micro analysis. Paper setter will enlist five different mixtures and the examiner will randomly distribute these mixtures amongst the students. Each candidate will analyse one mixture. Students are permitted to consult the books for the scheme of tests for semimicro analysis. Examiners will check the note books and will hold viva-voce.

**INORGANIC CHEMISTRY**

**Semi-micro analysis:**

Cation analysis, separation and identification of ions from Groups I, II, III, IV, V and VI. Anion analysis (2 cation and 2 anion with no interference). 30 Marks

Viva Voce 10 Marks

Copy 5 Marks

**SEMESTER II**

**PAPER-I**

**INORGANIC CHEMISTRY**

**Max Marks : 35 30 hours**

**Semester Paper : 26 Time allowed - 3 hrs**

**Internal Assessment: 9 3 period/week**

**Pass Marks : 35%**

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions (Section C 9th question being compulsory) selecting two questions from each of A & B Sections.

**Section - A**

**1. Ionic Solids-** 5 hrs.

Concept of close packing, Ionic structures, (NaCl type, Zinc blende, Wurzite, CaF2 ,and antifluorite), radius ratio rule and coordination number, Limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born-Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarisability of ions, Fajan’s rule. Metallic bond-free electron, valence bond and bond theories.

**2. S-Block Elements** 5 hrs.

Comparative study, diagonal relationships, salient features of hydrides, solvation and complexation tendencies including their function in biosystems, an introduction to alkyls and arys.

**3. Group No. 13** 5 hrs.

Comparative study (including diagonal relationship) of groups 13 elements, compounds like hydrides, oxides, oxyacids and halides of groups 13; hydrides of boron-diborane and higher boranes, borazine, borohydrides.

**Section - B**

**4. p - Block Elements** 15 hrs.

Comparative study (including diagonal relationship) of groups 14-l7 elements, compounds like hydrides, oxides, oxyacids and halides of groups 14-17; fullerenes, carbides, fluorocarbons, silicates (structural principle), tetrasulphur tetranitride, basic properties of halogens, interhalogens and polyhalides.

**SEMESTER II**

**PAPER-II**

**ORGANIC CHEMISTRY**

**Max Marks : 35 30 hours**

**Semester Paper : 26 Time allowed - 3 hrs**

**Internal Assessment: 9 3 period/week**

**Pass Marks : 35%**

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions (Section C 9th question being compulsory) selecting two questions from each of A & B Sections.

**Section - A**

**1. Stereochemistry of Organic Compounds** 15 Hrs.

Concept of isomerism. Types of isomerism

Optical isomerisin-elements of symmetry, molecular chirality, enantiomers, stereogenic centrec, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and

racemization.

Relative and absolute configuration, sequence rules, D & Land R & S systems of nomenclature.

Geometric isomerism-determination of configuration of geometric isomers, E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds.

Conformational isomerism-conformational analysis of ethane and n-butane; conformations of cyclohexane, axial and equatorial bonds, conformation of mono substituted cyclohexane derivatives.

Newman projection and Sawhorse formulae, Fischer and flying wedge formulae.

Difference between conti ration and conformation.

**Section - B**

1. **Arcncs and Aromaticity** 7 Hrs.

Nomenclature of benzene derivatives. The aryl group. Aromatic nucleus and side chain. Structure of benzene: molecular formula vand Kekule structure. Stability and carbon-carbon bond lengths of benzene, resonance structure, MO picture.

**Aromaticity**: the Huckel rule, aromatic ions.

Aromatic electrophilic substitution-general pattern of the mechanism, role of σ and π complexes. Mechanism or nitration, halogenation, sulphonation, mercuration and Friedel-Crafts reaction. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho/para ratio. Side chain reactions of benzene derivatives.

Methods of formation and chemical reaction of alkylbenzenes alkynyl benzenes.

1. **Alkyl and aryl halides** 8 Hrs.

Nomenclature and classes of alkyl halides, methods of formation chemical reactions. Mechanisms of nucleophilic substitution reactions of alkyl halides, SN2and SN1 reactions with energy profile diagrams.

Methods of formation of aryl halides, nuclear and side chain reactions. The addition elimination and the elimination-additional mechanisms of nucleophilic aromatic substitution reactions.

Relative reactivities of alkyl halides vs allyl, vinyl and aryl halides.

**SEMESTER II**

**PAPER-III**

**PHYSICAL CHEMISTRY**

**Max Marks : 35 30 hours**

**Semester Paper : 26 Time allowed - 3 hrs**

**Internal Assessment: 9 3 period/week**

**Pass Marks : 35%**

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions (Section C 9th question being compulsory) selecting two questions from each of A & B Sections.

**Section - A**

1. **Solutions, Dilute Solutions and Colligative Properties** 8 Hrs.

Ideal and non-ideal solutions, methods of expressing concentration of solutions, activity and activity coefficients.

Dilute solution, colligative properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis, law of osmotic pressure and its measurement, determination molecular weight from osmotic pressure, Elevation of boiling point and depression of freezing point, Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods for determining various colligative properties.

Abnormal molar mass, degree of dissociation and association of solutes.

1. **Colloidal State** 7 Hrs.

Definition of colloids, classification of colloids

Solids in liquids (sols): properties-kinetic, optical and electrical; stability of colloids protective action, Hardy-Schulze law, gold number.

Liquids in liquids (emulsions) types of emulsions, preparation, Emulsifiers.

Liquids in solids, (gels) classification, preparation and properties inhibition. General applications of colloids.

**Section – B**

1. **Chemical Kinetics and catalysis** 15 Hrs.

Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction- concentration, temperature, pressure, solvent, light, catalyst. Concentration dependence of rates, mathematical characteristics of simple chemical reactions-zero order, first order, second order, pseudo order, half life and mean life. Determination of the order of reaction-s-differential method, method of integration, method of half life period and isolation method.

Radioactive decay as a first order phenomenon.

Theories of chemical kinetics, effect of temperature on rate of reaction. Arrhenius equation, concept of activation energy.

Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis). Expression for the rate constant based on equilibrium constant and thermodynamic aspects.

Catalysis and general characteristics of catalytic reactions. Homogeneous catalysis, acid base catalysis and enzyme catalysis including their mechanisms, Michaelis Menten equation for enzyme catalysis and its mechanism.

**PRACTICAL CHEMISTRY II**

**SEMESTER II**

Max Marks : 45 6 Periods / week

Passing Marks : 35%

INSTRUCTIONS FOR THE

PAPER SETTERS EXAMINERS/CANDIDATES

In this session in morning students will perform physical and organic chemistry practicals. Examiner will again conduct viva-voce of students.

1. The examiner should preferably give different liquids solids to the candidates for the determination of boiling point/melting point and crystallization from the list of liquids/solids by the paper setter.
2. The paper setter will provide a list of five physical chemistry experiments. The examiner will allot one experiment randomly to each candidate. The candidate will write theory, brief procedure and general calculations of the experiment in the first 10 minutes and thereafter perform the actual experiment.

DETAILS OF DISTRIBUTION OF MARKS

1. Melting point/boiling point/crystallization 10 marks
2. Physical chemistry experiment 20 marks
   1. Initial write up 7 marks
   2. Performance 18 marks
      1. Viva-voce 10 marks

5) Note Book 5 marks

**Laboratory Techniques**

**Determination of melting points:**

Naphthalene, 80-820. Benzoic acid, 121.5-1220

Urea, 132.5-1330, Succinic acid, 184.5-1850.

Cinnamic acid, 132.5-1330, Salicylic acid, 157.5-1580.

Acetanilide, 113.5-1140, m-Dinitrobenzene, 900.

ρ-Dichlorobenzene, 520, Asprin, 1350.

**Determination of boiling points**

Ethanol, 780, Cyclohexane, 81.40. Tolune, 110.60, Benzene, 800.

**Crystallization**

concept of induction of crystallization

Phthalic acid from hot water (using fluted filter paper and seamless funnel)

Acetanilide from boiling water

Naphthalene from ethanol

Benzoic acid from water

**Physical Chemistry Experiment** 20 Marks

**Chemical Kinetics**

1. To determine the specific reaction rate of the hydrolysis of methyl acetate/ethyl acetate catalyzed by hydrogen ions at room temperature.

2. To study the effect of acid strength on the hydrolysis of an ester.

3. Viscosity & Surface Tension of pure liquids.

To determine the viscosity and surface tension of C2H5OH and glycerin solution in water

4. Molecular weight determined by Rast method.

**Viva Voce** 10 Marks

**Copy**  5 Marks

BOOKS SUGGESTED (THEORY COURSES)

1. *Basic Inorganic Chemistry.* F.A. Cotten. G. Wilkinson and P.L.. Gaus. Wiley.
2. *Concise Inorganic Chemistry. 1.D.* Lee. ELBS.
3. *Concepts of Models of Inorganic Chemistry.* B. Doaglas. D. McDaniel and 1. Alexander, John Wiley.
4. *Inorganic Chemistry.* D.E. Shriver, P. W. Aikins and C.H. Langford. <Oxford.
5. *Inorganic Chemistry.* W. W. Porterfield Addison. Wesley.
6. *Inorganic Chemistry.* A.G. Sharpe, ELBS.
7. *Inorganic Chemistry.* G.L. Miessler and O.A. Tarr, Prentice Hall.
8. *Organic Chemistry.* Morrison and Boyd, Prentice Hall.
9. *Organic Chemistry.* L.G. Wade lr.Prentice Hall.
10. *Fundamentals of Organic Chemistry.* Solomons, John Wiley.
11. *Organic Chemistry.* Vol. I, II & III. S.M. Mukherji, S.P. Singh and R.P. Kapoor, Wiley Eastern Ltd. (New Age International)
12. *Organic Chemistry.* F.A. Aarey, McGraw Hill India.
13. *Introduction to Organic Chemistry.* Stretwieser, Heathcock and Kosover, Machmilan.
14. *Physical Chemistry.* G.M. Barrow, International Student Edition. McGraw Hill.
15. *Basic Programming with Application.* V.K. Jain, 1'ata McGraw Hill.
16. *Computers and Common. Sense.* B. Ryal and Shely, Prentice Hall.
17. *University General Chemistry.* C.N.B. Rao. Macmillan.
18. *Physical Chemistry.* R.A. Alberty, Wiley Eastern Ltd.
19. *The Elements of Physical Chemistry,* P.w. Aikins, Oxford.
20. *Physical Chemistry Through Problems.* S.K. Dogra and S. Dogra. Wiley Eastern Ltd.

BOOKS SUGGESTED (LABORATORY COURSES)

1. *Vogel's Qualitative Inorganic Analysis,* revised, Svehla, Orient Longman.
2. *Vogel's Textbook of Quantitative Inorganic Analysis* (revised), J. Basseff, R.C. Dennery, 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, Brauer, Academic Press.
6. *Inorganic Synthesis,* McGraw Hill.
7. *Experimental Organic Chemistry.* Vol. I & II, P.R. Singh, D.S. Gupta and K.S. Bajpai, Tata McGraw Hill.
8. *Laboratory Manual in Organic Chemistry.* R.K. Bansal, Wiley Eastern.'
9. *Vogel's Textbook 0/ Practical Organic Chemistry.* B.S. Furniss, A.1. Harnaford, V. ogers, P.w.G. Smith and A.R. Tatchell, ELBS. -.
10. *Experiments in General Chemistry.* C.N.R. Rao and U.e. Aggarwal. East- West Press.

*11. Experiments in Physical Chemistry.* R.C. Dass and B. Behra, Tata McGraw Hill.

1. *Advanced Practical PhysicalChemistry,* J.B. Yadav, Goel Publishing House.
2. *Advanced Experimental Chemistry.* Vol. I : Physical, J.N. Gurtu and R. Kapoor, S. Chand & CO.
3. *Selected Experiments in Physical Chemistry,* N.G. Mukherjee, J.N. Ghose & Sons.

*15. Experiments in Physical Chemistry.* J.e. Ghosh, Bharati Bhavan.

**B.A./B.Sc. Part-I (COMPUTER SCIENCE)**

**(Semester I)**

**PAPER BAP-101: FUNDAMENTALS OF INFORMATION TECHNOLOGY**

**For Regular Students**

**External Marks: 45 Maximum Time: 3 Hrs.**

**Minimum Pass Marks: 35% Lectures to be delivered: 45-55**

**Internal Assessment: 15**

**For Distance Education Students**

**External Marks:60**

**Minimum Pass Marks:35%**

**A) Instructions for paper-setter**

The question paper will consist of three sections A, B & C. Sections A & B will have four questions from the respective sections of the syllabus and will carry 40% marks each. Section C will have 6-12 short answer type questions which will cover the entire syllabus uniformly and will carry 20% marks in all.

**B) Instructions for candidates**

1. Candidates are required to attempt two questions each from sections A & B of the question paper and the entire section C.
2. Use of non-programmable scientific calculator is allowed.

**SECTION A**

**Computer Fundamentals:** Block diagram of a computer, characteristics of computers and generations of computers. Categories of Computers - Supercomputer, mainframe computer, network server, Workstation, Desktop computers, notebook computer, Tablet PC, handheld PC, smart phone.

**Input Devices:** Keyboard, Mouse, Joy tick, Track Ball, Touch Screen, Light Pen, Digitizer, Scanners, Speech Recognition Devices, Optical Recognition devices – OMR, OBR, OCR

**Output Devices:** Monitors, Impact Printers - Dot matrix, Character and Line printer, Non Impact Printers – DeskJet and Laser printers, Plotter.

**Memories:** Memory Hierarchy, Primary Memory – RAM, ROM, Cache memory. Secondary Storage Devices - Hard Disk, Compact Disk, DVD, Flash memory.

**Software:** Types of Software- System Software, Application Software, Firmware. Type of System Software: Operating Systems, Language Translators, Utility Programs, Communications Software. **Commonly Used Application Software**: Word Processor, Spreadsheet, Database, Education, Entertainment Software.

**Computer Languages:** Machine language, assembly language, high level language, 4GL.

**SECTION B**

**Number System:** Non-positional and positional number systems, Base conversion, Concept of Bit and Byte, binary, decimal, hexadecimal, and octal systems, conversion from one system to the other. Binary Arithmetic: Addition, subtraction and multiplication, 1’s complement, 2’s complement, subtraction using 1’s complement and 2’s complement.

**Computer Codes:** weighted and non-weighted code, BCD, EBCDIC, ASCII, Unicode.

**Computer Network:** Network types, network topologies.

**Internet Related Concepts:** Internet, World Wide Web, Hypertext, Uniform Resource Locator, Web Browsers, IP Address, Domain Name, Internet Services Providers, Internet Security, Web Search Engine, Net Surfing, web portal, Wiki, Blog.

**Advanced Trends in IT :** Mobile Internet, GPS, 3G, 4G, Wi-Fi, Bluetooth, Cloud Technology, Virtual LAN Technology, Firewall, E-Commerce, M-Commerce, Nanotechnology, Virtual Reality, BPO and KPO, Online shopping, Social Media - YouTube, FaceBook, Linkedin, Twitter, Google+.

**Applications of IT:** IT in Business and Industry, IT in Education & training, IT in Science and Technology, IT and Entertainment, Current Trends in IT Application - AI, Virtual Reports, voice recognition, Robots, Multimedia Technology.

**Reference Books:**

1. Peter Nortorn, Introduction to Computers, Seventh Edition

2. V. Rajaraman, Fundamentals of Computers, PHI.

3. Larry E. Long and Nancy Long, Computers: Information Technology in Perspective, PHI.

4. N. Subramanian, Introduction to Computers, Tata McGraw-Hill.

5. D.H. Sanders, Computers Today, McGraw- Hill.

**PAPER BAP-102: PRACTICAL BASED ON PAPER BAP-101**

**Maximum Marks: 40 Maximum Time: 3 Hrs.**

**Minimum Pass Marks: 35% Practical Units to be conducted: 45-55 Hrs**

The laboratory course will comprise of Activities related to Windows and exercise to what is learnt under Paper BAP-101 such as:

**Windows**

**Activity 1:** Windows 7 Installation and Software & Drivers installation.

**Activity 2:** Basic components of Window-Desktop, Icons, Taskbar, Status Bar,

Wallpapers,   Screen Saver

**Activity 3:** Start Menu: Accessories- Notepad,   Calculator, Clock, Date and Time, Disk Defragmentation,   Working with Control Panel.

**Activity 4:** Taskbar properties - Maximize Minimize, Restore, and Close.

**Activity 5:** Creating Files, Folders, Shortcuts, Moving folders (right click options)

**Internet**

**Activity 1:** Connecting through Wi-fi, Blue tooth and Hot Spot.

**Activity 2:** Web Surfing, searching contents through Search Engines.

**Activity 3:** Creating and maintaining Web Blogs and Web portals

**Social Media**

**Activity 1:** Creating account, linking accounts, setting profiles and preferences.

**Activity 2:** Posting messages, replying, forwarding, tagging contents.

**Activity 3:** Online shopping, comparing prices etc.

**Activity 4:** Creating and maintaining social profiles at Linkedin, FaceBook, Twitter etc.

The breakup of marks for the practical will be as under:

Lab Record : 05 Marks

**B.A./B.Sc. Part-I (COMPUTER SCIENCE)**

**(Semester II)**

**PAPER BAP-103: MS-OFFICE AUTOMATION TOOLS**

**For Regular Students**

**External Marks: 45 Maximum Time: 3 Hrs.**

**Minimum Pass Marks: 35% Lectures to be delivered: 45-55**

**Internal Assessment: 15**

**For Distance Education Students**

**External Marks:60**

**Minimum Pass Marks:35%**

**A) Instructions for paper-setter**

The question paper will consist of three sections A, B & C. Sections A & B will have four questions from the respective sections of the syllabus and will carry 40% marks each. Section C will have 6-12 short answer type questions which will cover the entire syllabus uniformly and will carry 20% marks in all.

**B) Instructions for candidates**

1. Candidates are required to attempt two questions each from sections A & B of the question   paper and the entire section C.

2. Use of non-programmable scientific calculator is allowed.

**SECTION A**

**MS-OFFICE:** Basic layout, components, Office Characteristics, Common Office Controls and shortcuts for Home, Insert, Page Layout, Mailing, Review and View

**MS Word 2010:** Introduction to Word Processing, Toolbars, Ruler, Menus, Keyboard Shortcut. Previewing documents, Printing documents, Formatting documents, Checking the grammar and spelling, Formatting via find and replace, Using the Thesaurus, using Auto Correct, word count, Hyphenating, Mail merge, mailing Labels Wizards and Templates, Handling Graphics, tables as Converting a word document into various formats.

**MS PowerPoint 2010:** Introduction, Elements of Power Point Package, Starting and exploring Power Point menus (Insert, Format, Tools, Slide Show, Window, Help options and all of their features, Options and sub options etc.), Creating, inserting, deleting and formatting slides, Formatting and enhancing text, Slides with graphs, Giving Animation to slides, Transfer of files between Power Point and other word processors and software packages.

**SECTION B**

**MS-EXCEL 2010:** Creating worksheet, entering data into worksheet, Entering data into worksheet, Entering, data, dates, alphanumeric, values, saving & quitting worksheet, Opening and moving and existing worksheet, Toolbars and Menus, keyboard shortcut. Working with single and multiple workbooks, working with formulation & cell referencing, formatting of worksheet.

**MS-ACCESS 2010:** Introduction to MS-ACCESS-2010 working with databases and tables, queries in Access. Introduction to forms, sorting and filtering, controls. Creating reports, Using Macro

**Reference Books:**

1. Rob Tindrow, Jim Boyce, Jeffrey R. Shapiro, Windows 10 Bible, Wiley.

**PAPER BAP-104: PRACTICAL BASED ON PAPER BAP-103**

**Maximum Marks: 40 Maximum Time: 3 Hrs.**

**Minimum Pass Marks: 35% Practical Units to be conducted: 45-55 Hrs**

The laboratory course will comprise of Activities related to MS-OFFICE and exercise to what is learnt under Paper BAP-103 such as:

**MS-Word**

**Activity 1:**

1. Create, open, save and close a document.
2. Typing, copying, moving and deleting data in word document.
3. Perform Save and Save as, Cut and Copy, Paste and Paste Special.

**Activity 2:**

Formatting of data in word Document:-

1. Text formatting (font size, font style, font color, subscript, superscript, upper/lower case etc.)
2. Text Alignment and character spacing
3. Indention and line spacing
4. Border and shading
5. Bullets and Numbering

**Activity 3:**

1. Find and replace and data sorting in a document.
2. Protect your document.
3. Add chart in word document. Create different types of Charts in word.
4. Set a size, margin, orientation of page, Hyphenation, Columns and Line Numbers in MS-Word.

**Activity 4:**

1. Set Page Color, Page Border, Themes, and Watermarks in MS-Word
2. Adding Tables, header/footers, pictures, page numbers and special symbols, Text Box in your word document.
3. Showing Ruler, Gridlines, Document Map, Thumbnails, Inserting Word Art, Drop Cap, Hyperlink, Equation etc. in word document

**Activity 5:**

1. Arranging, splitting windows in MS-word
2. Perform Mail-merge in MS-word
3. Create and run Macros in MS-Word
4. Set the print properties of a word document

**PowerPoint**

**Activity 1:**

* 1. Create, open, save and close a Presentation
  2. Typing, copying, moving and deleting data in presentation.
  3. New Slide, understanding Slide Layout, adding and deleting slides.

**Activity 2:**

Formatting of data in slides:-

Text formatting (font size, font style, font color, subscript, superscript, upper/lower case etc.)

Text Alignment and character spacing

Indention and line spacing

Border and shading

Bullets and Numbering

**Activity 3:**

* 1. Set a size, margin, orientation of slides in PowerPoint.
  2. Adding Tables, header/footers, pictures, page numbers and special symbols, Text Box etc. in your presentation

**Activity 4:**

1. Adding Animation and Transition Effects in Slides, Understanding Slide Show
2. Presentation Views, Understanding Formatting commands in PowerPoint

**Activity 5:**

1. Create and run Macros in PowerPoint
2. Arranging, splitting windows in MS-PowerPoint.

**MS-Excel**

**Activity 1:**

1. Create, open, save and close workbook?
2. Create a new worksheet, renaming and moving sheet.
3. Entering, copying, moving and deleting data in cells and worksheets.
4. Insert and delete cells, columns and rows in MS-Excel.

**Activity 2:**

1. Formatting of data in cells:-
2. Text formatting (font size, font style, font color, Cell border etc.)
3. Text Alignment
4. Text Orientation, Text Direction, Text Control.

**Activity 3:**

1. Find and replace data in a sheet
2. Perform data sorting and data filtering in MS-Excel
3. Protect your Worksheet and Workbook?
4. Enter and perform some basic formulas in ms-excel.

**Activity 4:**

1. Perform some basic Functions in MS-Excel.
2. Create a chart in MS-Excel.
3. Create different types of Charts in excel.
4. Set a size, margin, orientation of page in Ms-Excel.
5. The print properties of worksheet in MS-Excel.

**Activity 5:**

1. Hide and unhide row and column in MS-Excel
2. Set column width and row height in MS-Excel.
3. Adding text Box, header/footers, pictures and special symbols in your worksheet.
4. Arranging, splitting and hiding windows in MS-Excel. And also freezing panes.
5. Create and run Macros in MS-Excel.

**MS-Access 2010**

**Activity 1:**

1. Creating with databases and tables
2. Linking various Tables
3. Queries in Access

**Activity 2:**

1. Creating forms
2. Filling information in forms
3. Saving forms

**Activity 3:**

1. Sorting data
2. Filtering Data

**Activity 4:**

1. Creating reports,
2. Using Macro

The breakup of marks for the practical will be as under:

Lab Record : 05 Marks

Viva Voce : 10 Marks

Practical Work : 25 Marks

**ਬੀ.ਐਸ.ਸੀHGkr^ਪਹਿਲਾ (;w?;No)**

**(gzikph bkiawh)**

**;w?;No ਪਹਿਲਾ**

e[b nze L 100 ft;a/ ftu'A gk; j'D bJh nze L 35

nzdo{Bh w[bKeD L 25 nze nzdo{Bh w[bKeD ftu'A gk; j'D bJh nze L 09

pkjoh gohfynkL 75 nze pkjoh gohfynk ftu'A gk; j'D bJh nze L 26

;wK L 3 xzN/ (nfXnkgBL 6 ghohnv gqsh jcask)

**f;b/p; s/ gkm g[;seK**

Gkr^TL **eEk ozr**, ;zgkH tfonkw f;zx ;zX{ ns/ vkH pbd/t f;zx uhwk1 12+12=24 nze

Gkr^n L (1) fBpzX^ouBk L ;wkie, tksktoD ns/ ;fGnkuko ft;a/ Bkb ;pzXs. 09 ਅੰਕ

(2) **ftnkoeDL**

(i) ਩ੰਜਾਬੀ ਧੁਨੀ-ਵਿਉਂਤ, ਸਿਰ, ਵਿਅੰਜਨ, ਉਚਾਰਨ ਅੰਗ, ਉਚਾਰਨ ਸਥਾਨ ਤ੃ ਉਚਾਰਨ ਵਿਧੀ ਅਨੁਸਾਰ

ਧੁਨੀਆਂ ਦਾ ਿਰਗੀਕਰਣ।

(ii) ਸ਼ਬਦ-ਸ਼ਰ੃ਣੀਆਂ ਅਤ੃ ਰੂ਩ਾਂਤਰਨ: ਨਾਂਿ, ਩ੜਨਾਂਿ, ਵਿਸ਼੃ਸ਼ਣ, ਵਕਵਰਆ, ਵਕਵਰਆ ਵਿਸ਼੃ਸ਼ਣ, ਸੰਬੰਧਕ,

ਯੋਜਕ, ਩ਰਸ਼ਨ ਸੂਚਕ ਸ਼ਬਦ। 12 ਅੰਕ

ਭਾਗ-ੲ: ਭਾਗ-ੳ ਅਤ੃ ਭਾਗ-ਅ ਦ੃ ਵਿਆਕਰਣ ਿਾ਱੃ ਭਾਗ ਵਿਚੋਂ ਸੰਖ੃਩ ਉੱਤਰਾਂ ਿਾ਱੃ ਩ਰਸ਼ਨ। 30 ਅੰਕ

**ਅੰਕ-ਵੰਡ ਅਤੇ ਪੇਪਰ ਸ ੈੱਟਰ ਲਈ ਿਦਾਇਤਾਂ**

1. ਵਸ਱੃ਬਸ ਦ੃ ਸਾਰ੃ ਭਾਗਾਂ ਵਿਚੋਂ ਩ਰਸ਼ਨ ਩ੁੁੱਛ੃ ਜਾਣਗ੃।

2H ਩੃਩ਰ ਨੂੰ ਵਤੰਨ ਭਾਗਾਂ ੳ, ਅ ਅਤ੃ ੲ ਵਿੁੱਚ ਿੰਵਡਆ ਜਾਿ੃ਗਾ।

3. ਭਾਗ ੳ ਵਿੁੱਚੋਂL

(i) ਵਕਸ੃ ਕਹਾਣੀ ਦਾ ਵਿਸ਼ਾ-ਿਸਤੂ/ਸਾਰ/ ਱੃ਖਕਾਂ ਦ੃ ਯੋਗਦਾਨ ਜਾਂ ਕਹਾਣੀ ਕ਱ਾ (ਵਤੰਨ ਵਿੁੱਚੋਂ ਇੁੱਕ) 12 ਅੰਕ

(ii) ਩ਾਤਰ ਸੰਬੰਧੀ ਜਾਣਕਾਰੀ। । (਩ੰਜ ਵਿੁੱਚੋਂ d') 2x6= 12ਅੰਕ

4. ਭਾਗ ਅ-1 ਵਕਸ੃ ਵਿਸ਼੃ ਤ੃ ਵਨਬੰਧ ਵ਱ਖਣ ਱ਈ ਵਕਹਾ ਜਾਿ੃ਗਾ। (ਵਤੰਨ ਵਿੁੱਚੋਂ ਇੁੱਕ) 09ਅੰਕ

ਅ-2 ਦ੃ ਦੋਿਾਂ ਭਾਗਾਂ ਵਿੁੱਚੋਂ ਇਕ-ਇਕ ਩ਰਸ਼ਨ ਩ੁੱਵਛਆ ਜਾਿ੃ਗਾ ਅਤ੃ ਵਿਵਦਆਰਥੀ ਨੇ ਦੋਿਾਂ ਵਿਚੋਂ

ਇੁੱਕ ਩ਰਸ਼ਨ ਕਰਨਾ ਹੋਿ੃ਗਾ। 12 ਅੰਕ

5. ਭਾਗ-ੲ **ਕਥਾ ਰੰਗ** ਅਤ੃ **ਹਵਆਕਰਣ** ਿਾ਱੃ ਭਾਗ ਵਿੁੱਚੋਂ ਸੰਖ੃਩ ਉੱਤਰਾਂ ਿਾ਱੃ 15 (਩ਾਠ ਩ੁਸਤਕ **ਕਥਾ ਰੰਗ**

ਵਿੁੱਚੋਂ 7 ਅਤ੃ **ਹਵਆਕਰਣ** ਵਿੁੱਚੋਂ 8) ਩ਰਸ਼ਨ ਩ੁੁੱਛ੃ ਜਾਣਗ੃। ਵਿਵਦਆਰਥੀ ਨੇ ਸਾਰ੃ ਩ਰਸ਼ਨਾਂ ਦ੃ ਸੰਖ੃਩ ਉੱਤਰ ਦ੃ਣ੃

ਹੋਣਗ੃। ਹਰ੃ਕ ਩ਰਸ਼ਨ ਦ੃ 2 ਅੰਕ ਹੋਣਗ੃। 15x2=30 ਅੰਕ

**;jkfJe gkm^;wZroh**

1H joehos f;zx, Gk;ak ftfrnkB ns/ gzikph Gk;ak, pkjoh gpfb;aoia, fdZbh, 1973H

2H pbd/t f;zx uhwk, gzikph Gk;ak ftfrnkB ns/ ftnkeoB (seBheh ;apdktbh dk ft;ak e';a),

gzikph :{Bhtof;Nh, gfNnkbk, 2000H

3H p{Nk f;zx pokV, gzikph ftnkeoB L f;XKs s/ ftjko, u/sBk gqek;aB, b[fXnkDk, 2008H

4H gq/w gqek;a f;zx, f;XKse Gk;ak ftfrnkB, wdkB gpfb;aoia, gfNnkbk, 2002H

5H gq/w gqek;a f;zx, gzikph Gk;ak dk ;q's s/ pDso, gzikph :{Bhtof;Nh, gfNnkbk, 1996H

6H gq/w gqek;a f;zx, o{g ftfrnkB, wdkB gpfb;aoia, gfNnkbk, 2002H

7H i'frzdo f;zx g[nko ns/ j'o, gzikph Gk;ak dk ftnkeoB, (.,.. ns/ ...), gzikph Gk;ak

nekdwh, ibzXo.

8H ;[yftzdo f;zx ;zxk, gzikph Gk;ak ftfrnkB, gzikph Gk;ak nekdwh, ibzXo, 1999H

**phHJ/$phHn?;H;hH$phHekw Gkr^gfjbk (;w?;No)**

**(gzikph bkiawh)**

**;w?;No d{ik**

e[b nze L 100 ft;a/ ftu'A gk; j'D bJh nze L 35

nzdo{Bh w[bKeD L 25 nze nzdo{Bh w[bKeD ftu'A gk; j'D bJh nze L 09

pkjoh gohfynkL 75 nze pkjoh gohfynk ftu'A gk; j'D bJh nze L 26

;wK L 3 xzN/ (nfXnkgBL 6 ghohnv gqsh jcask)

**f;b/p; s/ gkm g[;seK**

ਭਾਗ-ੳ **tkose ftt/e**, ;zgk. vkH okfizdo gkb f;zx pokV, vkH irsko f;zx, gzikph 12+12=24 nze

:{Bhtof;Nh, gfNnkbk.

Gkr^n^1 fuZmh^gZso 09 nze

n^2 **ftnkoeDL**

(i) ਸ਼ਬਦ-ਬਣਤਰ ਅਤ੃ ਸ਼ਬਦ ਰਚਨਾ: ਩ਵਰਭਾਸ਼ਾ, ਮੁੁੱਢ਱੃ ਸੰਕ਱਩, ਮੂ਱ ਰੂ਩, ਅਗ੃ਤਰ, ਩ਛ੃ਤਰ,

ਵਿਉਤ਩ਤ ਰੂ਩ ਅਤ੃ ਰੂ਩ਾਂਤਰੀ ਰੂ਩।

(ii) ਭਾਸ਼ਾ ਿੰਨਗੀਆ: ਭਾਸ਼ਾ ਦਾ ਟਕਸਾ਱ੀ ਰੂ਩, ਭਾਸ਼ਾ ਅਤ੃ ਉ਩-ਭਾਸ਼ਾ ਦਾ ਅੰਤਰ ਅਤ੃ ਅੰਤਰ-ਸਬੰਧ,

਩ੰਜਾਬੀ ਉ਩- ਭਾਸ਼ਾਿਾਂ ਤ੃ ਩ਛਾਣ-ਵਚੰਨਹ। 12 nze

ਭਾਗ-ੲ ਉ਩ਰੋਕਤ ਵਸ਱੃ਬਸ ਤ੃ ਅਧਾਰਤ ਸੰਖ੃਩ ਉੱਤਰਾਂ ਿਾ਱੃ ਩ਰਸ਼ਨ। 30 nze

**ਅੰਕ-ਵੰਡ ਅਤੇ ਪੇਪਰ ਸ ੈੱਟਰ ਲਈ ਿਦਾਇਤਾਂ**

1. ਵਸ਱੃ਬਸ ਦ੃ ਸਾਰ੃ ਭਾਗਾਂ ਵਿਚੋਂ ਩ਰਸ਼ਨ ਩ੁੁੱਛ੃ ਜਾਣਗ੃।

2H ਩੃਩ਰ ਨੂੰ ਵਤੰਨ ਭਾਗਾਂ ੳ, ਅ ਅਤ੃ ੲ ਵਿੁੱਚ ਿੰਵਡਆ ਜਾਿ੃ਗਾ।

3. ਭਾਗ ੳ ਵਿਚੋਂ:

(i) ਵਕਸ੃ ਇਕ ਵਨਬੰਧ ਦਾ ਵਿਸ਼ਾ/ਸਾਰ/਱੃ਖਕਾਂ ਦ੃ ਯੋਗਦਾਨ ਜਾਂ ਵਨਬੰਧ ਕ਱ਾ ਬਾਰ੃ ਩ਰਸ਼ਨ. (ਵਤੰਨ ਵਿੁੱਚੋਂ ਇੁੱਕ) 12 ਅੰਕ

(ii) ਵਨਬੰਧਾਂ ਵਿਚ਱੃ ਵਿਚਾਰਾਂ ਸਬੰਧੀ ਩ਰਸ਼ਨ। (਩ੰਜ ਵਿੁੱਚੋਂ ਦੋ) 2x6=12 ਅੰਕ

4. ਭਾਗ ਅ-1 ਵਕਸ੃ ਵਿਸ਼੃ ਤ੃ ਵਚੁੱਠੀ/਩ੁੱਤਰ ਵ਱ਖਣ ਱ਈ ਵਕਹਾ ਜਾਿ੃ਗਾ। (ਵਤੰਨ ਵਿੁੱਚੋਂ ਇੁੱਕ) 09 ਅੰਕ

ਅ-2 ਦ੃ ਦੋਿਾਂ ਭਾਗਾਂ ਵਿੁੱਚੋਂ ਇਕ-ਇਕ ਩ਰਸ਼ਨ ਩ੁੁੱਵਛਆ ਜਾਿ੃ਗਾ ਅਤ੃ ਵਿਵਦਆਰਥੀ ਨੇ ਦੋਿਾਂ ਵਿੁੱਚੋਂ

ਇੁੱਕ ਩ਰਸ਼ਨ ਕਰਨਾ ਹੋਿ੃ਗਾ। 12 ਅੰਕ

5. ਭਾਗ-ੲ ਵਿਚ ਩ਾਠ ਩ੁਸਤਕ **ਵਾਰਤਕ ਹਵਵੇਕ** ਅਤ੃ **ਹਵਆਕਰਣ** ਿਾ਱੃ ਭਾਗ ਵਿੁੱਚੋਂ ਸੰਖ੃਩ ਉੱਤਰਾਂ ਿਾ਱੃

15 (਩ਾਠ ਩ੁਸਤਕ **ਵਾਰਤਕ ਹਵਵੇਕ** ਵਿੁੱਚੋਂ 7 ਅਤ੃ **ਹਵਆਕਰਣ** ਵਿੁੱਚੋਂ 8) ਩ਰਸ਼ਨ ਩ੁੁੱਛ੃ ਜਾਣਗ੃।

ਵਿਵਦਆਰਥੀ ਨੇ ਸਾਰ੃ ਩ਰਸ਼ਨਾਂ ਦ੃ ਸੰਖ੃਩ ਉੱਤਰ ਦ੃ਣ੃ ਹੋਣਗ੃। ਹਰ੃ਕ ਩ਰਸ਼ਨ ਦ੃ 2 ਅੰਕ ਹੋਣਗ੃। 15x2=30 ਅੰਕ

**;jkfJe gkm-;wZroh**

1H joehos f;zx, Gk;ak ftfrnkB ns/ gzikph Gk;ak, pkjoh gpfb;aoia, fdZbh, 1973H

2H pbd/t f;zx uhwk, gzikph Gk;ak ftfrnkB ns/ ftnkeoB (seBheh ;apdktbh dk ft;ak e';a),

gzikph :{Bhtof;Nh, gfNnkbk, 2000H

3H p{Nk f;zx pokV, gzikph ftnkeoB L f;XKs s/ ftjko, u/sBk gqek;aB, b[fXnkDk, 2008H

4H gq/w gqek;a f;zx, f;XKse Gk;ak ftfrnkB, wdkB gpfb;aoia, gfNnkbk, 2002H

5H gq/w gqek;a f;zx, gzikph Gk;ak dk ;q's s/ pDso, gzikph :{Bhtof;Nh, gfNnkbk, 1996H

6H y'i gfsqek (fBpzX nze), gzikph :{Bhtof;Nh, gfNnkbkH

7H i'frzdo f;zx g[nko ns/ j'o, gzikph Gk;ak dk ftnkeoB, (.,.. ns/ ...), gzikph Gk;ak

nekdwh,ibzXo.

8H ;[yftzdo f;zx ;zxk, gzikph Gk;ak ftfrnkB, gzikph Gk;ak nekdwh, ibzXo,

**B.Sc. (N.M &C.S) 2nd YEAR**

**B. A. \ B.Sc. (Mathematics) III semester**

**Paper-I: Advanced Calculus**

University Exam: 40

Teaching Hours 50 Internal Assessment: 10

Time Allowed: 3 hours Total: 50

**INSTRUCTIONS FOR THE PAPER-SETTER**

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

**Objective:** The aim is to introduce the Calculus of Several Variables and give some of its physical applications.

**SECTION-A**

Limit and Continuity of Functions of several variables. Differentiability of real-valued functions of two variables. Partial differentiation, Jacobians and their properties, Schwarz’s & Young’s theorems. Euler’s theorem on homogenous functions. Taylor’s theorem for functions two variables and error estimation. Maxima and Minima, Lagrange’s multiplier method.

**SECTION-B**

Double and Triple Integrals, Change of order of integration in double integrals, Change of variables. Applications to evaluation of areas, Volume, Centre of Gravity and Moments of Inertia

**Pedagogy:** The previous knowledge of the students in Calculus of one variable should lead to effective strategy in the introduction of the concepts of several variables. The usefulness of this approach will lead to the continuity in the process of student learning.

. **REFERENCE BOOKS:**

1. Malik and Arora, Mathematical Analysis.

2. Shanti Narayan, Mathematical Analysis.

3. Thomas and Finney, Calculus and Analytical Geometry.

**B. A. \ B.Sc (Mathematics) III semester**

**PAPER-II: ANALYSIS-I**

University Exam: 40

Teaching Hours 50 Internal Assessment: 10

Time Allowed: 3 hours Total: 50

**INSTRUCTIONS FOR THE PAPER-SETTER**

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

**Objective:**  The course introduces some convergence tests of sequences and series and gives an introduction to the Riemann Integral. Functions of Bounded Variation which are essential to the study of Riemann-Stieltjes integral are also introduced .

**SECTION-A**

Definition of a sequence, Bounded and Monotonic sequences, Convergent sequence, Cauchy sequences, Cauchy’s Convergence Criterion, Theorems on limits of sequences. Subsequence , Sequential continuity, Definition of a series, Test’s of convergence (Without proofs) Comparison tests. Cauchy’s integral Ratio tests. Raabe’s, Logarithmic, Gauss Test, Cauchy’s root test, Alternating series. Leibnitz’s test. Absolute and conditional convergence.

**Section-B**

Definition and existence of Riemann integrals. Properties of integrals. Integrability of continuous and monotonic functions. The fundamental theorem of integral calculus. Mean value theorems of integral calculus.

Functions of bounded Variation and Rectifiable Curves: Properties of Monotonic Functions, Functions of Bounded Variation, Total variation, Additive property of total variation, Total Variation on [a, x] as a function of x, functions of bounded variation expressed as the difference of increasing functions, continuous functions of bounded variation, rectifiable curves and arc length. (Scope as in Chapter 6 of Apostol)

**Pedagogy:**  Apart from the usual techniques to be made available to the students the instructor should lay emphasis on the existence and properties of the Riemann Integral. The functions of bounded variation should be covered from the referred text only.

**TEXT:** Tom.M. Apostol: *Mathematical Analysis*, Second Edition. Addsion-Wesley Publishing Company.

**Reference Books**

1. Rudin, W.: *Principles of Mathematical Analysis*, third edition. McGraw Hill
2. R.G. Bartle and D. R Sherbet,  *Introduction to Real Analysis,* 3rd Edition., John Wiley and Sons, 2002
3. Kenneth A. Ross, *Elementary Analysis: The Theory of Calculus.*Undergraduate Texts in Mathematics. Springer, 1998.
4. K.G. Binmore, *Mathematical Analysis,*  2nd Edition, Cambridge University Press (1982).
5. Terrance Tao: *Analysis I,*  2nd Edition, Hindustan Book Agency, New Delhi.
6. Terrance Tao: *Analysis II,*  2nd Edition, Hindustan Book Agency, New Delhi
7. S.C Malik and S. Arora:  *Mathematical Analysis,*  New Age International Publishers.

**B. A./ B.Sc. (Mathematics) III semester**

**Paper-III: STATICS**

University Exam: 40

Teaching Hours 50 Internal Assessment: 10

Time Allowed: 3 hours Total: 50

**INSTRUCTIONS FOR THE PAPER-SETTER**

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

**Objective:**  The course will give introduction to the Statics part of Mechanics. This theory and its applications are an excellent example of how physics and mathematics work hand in hand to give a complete picture of the real problems.

**SECTION-A**

**Statics:** Basic notation, Newton Laws of motion, system of two forces, parallelogram law of forces, resultant of two collinear forces, resolution of forces, moment of a force, couple, theorem on moments of a couple, coplanar forces, resultant of three coplanar concurrent forces, theorem of resolved parts, resultant of two forces acting on a rigid body, Varignon’s theorem, generalized theorem of moments.

**SECTION-B**

Equilibrium of two concurrent forces, equilibrium condition for any number of coplanar concurrent forces, Lami’s theorem. λ - µ theorem, theorems of moments, resultant of a force and a copule. Equilibrium conditions for coplanar non-concurrent forces.

**Friction**: Definition and nature of friction, laws of friction, Centre of gravity.

**Pedagogy:**  The instructor should lay emphasis on how the laws of physics are applied by making a mathematical model of the real life situation and how the mathematical model in turn gives verifiable predictions.

**Books recommended:**

1. S.L. Loney: *The Elements of Statics and Dynamics*, 5th edition, Cambridge University Press, 1947.
2. John L. Synge and Byron A. Griffith :*Principles of Mechanics* 3rd Edition McGraw-Hill international student editions

**B. A. \ B.Sc (Mathematics) IV semes**

**PAPER-IV: Numerical Methods**

University Exam: 40

Teaching Hours 50 Internal Assessment: 10

Time Allowed: 3 hours Total: 50

**INSTRUCTIONS FOR THE PAPER-SETTER**

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%. Use of non-programmable scientific calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

**Objective:** The course introduces the numerical methods which are essential to make predictions about situations in which complete analytical solutions are not possible due to the complexity of the problems. Such methods are indispensible in sciences.

**Section-A**

Bisection Method, Regula-falsi method, Sectant method, Fixed – point iteration and Newton-Raphson method and convergence of Secant, Newton- Raphson method and fixed-point iteration. Pivoting strategies, Partial Pivoting, Gauss-Elimination, Gauss Jordan and Triangularisation method, Jacobi Method, Gauss Seidel Method.

**Section-B**

**Interpolation:** Finite differences, Divided differences, Newton Gregory Forward and Backward formula, Lagrange’s formula, Newton’s formulae, Central Differences, Stirling, Bessel’s and Everett’s formulae, Error in linear and quadratic interpolation.

**Pedagogy:** The instructor should lay emphasis on the necessity of numerical methods by introducing problems that have no analytical situations. Discussion of some historical problems that lead to numerical techniques will make the subject more alive.

***References:***

1. M.K.Jain, S.R.K lyengar and R.K.Jain, Numerical Methods for Scientific and Engineering Computation, New Age Publisher, New Delhi.

2. S.D.Conte and C.D.Boor, *Elementary Numerical Analysis*, 3rd Edition, Mc-Graw Hill International Company, Newyork.

**B. A. / B.Sc (Mathematics) IV semester**

**Paper-V: Analysis-II**

University Exam: 40

Teaching Hours 50 Internal Assessment: 10

Time Allowed: 3 hours Total: 50

**INSTRUCTIONS FOR THE PAPER-SETTER**

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

**Objective:** This course continues the study of Analysis started in Paper II (Analysis I) and will students will study Uniform Convergence, Power Series and Vector Calculus.

**Section-A**

Concept of Point-wise and Uniform convergence of sequence of functions and series of functions with special reference to power Series. Statement of Weierstrass M-Tests for Uniform convergence of sequence of functions and of series of functions. Simple applications. Determination of Radius of convergence of power series. Term by term integration and Term by term differentiation of power Series.

**Section-B**

Scalar and vector fields, differentiation of vectors, velocity and acceleration. Vector differential operators: Del, Gradient, Divergence and Curl, their physical interpretations. Formulae involving Del applied to point functions and their products. Line, surface and volume integrals, Greens Theorem in the Plane Parameterized Surface, Stokes Theorem and the Divergence Theorem. Applications of Green’s, Stoke’s and Divergence theorem.

**Pedagogy:** The instructor should justify the test to be used to discuss convergence and should illustrate the Theory of Vector Calculus with relevant examples.

**REFERENCE BOOKS:**

1. T. M. Apostol, *Mathematical Analysis*, Norosa Publishing House, New Delhi, 1985.

2. R. R. Goldberg, *Real Analysis*, Oxford & IBH Publishing Co., New Delhi, 1970.

3. Shanti Narayan. S *Course of Mathematical Analysis*, S.Chand & Co., New Delhi.

4. S. C. Malik and Savita Arora, , *Mathematical Analysis,* Wiley, 1984.

5..Shanti Narayan, *Theory of Functions of a Complex Variable*, S. Chand & Co., New Delhi

**B. A. / B.Sc (Mathematics) IV semester**

**Paper-VI: DYNAMICS**

University Exam: 40

Teaching Hours 50 Internal Assessment: 10

Time Allowed: 3 hours Total: 50

**INSTRUCTIONS FOR THE PAPER-SETTER**

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

**Objective:** The study of the laws of Mechanics started in Statics in Sem III will now be extended to the dynamical problems. Thorough understanding of dynamics is essential to understanding any modern development of Physical Sciences.

**Section - A**

Motion of a particle with constant acceleration, acceleration of falling bodies, motion under gravity, motion of a body projected vertically upward, motion of a two particles connected by a string, motion along a smooth inclined plane, constrained motion along a smooth inclined plane. Variable acceleration, Simple harmonic motion, elastic string, simple pendulum.

**Section - B**

Projectile, Work, Power, conservative fields and potential energy, work done against gravity, potential energy of a gravitational field.

Relative motion, relative displacement, velocity and acceleration, motion relative to a rotating frame of reference. Linear momentum, angular momentum, conservation of angular momentum, impulsive forces, principle of impulse and momentum.

**Pedagogy:** Same as for Paper III in Statics.

**REFERENCE BOOKS:**

1. S.L. Loney: The elements of statics and dynamics, 5th edition, Cambridge University Press, 1947.
2. John L. Synge and Byron A. Griffith :*Principles of Mechanics* 3rd Edition McGraw-Hill international student editions

**SCHEME**

**B.Sc. (Physics) Part-II (IIIrd and IVth Semester)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Code** | **Title of Paper** | | **No of**  **Lectures** | **Max Marks** | | | **Examination**  **Time (Hours)** | |
| **Semester -III** | | |  | **Total** | **Ext.** | **Int.** |  | |
| Paper**- I** | | Statistical Physics and Thermodynamics-I | 40 | 40 | 30 | 10 | 03 | |
| Paper**- II** | | Optics | 40 | 40 | 30 | 10 | 03 | |
| Paper **– III** | | Quantum Mechanics-I | 40 | 40 | 30 | 10 | 03 | |
| Paper **– IV** | | Physics Practical Lab | 80 | 30 | 22 | 08 | 03 | |
| **SEMESTER -IV** | | |  |  |  |  |  | |
| Paper**- I** | | Statistical Physics and Thermodynamics-II | 40 | 40 | 30 | 10 | 03 | |
| Paper **– II** | | Lasers | 40 | 40 | 30 | 10 | 03 | |
| Paper **– III** | | Quantum Mechanics-II | 40 | 40 | 30 | 10 | 03 | |
| Paper **– IV** | | Physics Practical Lab | 80 | 30 | 22 | 08 | 03 | |
|  | | | | | | | |

# General Instructions

|  |  |
| --- | --- |
| 1) | There will be three papers of theory and one laboratory (practical) course. |
| 2) | The number of lectures per week will be three for each theory paper. |
| 3) | The number of lectures per week will be six for practicals. |
| 4) | The examination time for each theory will be 3 hours. |
| 5) | The examination time for practical will also be 3 hours. |
| 6) | The use of nonprogrammable calculator will be allowed in the examination centre but this will not be provided by the University/College. |
| 7) | Each theory paper will consist of three sections A, B and C. Section C is compulsory |
| 8) | Use of scientific nonprogrammable calculator is allowed in practicals also. |

**SECTION A**

There will be four questions. Each question will carry five marks. Two questions are to be attempted

**SECTION B**

There will be four questions. Each question will carry five marks. Two questions are to be attempted.

**SECTION C**

There will be seven questions of short answer type covering the whole syllabi. Each question will carry two marks. Any five questions are to be attempted.

**SEMESTER - III**

**PAPER-I: STATISTICAL PHYSICS AND THERMODYNAMICS-I**

Maximum Marks: External 30 Time Allowed: 3 Hours

Internal 10 Total Teaching hours: 40

Total 40 Pass Marks: 35 %

Out of 40 Marks, internal assessment (based on two mid-semester tests/internal examinations, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

# Instruction for the Paper Setter

# The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candidate is to attempt any five questions), which will cover the entire syllabus uniformly. Each question of sections A and B carries 05 marks. Section C will carry 10 marks and each question is of 2 marks.

# 

# Instruction for the candidates

1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and consist of seven questions (Candidate has to attempt any five questions).

2) Use of nonprogrammable calculator is allowed in the examination centre but this will not be provided by the University/College.

**SECTION**  **- A**

Basic ideas of statistical physics, Scope of statistical physics, Basic ideas about probability, distribution of four distinguishable particles in two compartment of equal size. Concept of macro states, microstates, thermodynamic probability, Effects of constraints on the system, Distribution of n particles in two compartments, Deviation from the state of maximum probability, equilibrium state of dynamic system, Distribution of distinguishable n particles in k compartments of unequal sizes.

**SECTION - B**

Phase space and its division into elementary cells, Three kinds of statistics. The basic approach in the three statistics, Maxwell Boltzman (MB) statistics applied to an ideal gas in equilibrium. Experimental verification of Maxwell Boltzman law of distribution of molecular speeds, Need for quantum statistics-Bose-Einstein (B.E.) statistics, Derivation of Planck’s law of radiation, Deduction of Wien’s displacement law and Stefan’s law from Planck’s law, Fermi-Dirac (F.D.) statistics, Comparison of M.B., B.E. and F.D. statistics.

**Text Books:**

1. Statistical Physics and Thermodynamics, V.S. Bhatia (Sohan Lal Nagin Chand, Jalandhar)
2. Statistical Physics and Thermodynamics, A.K. Sikri (Pardeep Publication, Jalandhar)
3. A Treatise on Heat, M.N. Saha & B.N. Srivastava, (The Indian Press Pvt. Ltd., Allahabad) 1965.

**Reference Books**

1. Statistical Mechanics: An Introductory Text, Bhattacharjee, J.K. (Allied Pub., Delhi) 2000.
2. Statistical Physics, Bhattacharjee, J.K. (Allied Pub., Delhi) 2000.
3. Statistical Mechanics, B.B. Laud (Macmillan India Ltd), 1981.

**PAPER-II: OPTICS**

Maximum Marks: External 30 Time Allowed: 3 Hours

Internal 10 Total Teaching hours: 40

Total 40 Pass Marks: 35%

Out of 40 Marks, internal assessment (based on two mid-semester tests/internal examinations, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

# Instruction for the Paper Setter

# The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candidate is to attempt any five questions), which will cover the entire syllabus uniformly. Each question of sections A and B carries 05 marks. Section C will carry 10 marks and each question is of 2 marks.

# 

# Instruction for the candidates

1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and consist of seven questions (Candidate has to attempt any five questions).

2) Use of nonprogrammable calculator is allowed in the examination centre but this will not be provided by the University/College.

**SECTION - A**

**Interference**: Concept of coherence, Spatial and temporal coherence. Coherence time, Coherence length, Area of coherence, Conditions for observing interference fringes, Interference by wave front division and amplitude division, Michelson’s interferometer—working, Principle and nature of fringes, Interference in thin films, Role of interference in anti-reflection and high reflection dielectric coatings. Multiple beam interference, Fabry-Perot interferometer, Nature of fringes, Newton Rings.

**SECTION - B**

**Diffraction:** Huygens-Fresnel theory, half-period zones, Zone plates, Distinction between Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at rectangular and circular apertures, Effects of diffraction in optical imaging, resolving power of telescope. The diffraction grating, its use as a spectroscopic element and its resolving power.

**Polarization**: Concept and analytical treatment of un-polarized, plane polarized and elliptically polarized light. Double refraction, Nicol prism, Sheet polarizer, Retardation plates, Production and analysis of polarized light (quarter and half wave plates).

**Text Books:**

1. Fundamentals of Optics, F.A. Jenkins and Harvery E. White (McGraw Hill) 4th edition, 2001.

2. Optics, Ajoy Ghatak (McMillan India) 2nd edition, 7th reprint 1997.

3. Introduction to Atomic Spectra, H.E. White (McGraw Hill Book Co.)

**Reference Book:**

1. Optics, Born and Wolf (Pergamom Press), 3rd edition, 1965.

**PAPER-III: QUANTUM MECHANICS-I**

Maximum Marks: External 30 Time Allowed: 3 Hours

Internal 10 Total Teaching hours: 40

Total 40 Pass Marks: 35%

Out of 40 Marks, internal assessment (based on two mid-semester tests/internal examinations, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

# Instruction for the Paper Setter

# The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candidate is to attempt any five questions), which will cover the entire syllabus uniformly. Each question of sections A and B carries 05 marks. Section C will carry 10 marks and each question is of 2 marks.

# 

# Instruction for the candidates

1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and consist of seven questions (Candidate has to attempt any five questions).

2) Use of nonprogrammable calculator is allowed in the examination centre but this will not be provided by the University/College.

**SECTION - A**

**Formalism of Wave Mechanics**: Brief introduction to need and development of quantum mechanics, Wave-particle duality, de-Broglie hypothesis, Complimentarity and uncertainty principle, Gaussian wave-packet, Schrodinger equation for a free particle, operator correspondence and equation for a particle subject to forces. Normalization and probability

Interpretation of wave function, Super position principle, Expectation value, probability current and conservation of probability, Admissibility conditions on the wave function. Ehrenfest theorem, Fundamental postulates of wave mechanics, Eigen functions and eigen values. Operator formalism, Orthogonal systems, Expansion in eigen functions, Hermitian operators. Simultaneous eigen functions. Equation of motion.

**SECTION - B**

**Problems in one and three dimensions:** Time dependent Schrodinger equation. Application to stationary states for one dimension, Potential step, Potential barrier, Rectangular potential well, Degeneracy, Orthogonality, Linear harmonic oscillator, Schrodinger equation for spherically symmetric potential, Spherical harmonics. Hydrogen atom energy levels and eigen functions. Degeneracy, Angular momentum.

**Text Books:**

1. Quantum Mechanics by V.K. Thankappan.
2. A Text Book of Quantum Mechanics, P.M. Mathews and K. Venkatesan, (Tata McGraw Hill Pub. Co. Delhi), 2002.
3. Quantum Mechanics, J .L. Powell and B. Crasemann (Narosa Pub. House, N. Delhi) 1997.

**PAPER- IV: PHYSICS PRACTICAL LAB**

**General Guidelines for Physics Practical Examination**

Maximum Marks: External 22

Internal 08

Total 30

1. The student will be asked to perform one experiment out of the experiments mentioned in the syllabus.

2. The distribution of marks is as follows:

(i) One full experiment requiring the student to take some data, analyse it and draw conclusions-(candidates are expected to state their results with limits of error. (10)

(ii) Brief theory (04)

(iii) Viva-Voce (04)

(iv) Record (Practical File) (04)

3 There will be one session of 03 hours duration. The paper will consist of 08 experiments out of which an examinee will mark 06 experiments and one of these is to be allotted by the external examiner.

4 Number of candidates in a group for practical examination should not exceed 12.

5. In a single group, no experiment is allotted to more than three students in any group.

6. The student should determine Standard Deviations and probable error in the calculations whereas needed.

**LIST OF EXPERIMENTS**

|  |  |
| --- | --- |
| 1 | Adiabatic expansion of a gas |
| 2 | Thermal expansion of crystal using interference fringes |
| 3 | Probability distribution using coloured dice coins. |
| 4 | To determine the refractive index of liquid using spectrometer |
| 5 | To determine the Cauchy’s constants |
| 6 | To study the refractive index of doubly refracting prism |
| 7 | To determine the wave length of a given light using bi-prism |
| 8 | To determine the resolving power of a telescope |
| 9 | To determine the principal points of a lens system |
| 10 | Study the photoelectric effect and determine the value of Planck’s constant |
| 11 | To study the gas discharge spectrum of hydrogen |
| 12 | To determine the angle of wedge using interference method |

**Text and Reference Books:**

1. A Laboratory Manual of Physics for Undergraduate Classes, D.P.Khandelwal.

2. B.Sc. Practical Physics, C.L. Arora.

**SEMESTER-IV**

**PAPER-I: STATISTICAL PHYSICS AND THERMODYNAMICS-II**

Maximum Marks : External 30 Time Allowed: 3 Hours

Internal 10 Total Teaching hours: 40

Total 40 Pass Marks: 35%

Out of 40 Marks, internal assessment (based on two mid-semester tests/internal examinations, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

# Instruction for the Paper Setter

# The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candidate is to attempt any five questions), which will cover the entire syllabus uniformly. Each question of sections A and B carries 05 marks. Section C will carry 10 marks and each question is of 2 marks.

# 

# Instruction for the candidates

1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and consist of seven questions (Candidate has to attempt any five questions).

2) Use of nonprogrammable calculator is allowed in the examination centre but this will not be provided by the University/College.

**SECTION-A**

Statistical definition of entropy, Change of entropy of a system, Additive nature of entropy, Law of increase of entropy, Reversible and irreversible process and their examples. Work done in a reversible process. Examples of increase of entorpy in natural processes, Entropy and disorder, Brief review of terms and laws of thermodynamics, Carnot’s cycle, Entropy changes in Carnot cycle. Applications of thermodynamics to thermoelectric effect. Change of entropy along a reversible path in a P.V. diagram, Entropy of a perfect gas, Equation of state of an ideal gas from simple statistical consideration, Heat death of the universe.

**SECTION-B**

Derivation of Maxwell’s thermo dynamical relations, Cooling produced by adiabatic streching, Adiabatic compression, Change of internal energy with volume, specific heat at constant pressure and constant volume, Expression for Cp -Cv , Change of state and Clayperon equation, Thermo dynamical treatment of Joule-Thomson effect, Use of Joule-Thomson effect, liquefiction of helium, Production of very low temperature by adiabatic demagnetization.

**Text Books:**

* + - 1. Statistical Physics and Thermodynamics, V.S. Bhatia (Sohan Lal Nagin Chand, Jalandhar)
      2. Statistical Physics and Thermodynamics, A.K. Sikri (Pardeep Publication, Jalandhar)
      3. A Treatise on Heat, M.N. Saha & B.N. Srivastava, (The Indian Press Pvt. Ltd., Allahabad) 1965.

**Reference Books:**

1. Statistical Mechanics: An Introductory Text, Bhattacharjee, J.K. (Allied Pub., Delhi) 2000.
2. Statistical Physics, Bhattacharjee, J.K. (Allied Pub., Delhi) 2000.
3. Statistical Mechanics, B.B. Laud (Macmillan India Ltd), 1981.

**PAPER-II: LASERS**

Maximum Marks: External 30 Time Allowed: 3 Hours

Internal 10 Total Teaching hours: 40

Total 40 Pass Marks: 35%

Out of 40 Marks, internal assessment (based on two mid-semester tests/internal examinations, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

# Instruction for the Paper Setter

# The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candidate is to attempt any five questions), which will cover the entire syllabus uniformly. Each question of sections A and B carries 05 marks. Section C will carry 10 marks and each question is of 2 marks.

# 

# Instruction for the candidates

1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and consist of seven questions (Candidate has to attempt any five questions).

2) Use of nonprogrammable calculator is allowed in the examination centre but this will not be provided by the University/College.

**SECTION-A**

**Laser Fundamentals** : Derivation of Einstein’s relations. Concept of stimulated emission and population inversion. Broadening of spectral lines, natural, collision and Doppler broadening. Line width, Line profile, Absorption and amplification of a parallel beam of light passing through a medium. Threshold condition, Introduction of three level and four level laser schemes, elementary theory of optical cavity, Longitudinal and transverse modes.

**SECTION-B**

**Laser Systems :** types of lasers, Ruby and Nd: YAG lasers, He-Ne and CO2 lasers-construction, mode of creating population inversion and output characterstics. Semiconductor lasers, Dye lasers, Q-switching, Mode locking, Applications of lasers–a general outline. Basics of holography.

**Text Books:**

1. Laser Fundamentals, W.T. Silfvast (Foundation Books), New Delhi,1996.

2. Lasers and Non-linear Optics, B.B. Laud (New Age Pub.), 2002.

**Reference Book:**

1. Lasers, Svelto (Plenum Press), 3rd Ed., New York.

**PAPER-III: QUANTUM MECHANICS-II**

Maximum Marks: External 30 Time Allowed: 3 Hours

Internal 10 Total Teaching hours: 40

Total 40 Pass Marks: 35%

Out of 40 Marks, internal assessment (based on two mid-semester tests/internal examinations, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

# Instruction for the Paper Setter

# The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candidate is to attempt any five questions), which will cover the entire syllabus uniformly. Each question of sections A and B carries 05 marks. Section C will carry 10 marks and each question is of 2 marks.

# 

# Instruction for the candidates

1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and consist of seven questions (Candidate has to attempt any five questions).

2) Use of nonprogrammable calculator is allowed in the examination centre but this will not be provided by the University/College.

**SECTION-A**

**One Electron Atomic Spectra**: Excitation of atom with radiation. Transition probability, Spontaneous transition, Selection rules and life time, Spectrum of hydrogen atom. Frank Hertz Experiment, Line structure, Normal Zeeman effect, Electron spin, Stern Gerlach experiment, Spin orbit coupling (electron magnetic moment, total angular momentum),Hyperfine structure, Examples of one electron systems, Anomalous,Zeeman effect, Lande-g factor (sodium D-lines).

**SECTION-B**

**Many Electron System Spectra**: Exchange symmetry of wave functions, exclusion principle, Shells, Sub shells in atoms, atomic spectra (Helium), L.S. coupling, Selection rules, Regularities in atomic spectra, Interaction energy, X-ray spectra, Mosley law, Absorption spectra, Auger effect. Molecular bonding, Molecular spectra, Selection rules, Symmetric structures, Rotational, vibrational electronic level and spectra of molecules, Raman spectra.

**Text Books:**

1. Concepts of Modern Physics, Arthur Beiser (McGraw Hill Pub. Co., Delhi, 9th ed.), 1995.

2. Elements of Modern Physics, S.H. Patil (McGraw Hill), 1998.

**Reference Books:**

1. Quantum Mechanics, E. Merzbacher (John Wiley, 2nd ed.)

2. Fundamental of Molecular Spectroscopy, C.N. Banwell (Tata McGraw Hill Pub. Co., Delhi), 2001.

3. Atomic Spectra, H.G. Kuhn (Longmans), 2nd ed., 1969.

4. Introduction to Quantum Mechanics, L. Pauling and E.B. Wilson(Tata McGraw Hill Pub. Co., Delhi), 2002.

5. Quantum Mechanics, W. Greiner (Springer Verlag), 1994.

**PAPER-IV: PHYSICS PRACTICAL LAB**

**General Guidelines for Physics Practical Examination**

Maximum Marks: External 22

Internal 08

Total 30

1. The student will be asked to perform one experiment out of the experiments mentioned in the syllabus.

2. The distribution of marks is as follows:

(i) One full experiment requiring the student to take some data, analyse it and draw conclusions-(candidates are expected to state their results with limits of error. (10)

(ii) Brief theory (04)

(iii) Viva-Voce (04)

(iv) Record (Practical File) (04)

3 There will be one session of 03 hours duration. The paper will consist of 08 experiments out of which an examinee will mark 06 experiments and one of these is to be alloted by the external examiner.

4 Number of candidates in a group for practical examination should not exceed 12.

5. In a single group no experiment be allotted to more than three students in any group.

6. The student should determine Standard Deviations and probable error in the calculations whereas needed.

**LIST OF EXPERIMENTS**

|  |  |
| --- | --- |
|  | Thermal conduction in poor conductor (variation with geometry) by Lee’s method |
|  | Thermo e.m.f. calibration comparison |
|  | Total radiation law, temperature dependence of radiation |
|  | Study of rotation of plane of polarization with a polarimeter. |
|  | Set up Newton’s rings to determine wave length of sodium light |
|  | To determine the wave length and dispersive power using plane diffraction grating (Use Hg source) |
|  | To determine the resolving power of a grating |
|  | To measure an inaccessible height using sextant |
|  | To determine the divergence and wave length of a given laser source. |
|  | To study the absorption spectra of iodine vapours |
|  | To determine the ionization potential of mercury |
|  | Study of variation of light intensity using photovoltaic cell/inverse square law |
|  | To determine the angle of wedge using interference method |

**Text and Reference Books:**

1. A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal.

2. B.Sc. Practical Physics, C.L. Arora.

**B.Sc.-II (Chemistry) Semester III & IV**

**SEMESTER III**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Paper** | **Title** | **Max. Marks** | **Sem. Paper Int. Asstt.** | **Pass Percentage** |
| I | INORGANIC CHEMISTRY | 35 | 26 09 | 35% |
| II | ORGANIC CHEMISTRY | 35 | 26 09 | 35% |
| III | PHYSICAL CHEMISTRY | 35 | 26 09 | 35% |
| I | PRACTICAL CHEMISTRY-I | 45 | 16 (Pass Marks) | 35% |

**SEMESTER IV**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Paper** | **Title** | **Max. Marks** | **Sem. Paper Int. Asstt.** | **Pass Percentage** |
| I | INORGANIC CHEMISTRY | 35 | 26 09 | 35% |
| II | ORGANIC CHEMISTRY | 35 | 26 09 | 35% |
| III | PHYSICAL CHEMISTRY | 35 | 26 09 | 35% |
| I | PRACTICAL CHEMISTRY-I | 45 | 16 (Pass Marks) | 35% |

**B.Sc.-II (Chemistry) 2018-19, 2019-20 & 2020-21**

**CHEMISTRY**

**SEM-III**

**PAPER-I**

**INORGANIC CHEMISTRY**

**Max Marks : 35 30 hours**

**Semester Paper : 26 Time allowed - 3 hrs**

**Internal Assessment: 9 3 period/week**

**Pass Marks : 35%**

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions selecting two questions from each of A & B Sections and Section C 9th question being compulsory.

**SECTION-A**

**I. Chemistry of Elements of First Transition Series**

Characteristic properties of d-block elements. Properties of the elements of the first transition series, their simple compounds and complexes illustrating relative stability of their oxidation states, coordination number and geometry. (10 Hrs.)

**II. Chemistry of Lanthanide Elements**

Electronic structure, oxidation states and ionic radii and lanthanide contraction, complex formation, occurrence and isolation of lanthanide compounds. (5 Hrs.)

**SECTION-B**

**Ill. Chemistry of Elements of Second and Third Transition Series**

General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states. Magnetic behaviour, spectral properties & stereochemistry (10 Hrs.)

**IV. Chemistry of Actinides Elements**

General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from U, similarities between the later actinides and the later lanthanides. (5 Hrs.)

**CHEMISTRY**

**SEM-III**

**PAPER II : ORGANIC CHEMISTRY**

**Max Marks : 35 30 hours**

**Semester Paper : 26 Time allowed - 3 hrs**

**Internal Assessment: 9 3 period/week**

**Pass Marks : 35%**

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions selecting two questions from each of A & B Sections and Section C 9th question being compulsory.

**Section - A**

**I. Alcohols**

Classification and nomenclature.

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

Dihydric alcohols-nomenclature, methods of formation, chemical reactions of vicinal glycols-nomenclature, methods of formation chemical reaction of vicinal glycols, oxidative cleavage with [Pb (OAc)4 and HIO4] and Pinacol-Pinacolone rearrangement.

Trihydric alcohol-nomenclature, methods of formation and chemical reactions of glycerol. (7 Hrs.)

**II.- Phenols**

Nomenclature, structure and bonding. Preparation of Phenols, physical properties and acidic character. Comparative acidic strengths of alcohols and phenols, resonanace stabilization of phenoxide ion. Reactions of phenols-electrophilic aromatic subsititution, acylation and carboxylation Mechanisms of Fries rearrangement. Gatterman synthesis, Hauben. Hostch reaction. Lederer-Mianasse reaction and Reimer-Tiemann reaction. (8 Hrs.)

**Section - B**

**III. Aldehydes and Ketones**

Nomenclature and structure of the carbonyl group, Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehyes and ketones using 1,3- dithianes, synthesis of ketones from nitrites and from carboxylic acids. Physical properties and Mechanism of nucleophillic addition to carbonyl group with particular emphasis ofBenzoin, Aldol, Perkin and Knoevenagel condensations, Condensation with ammonia and its derivatives, Wittig reaction, and Mannich reaction.

Use of acetals as protecting group. Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro reaction, MPV (Meerwein Pondoroff Vorley) reaction, Clemmensen, Wolff-Kishner, LiAIH4 and NaBH4 reductions. Halogenation of enolizable ketones.

An Introduction to α, β unsaturated aldehydes and ketones, Michael addition.

(15 Hrs.)

**CHEMISTRY**

**SEM-III**

**PAPER III : PHYSICAL CHEMISTRY**

**Max Marks : 35 30 hours**

**Semester Paper : 26 Time allowed - 3 hrs**

**Internal Assessment: 9 3 period/week**

**Pass Marks : 35%**

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions selecting two questions from each of A & B Sections and Section C 9th question being compulsory.

**Section - A**

**I. Thermodynamics-I**

Definition of thermodynamics terms: system, surroundings. Types of systems, intensive and extensive properties. State and path functions and their differentials, Thermodynamic processes, Concept of heat and work, elementary idea of thermochemistry.

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

(10 Hrs.)

**II. Thermodynamics-II- (Part-a)**

Second law of thermodynamics: need for the law, different statements of the law. Carnot cycle and its efficiency, Carnot theorem. Thermodynamic scale of temperature. (5 Hrs.)

**SECTION-B**

**III. Thermodynamics-II- (Part-b)**

Concept of entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, Clausius inequality, entropy as a criterion of spontaneity and equilibrium. Entropy change in ideal gases mixing of gases. (5 Hrs.)

**IV. Thermodynamics-III**

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 Helmhotz function (A) as thermodynamic quantities. A & G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G and A with P, V and T. (5 Hrs.)

**V. Chemical Equilibrium**

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

Reaction isotherm and reaction isochore-Clapeyron equation and Clausius-Claperyron equation. (5 Hrs.)

**B.Sc.-II**

**PRACTICALS CHEMISTRY-I**

**Sem.-III**

Max. Marks: 45 6 Periods/week

Time: 4 Hrs.

Pass Percentage: 35%

**Volumetric Analysis and TLC**

**Volumetric Analysis**

(a) Determination of acetic acid in commercial vinegar using NaOH, Alkalinity of water sample.

(b) Determination of alkaline content of antacid.

(c) Estimation of calcium content in chalk as calcium oxalate by

permanganometry .

(d) Estimation of hardness of water by EDT A.

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

(f) Estimation of copper using sodium thiosulphate.

**Organic Chemistry**

**Laboratory Techniques**

Thin Layer Chromatography

Determination of Rf values of different components.

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

(b) Preparation and separation of 2, 4-dinitrophenylhydrazones of acetone, benzophenone and cyclohexanone using toluene and light petroleum mixture (40 : 60).

(c) Separation of a mixture of dyes.

**PRACTICALS**

***INSTRUCTIONS FOR EXAMINERS AND CANDIDATES***

The practical examination will be held in single session (morning/evening). Candidates are required to perform practicals from volumetric Analysis and TLC. Distribution of marks will be as under (Books may be consulted):

(1) Volumetry analysis = 20 marks

{Initial write up 7 marks

(Volumetry; equation:1,

Indicator:1, end point:1 and general

calculations:4)

Performance and results 13 marks

(initial burette reading:2, final

reading:2, end point:2 calculations

and result:7)}

(2) TLC = 10 marks (Performance and result)

(3) Viva-Voce = 10 marks   
(4) Note Books = 5 marks

**Total = 45 marks**

**CHEMISTRY**

**SEM-IV**

**PAPER I : INORGANIC CHEMISTRY**

**Max Marks : 35 30 hours**

**Semester Paper : 26 Time allowed - 3 hrs**

**Internal Assessment: 9 3 period/week**

**Pass Marks : 35%**

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions selecting two questions from each of A & B Sections and Section C 9th question being compulsory.

**Section - A**

**I. 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. (10 Hrs.)

**II. Oxidation and Reduction**

Use of redox potential data-analysis of redox cycle, redox stability of water-Frost, Latimer and Pourbaix diagrams. Principles involved in the extraction of the elements. (5 Hrs.)

**Section - B**

**III. Acids and Bases**

Arrhenius, Bronsted-Lowry, the Lux-Flood solvent system and Lewis concepts of acids and bases. (7Hrs.)

**IV. Non-aqueous Solvents**

Physical properties of a solvent, types of solvents and their general characteristics, reaction in non-aqueous solvents with reference to liquid NH3 and liquid SO2 (8 Hrs.)

**CHEMISTRY**

**SEM-IV**

**PAPER II : ORGANIC CHEMISTRY**

**Max Marks : 35 30 hours**

**Semester Paper : 26 Time allowed - 3 hrs**

**Internal Assessment: 9 3 period/week**

**Pass Marks : 35%**

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions selecting two questions from each of A & B Sections and Section C 9th question being compulsory.

**Section - A**

**I. Carboxylic Acids**

Nomenclature, structure and bonding. physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Preparation of carboxylic acids, Reactions of amides, Reactions of carboxylic acids, Mechanism of decarboxylation.

Methods of formation and chemical reactions of Halo acids and Hydroxyacids. Maleic acid, tartaric acid and citric acid. (Structural Formula only).

Methods of formation and chemical reaction of unsaturated monocarboxylic acids. Dicaboxylic acids, methods of formation and effect of heat and dehydrating agents. (10 Hrs.)

**II. Carboxylic Acid Derivatives**

Structure and nomenclature of acid chlorides, esters. amides and acid anhydrides. Relative stability and reactivity of acyl derivatives.

Physical properties, interconversion of acid derivatives by nucleophillic acyl substitution.

Preparation of carboxylic derivatives, chemical reactions, Mechanism of esterfication and hydrolysis (acidic and Basic). (5 Hrs.)

**SECTION-B**

**III. Ethers and Epoxides**

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

Synthesis of epoxides, acid and base catalysed ring opening of epoxide, orientation of ring opening reactions of Gringard and organolithium reagents with epoxide. (3 Hrs.)

**IV. Fats, Oils and Detergents**

Natural fats, edible and industrial oils of vegetable origin, common fatty acids, glycerides, hydrogenation of unsaturated oils. Saponification value, iodine value, acid value. Soaps, synthetic detergents, alkyl and aryl sulphonates. (3 Hrs.)

**V. Organic Compounds of Nitrogen**

**a) Nitro Compounds**

Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanism of nucleophilic substitution in nitroarenes and their reactions in acidic, neutral and alkaline media, Picric acid. (4 Hrs.)

**b) Amines**

Reactivity, structure and nomenclature of amines, physical properties. Stereochemistry of amines. Separation of mixture of primary, secondary and tertiary amines. Structural features affecting the basicity of amines. Amine salts as phase-transfer catalyst and preparation of alkyl and aryl amines (reduction of nitro compounds and nitriles), reductive amination of aldehydic and ketonic compounds   
Gabriel-phthalimide reaction, Hoffmann bromamide reaction. (5 Hrs.)

**CHEMISTRY**

**SEM-IV**

**PAPER III : PHYSICAL CHEMISTRY**

**Max Marks : 35 30 hours**

**Semester Paper : 26 Time allowed - 3 hrs**

**Internal Assessment: 9 3 period/week**

**Pass Marks : 35%**

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions selecting two questions from each of A & B Sections and Section C 9th question being compulsory.

**Section - A**

**I. 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 and S systems.

Phase equilibria of two component systems-solid-liquid equilibria, simple eutectic Pb-Ag sytems, desilverisation of lead.

Solid Solutions-compound formation with congruent melting point (Mg-Zn) and incongruent melting point, (NaCI-H2O), (FeCI3H2O) systems. Freezing mixtures, acetone-dry ice.

Partially miscible liquids: Lower and upper consolute temperature, Effect of impurity on consolute temperature. Immiscible liquids, steam distillation.

Nernst distribution law, thermodynamic derivation & applications. (10 Hrs.)

**II. Electrochemistry-l (a)**

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

Migration of ions and Kohlrausch law. Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law, its uses and limitations. Debye-Huckel-Onsagar's equation for strong electrolytes (elemental treatment only). (5 Hrs.)

**SECTION-B**

**III. Electrochemistry-I (b)**

Transport number, definition and determination by Hittorf method and moving boundary method. Applications of conductance measurements: determination of degree of dissociation, determination of Ka of acids, determination of solubility product of a sparingly soluble salts, conductometric titrations. (5 Hrs.)

**IV. Electrochemistry-II**

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

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

EMF of a cell and its measurements, Computation of cell EMF. Calculation of thermodynamic quantities of cell reaction (G, 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.

Definition of pH and pK., determination of pH using hydrogen, quinhydrone and glass electrodes, by potentiomentric methods.

Buffers--mechanism of buffer action, Henderson-Hazel equation, Hydrolysis of saits, Corrosion-types, theories and methods of combating it. (10 Hrs.)

**B.Sc.-II**

**PRACTICALS CHEMISTRY-II**

**Sem.-IV**

Max. Marks: 45 6 Periods/week

Time: 4 Hrs.

Pass marks: 35%

**Qualitative Analysis**

Detection of elements (N, S and halogens) and functional groups (phenolic, carboxylic, carbonyl, esters, carbohydrates, amines, amides, nitro and anilide) in simple organic compounds.

**Physical Chemistry**

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

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

3. To determine the enthalpy of solution of solid calcium chloride.

***INSTRUCTIONS FOR EXAMINERS AND CANDIDATES***

The practical examination will be held in single session (morning/evening). Candidates are required to perform practicals from Qualitative Organic Analysis and Physical Chemistry Experiments. Distribution of marks will be as under (Books may be consulted):

(1) Organic Qualitative Analysis = 15 marks (Detection of elements

identification and confirmation of

functional group by 2

confirmatory tests.)

(2) Physical Chemistry Experiment = 15 marks

{Initial Write up 5 marks

(Theory/principle:1, Procedure:2,

General Calculations:2 )

Performance and result: 10 marks

(Full credit up to 10% error)}

(3) Viva-Voce = 10 marks  
(4) Note Books = 5 marks

**Total = 45 marks**

BOOKS SUGGESTED (THEORY COURSES)

1. *Basic Inorganic Chemistry.* F.A. Cotten. G. Wilkinson and P.L.. Gaus. Wiley.
2. *Concise Inorganic Chemistry. 1.D.* Lee. ELBS.
3. *Concepts of Models of Inorganic Chemistry.* B. Doaglas. D. McDaniel and 1. Alexander, John Wiley.
4. *Inorganic Chemistry.* D.E. Shriver, P. W. Aikins and C.H. Langford. <Oxford.
5. *Inorganic Chemistry.* W. W. Porterfield Addison. Wesley.
6. *Inorganic Chemistry.* A.G. Sharpe, ELBS.
7. *Inorganic Chemistry.* G.L. Miessler and O.A. Tarr, Prentice Hall.
8. *Organic Chemistry.* Morrison and Boyd, Prentice Hall.
9. *Organic Chemistry.* L.G. Wade lr.Prentice Hall.
10. *Fundamentals of Organic Chemistry.* Solomons, John Wiley.
11. *Organic Chemistry.* Vol. I, II & III. S.M. Mukherji, S.P. Singh and R.P. Kapoor, Wiley Eastern Ltd. (New Age International)
12. *Organic Chemistry.* F.A. Aarey, McGraw Hill India.
13. *Introduction to Organic Chemistry.* Stretwieser, Heathcock and Kosover, Machmilan.
14. *Physical Chemistry.* G.M. Barrow, International Student Edition. McGraw Hill.
15. *Basic Programming with Application.* V.K. Jain, 1'ata McGraw Hill.
16. *Computers and Common. Sense.* B. Ryal and Shely, Prentice Hall.
17. *University General Chemistry.* C.N.B. Rao. Macmillan.
18. *Physical Chemistry.* R.A. Alberty, Wiley Eastern Ltd.
19. *The Elements of Physical Chemistry,* P.w. Aikins, Oxford.
20. *Physical Chemistry Through Problems.* S.K. Dogra and S. Dogra. Wiley Eastern Ltd.

phH J///./ਬੀ.ਐਸ.ਸੀ. ਭਾਗ ਦੂਜਾ, ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ (ਸਮੈਸਟਰ ਤੀਜਾ ਅਤੇ ਚੌਥਾ)

(;w?;No shik)

e[b nze L 100 ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ :35

ਅੰਦਰੂਨੀ ਮੁਲਾਂਕਣ : 25 ਅੰਕ ਅੰਦਰੂਨੀ ਮੁਲਾਂਕਣ ਵਿੱਚੋਂ ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ : 09

ਬਾਹਰੀ ਪਰੀਖਿਆ : 75 ਅੰਕ ਬਾਹਰੀ ਪਰੀਖਿਆ ਵਿੱਚੋਂ ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ : 26 (ਅਧਿਆਪਨ : 6 ਪੀਰੀਅਡ ਪ੍ਰਤੀ ਹਫਤਾ)

;wK L 3 xzN/ **gkmeqw ns/ gqPB^gZso dh o{g^o/yk**

**Gkr^T**

BktbL **fJe fwnkB d' sbtkoK (ਪੂਰਾ ਨਾਵਲ)**, BkBe f;zx

**Gkr^n**

n^1 d|soh fu¤mh g¤so

n^2 **ftnkeoD**L

(i) w{b ftnkeoBe fJekJhnK dh gSkD s/ ;Ekgsh

(ii) tke pDso ns/ tke ouBk

(iii) T[gtke pDso L gSkD s/ ekoi

**Gkr^J**

ਭਾਗ ੳ ਅਤੇ ਅ ਦੇ ਵਿਆਕਰਣ ਵਾਲੇ ਭਾਗ ਵਿਚੋਂ ਸੰਖੇਪ ਉਤਰਾਂ ਵਾਲੇ ਪ੍ਰਸ਼ਨ।

**nµe^tµv s/ g/go ;?ZNo bJh jdkfJsK**

1H Gkr T ftu'A Bktb dk ftPk t;s{$;ko$Bktb ebk (fszB ftu'A fJe) 12 nµe

2H gkso fusoB (fszB ftu'A fJe) 12 nµe

3H d|soh fu¤mh (fszB ftu'A fJ¤e) 09 nµe

4H Gkr n^2 ftub/ ftnkeoD tkb/ Gkr ftu'A toDBkswe gqPB (d' ftu'A fJ¤e) 12 nµe

5H Gkr T ftu'A Bktb **fJe fwnkB d' sbtkoK** ns/ n^2 **ftnkeoD** tkb/ Gkr

ftu'A ;zy/g T[soK tkb/ 15 gqPB g[ZS/ ikDr/.ftfdnkoEhnK B/ ;ko/ gqPB ਹੱਲ eoB/ j'Dr/.

jo/e gqPB d/ 2 nze j'Dr/. 15x2=30 nµe

**;jkfJe gkm^;wZroh**

1H vkH i'frµdo f;µx g[nko ns/ j'o, gµikph GkPk dk ftnkeoD Gkr^., gµikph GkPk nekdwh ibµXo, 1991, gµBk 67^73

2H vkH i'frµdo f;µx g[nko ns/ j'o, gµikph GkPk dk ftnkeoD Gkr^.., gµikph GkPk nekdwh ibµXo, 1992

3H frH bkb f;µx s/ joehos f;µx, ekbi gµikph ftnkeoD, gµik; ;N/N :{BhH N?;eN p[¤e p'ov, uµvhrVQ

4H ;µs f;µx ;/y'A, ;kfjsnkoE, bkj"o p[¤e Pkg, b[fXnkDk

5H gzikph d[BhnK (BkBe f;zx ftP/P nze), GkPk ftGkr gzikp, gfNnkbk

6H vkH irihs f;zx, gzikph ftnkeoBL Po/DhnK s/ fJekJhnK

7H y'ਜ gfsqek (rbg ftP/P nze), gzikph :{Bhtof;Nh, gfNnkbk

phH J///./ਬੀ.ਐਸ.ਸੀ. ਭਾਗ ਦੂਜਾ, ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ (ਸਮੈਸਟਰ ਤੀਜਾ ਅਤੇ ਚੌਥਾ)

(;w?;No u"Ek)

e[b nze L 100 ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ : 35

ਅੰਦਰੂਨੀ ਮੁਲਾਂਕਣ : 25 ਅੰਕ ਅੰਦਰੂਨੀ ਮੁਲਾਂਕਣ ਵਿੱਚੋਂ ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ : 09

ਬਾਹਰੀ ਪਰੀਖਿਆ : 75 ਅੰਕ ਬਾਹਰੀ ਪਰੀਖਿਆ ਵਿੱਚੋਂ ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ : 26 ;wK L 3 xzN/ (ਅਧਿਆਪਨ : 6 ਪੀਰੀਅਡ ਪ੍ਰਤੀ ਹਫਤਾ)  **gkmeqw ns/ gqPB^gZso dh o{g^o/yk**

**Gkr^T**

**ਕਾਵਿ ਲਹਿਰਾਂ (ਸੰਪਾ. ਲਖਵੀਰ ਸਿੰਘ, ਡਾ. ਜਸਵਿੰਦਰ ਸਿੰਘ, ਡਾ. ਇੰਦਰਜੀਤ ਸਿੰਘ ਚੀਮਾ, ਪਬਲੀਕੇਸ਼ਨ ਬਿਓਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ)**

**Gkr^n**

n^1 ਅਖ਼pkoh fog'oN fsnko eoBk

n^2 ftnkeoD

(i) r[ow[yh fbgh dk fJfsjk;

(ii) r[ow[yh fbgh dhnK ftP/PsktK

(iii) gzikph Ppd i'VK d/ fB:w

**Gkr^J**

ਭਾਗ ੳ ਅਤੇ ਅ ਦੇ ਵਿਆਕਰਣ ਵਾਲੇ ਭਾਗ ਵਿਚੋਂ ਸੰਖੇਪ ਉਤਰਾਂ ਵਾਲੇ ਪ੍ਰਸ਼ਨ।

**nµe^tµv s/ g/go ;?ZNo bJh jdkfJsK**

1H Gkr ‘T’ ftu'A fe;/ eftsk dk ftPk t;s{$;ko$eth dk :'rdkB (fszB ftu'A fJ¤e) 12 nµe

2H gq;zr ;fjs ftnkfynk (uko ftu'A d') 2x6 =12 nµe

3H fog'oN fbyDh (fszB ftu'A fJ¤e) 09 nµe

4H Gkr n^2 ftub/ ftnkeoB tkb/ Gkr ftu'A toDBkswe gqPB (d' ftu'A fJ¤e) 12 nµe

5H Gkr T ftu'A eftsk dh g[;se ns/ n^2 ftnkeoB tkb/ Gkr ftu'A ;zy/g

T[soK tkb/ 15 gqPB g[ZS/ ikDr/.ftfdnkoEhnK B/ ;ko/ gqPB eoB/ j'Dr/.

jo/e gqPB d/ 2 nze j'Dr/. 15x2=30 nµe

**;jkfJe gkm^;wZroh**

1H vkH i'frµdo f;µx g[nko ns/ j'o, gµikph GkPk dk ftnkeoD Gkr^., gµikph GkPk nekdwh ibµXo, 1991, gµBk 67^73

2H vkH i'frµdo f;µx g[nko ns/ j'o, gµikph GkPk dk ftnkeoD Gkr^.., gµikph GkPk nekdwh ibµXo, 1992

3H frH bkb f;µx s/ joehos f;µx, ekbi gµikph ftnkeoD, gµik; ;N/N :{BhH N?;eN p[¤e p'ov, uµvhrVQ

4H okfiµdo gkb f;µx, nkX[fBe gµikph eftsk g[Bo fuµsB, b'erhs gqekPB, uµvhrVQ.

5H okfiµdo gkb f;µx, nkX[fBe gµikph eftsk dk fJfsjk;, gµikph nekdwh, fd¤bh.

6H i;ftµdo f;µx , BthA gµikph eftsk gSkD fuµB, u/sBk gqekPB, b[fXnkDk

7H ;µs f;µx ;/y'A, ;kfjsnkoE, bkj"o p[¤e Pkg, b[fXnkDk ।

**B.Sc. Part-II (ENGLISH)**

**SEMESTER -III**

Teaching Hours : Theory : 3 Hrs., Tutorials : 2 Hrs.

Time Allowed : 3 Hrs. Maximum Marks : 75

Pass Marks : 35%

**COURSE CONTENT**

The course content of this paper shall comprise the following books :

1. *Perspectives: Selections from Modern English Prose and Fiction,* edited by S.A.

Vasudevan and M. Sathya Babu, Published by Orient Longman.

*2. Six One-Act Plays,* edited by Maurice Stanford, Published by Orient Longman.

**TESTING**

The paper shall have two sections. Section-A shall comprise testing from *Perspectives*

while Section-B from *Six One-Act Plays*.

**SECTION - A : PERSPECTIVES**

Q.1 (Based on the section entitled "Prose", comprising chapters I to VI)

(a) One essay-type question with internal alternative. The answer should not

exceed 250 words. 10 Marks

(b) Five short-answer questions to be attempted out of seven. Each answer should

be written in 25 to 30 words.

5×2=10 Marks

Q.2 (Based on the section entitled "Fiction", comprising chapter VII to IX)

(a) One essay type question with internal alternative on character/theme and

incident/episode. The answer should not exceed 250 words.

10 Marks

(b) There will be one short answer question from each of the three stories. The

candidate shall be required to attempt any two. Each answer should be written

in 25 to 30 words.

2×2½=5 Marks

Q.3 (Based on the section entitled "Biographies", comprising chapter X to XII)

(a) One essay type question with internal alternative. The answer should not

exceed 250 words. 10 Marks

(b) There will be one short answer question from each chapter. The candidate

shall be required to attempt any two. Each answer should be written in 25 to

30 words.

2×2½=5 Marks

**SECTION – B : SIX ONE-ACT PLAYS**

Q.4 (a) One essay type question on character, incident/episode or theme with internal

alternative. The answer should not exceed 250 words.

15 Marks

(b) Five short-answer questions to be attempted out of seven. Each answer should

be written in 25 to 30 words.

5×2=10 Marks

**SEMESTER -IV**

Teaching Hours : Theory : 3 Hrs., Tutorials : 2 Hrs.

Time Allowed : 3 Hrs.

Maximum Marks : 75

Pass Marks : 35%

**COURSE CONTENT**

The course content of this paper shall comprise composition, comprehension,

translation and grammar.

2

**TESTING**

The paper shall have two sections. Section-A shall test the candidate's skills in

composition, comprehension and translation. Section-B shall test his/her skills in grammar.

**SECTION - A**

Q.1 An essay of 300-350 words on a topical or reflective subject (one to be attempted out

of the five given).

15 Marks

Q.2 Letter-Writing with internal choice between personal and official letters.

10 Marks

Q.3 Precis

10 Marks

Q.4 Comprehension of an unseen passage

10 Marks

Q.5 Translation of a given passage from Punjabi/Hindi into English.

05 Marks

**SECTION – B**

Q.6 (a) Analysis of sentences : Converting simple sentences into complex and

compound ones and identifying adverb clause, noun clause and adjective

clause in the given sentences.

05 Marks

(b) Synthesis of sentences : (i) Combining two simple sentences into a single

simple sentence by using a participle, an infinitive, a noun or phrase in

apposition, too/enough + adjective/adverb + infinitive and the bare infinitive.

(ii) Combining simple sentences into complex ones by using a noun clause,

adjective clause or an adverb clause. (iii) Combining simple sentences into

compound ones by using conjunctions such as 'and', 'as well as', 'not only....

but also' or 'either... or' 'neither....nor', 'but yet', 'nevertheless', 'so', 'therefore',

for etc.

10 Marks

(c) Transformation of sentences. (i) Transformation of degree, i.e., from positive

to comparative degree and positive to superlative degree. (ii) Transformation

of kinds of statements, i.e. from rhetorical or interrogative into assertive

statements, from affirmative into negative sentences and from statement into

exclamatory sentences. (ii) Transformation from active into passive voice and

vice-versa and from direct speech into indirect speech and vice-versa.

10 Marks

*Note :* In part (a) of Q. No. 6, the paper-setter shall set 8 sentences out of which the

students shall have to attempt any 5. In part (b) and (c), a total of 15 sentences

each shall be set out of which the students shall have to attempt any 10 in each

part.

**B.Sc. (Computer Application) Part II (Semester III)**

BAP 201 : C PROGRAMMING AND DATA STRUCTURES

External Marks: 45 Maximum Time: 3 Hrs.

Minimum Pass Marks: 35% Lectures to be delivered: 45-55 Hrs.

Internal Assessment: 15

A) Instructions for paper-setter

The question paper will consist of three sections A, B & C. Sections A & B will have four questions

from the respective sections of the syllabus and will carry 40% marks each. Section C will have 6-12

short answer type questions which will cover the entire syllabus uniformly and will carry 20% marks

in all.

B) Instructions for candidates

1. Candidates are required to attempt two questions each from sections A & B of the question paper

and the entire section C .

2. Use of non-programmable scientific calculator is allowed.

SECTION-A

Overview of C Language: C Fundamental : Introduction to C, character set, identifiers, keywords,

data types, constants, variable, user defined data types, arithmetic, unary, relational, logical,

assignment and conditional operators & expression. Basic structure of a C program. Data I/O

statement : single character I/O, formatted I/O, string I/O functions.

Control Structure: sequencing, alteration (if-else, switch, break, continue, go to, iteration while, dowhile,

for) and nested loops.

Functions: Defining and accessing a function, passing arguments to a function, specifying arguments

data types, function prototypes, recursion.

Storage Classes- Automatic, External, Static, Register.

Pointers and Structures: Character pointers, pointer to arrays, array of pointers. Structure and

Unions : Defining and processing structure, Unions Preprocessor Directives.

SECTION-B

Basic Notations and Array (Data Structure): Basic concept and notations, data structures, Types of

data structure and data structure operations, mathematical notation and functions, algorithmic

complexity, Big 'O' notation and time space trade off. Arrays: Linear array, Representation of Linear

array in memory, Traversing Linear array, Insertion and deletion in an array, Multi-dimensional array:

Row-Major, Column Major order, space array.

Stacks: Push and Pop in Stack. Representation of stack in memory (Using Arrays)

Queues: Insertion and deletion operations.

Searching Techniques: Linear and binary search

Sorting Techniques: Insertion sort, selection sort, bubble sort, merge sort, quick sort.

Text Books:

1. Byron Gottfried , Programming with C, Second edition, Schaum’ s outline series, TMH.

2. Vishal Goyal, Lalit Goyal, Pawan Kumar, A Simplified Approach to Data Structures, Shiroff

Publications.

3. Shubhnandan S. Jamwal, Programming in C, Pearson Publications.

Reference Books:

1. Seymour Lipschutz, Theory & Practice of Data Structures, McGraw Hill, 1988.

2. B.W. Kerrighan and D.M.Ritchie, The C programming language, PHI

3. Vikram Gupts and S. S. Bhatia, Programming Fundamentals through C Language, Kalyani

Publishers.

2

BAP 202: PRACTICAL BASED ON PAPER

Max. Marks : 40 Maximum Time: 3 hours

Min. Pass Marks: 35% Practical units to be conducted: 45-55 Hrs

The laboratory course will comprise of exercise to supplement what is learnt under Paper BAP 201: C

Programming & Data Structures.

Detailed Syllabus

1. Programs to be implemented in C language such as

Programs to be implemented in C language such as

(a) to find the sum of digits of a given number.

(b) to find the sum of odd numbers and sum of even numbers from the numbers entered

through the keyboard.

(c) to check whether a given number is prime or not.

(d) Conversion from one number system to another number system.

2. Programs related to array such as:

(a) to find the maximum and minimum in a given array

(b) for matrix multiplication, addition, subtraction, etc.

3. Programs related to function, structures, pointers

(a) all the programs should be written with the help of user defined functions.

(b) String processing with the help of pointers.

(c) Simple programs using structures, such as printing the merit list of the students

record.

4. Programs related to searching and storing.

All the techniques to be implemented in C Language which are taught in theory paper BAP 210: C

Programming and data structure.

The break up of marks for the practical will be as under :

Lab Record : 10 Marks

Viva Voce : 10 Marks

Program Development

And Execution : 20 Marks

3

**B.Sc. (Computer Application) Part II (Semester IV)**

BAP 203: DATABASE MANAGEMENT SYSTEM

External Marks: 45 Maximum Time: 3 Hrs.

Minimum Pass Marks: 35% Lectures to be delivered: 45-55 Hrs.

Internal Assessment: 15

A) Instructions for paper-setter

The question paper will consist of three sections A, B & C. Sections A & B will have four

questions from the respective sections of the syllabus and will carry 40% marks each. Section C will

have 6-12 short answer type questions which will cover the entire syllabus uniformly and will carry

20% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt two question each from sections A & B of the question paper

and the entire section C .

2. Use of non-programmable scientific calculator is allowed.

SECTION-A

Traditional file procession system: Characteristics, limitation. Database: Definition, composition,

Database Management System : Definition, Characteristic advantages over traditional file

processing system, Implication Database approach, Uses of database, DBA and its responsibilities

Database schema, instance.

DBMS architecture, data independence, mapping between different levels.

Database language : DDL, DML, DCL.

Database utilities, Data Models, Keys : Super, candidate, primary, unique, foreign.

Entity relationship model : concepts, mapping cardinalities, entity relationship diagram, weak sets,

strong entity sets, aggregation, generalization, converting ER diagram to tables.

Relational Algebra : Basic operations, additional operations.

SECTION-B

Database design: Functional dependency, decomposition, problem arising out of bad database

design, normalization, multi-valued dependency. Database design process, database protection,

database integrity, Database concurrency: Problems arising out of concurrency, methods of handling

concurrency. Data recovery, database security: Authentication, authorization, methods of

implementing security.

MS-Access: Introduction to MS-Access, working with database and tables, queries in Access,

Applying integrity constraints, Introduction to forms, sorting and filtering controls, Reports and

Macro: Creating reports using Macros.

Text Book:

1. C.J. Date, An Introduction to Database Systems, Narosa Publishers.

Reference Books:

1. Siberscharts, Korth and Sudarshan, "Database Concepts", Mcgraw Hill Publication.

2. Ivan Bayross, “Oracle 7 The complete reference”, BPB Publications.

3. Jeffrey D. Ulliman, "Principles of Database Systems", 2nd Ed., Galgotia Publications.

4. D. Kroenke, "Database Processing", Galgotia Publications.

4

BAP 204 : PRACTICAL BASED ON BAP 203

Max. Marks : 40 Maximum Time: 3 hours

Min. Pass Marks: 35% Practical units to be conducted: 45-55Hrs

The laboratory course will comprise of exercise to supplement what is learn under Paper BAP 203:

Database Management Systems.

MS-ACCESS: Introduction to MS-ACCESS, working with databases and tables, queries in Access

Applying integrity constraints.

Introduction to forms, sorting and filtering, controls.

Reports and Macro: creating reports, using Macros.

The break up of marks for the practical will be as under:

Lab Record : 10 Marks

Viva Voce : 10 Marks

Program Development

And Execution : 20 Marks

**B.Sc. (N.M & C.S) 3rd year**

**B.A/B.Sc.- V TH Semester**

**MATHEMATICS**

**Paper-I: ALGEBRA - I**

**Maximum Marks: 50 EXT:- 40 / INT: 10**

**Time allowed: 3 Hrs.**

**Teaching hours: 50 Minimum Pass Marks: 35%**

**Lectures to be delivered: 5 periods (of 45 minutes duration) per week**

**Instructions for paper-setters**

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and Section C will consist of one compulsory question having ten short answer type questions covering the entire syllabus uniformly. All questions will carry equal marks.

**Instructions for the candidates**

Candidates are required to attempt five questions in all selecting two questions from each section A and B and compulsory question of Section C. All questions will carry equal marks. **Section-A**

**Group:** definition, examples, subgroups, counting Principle, Langrange's theorem, Normal subgroups, Quotient groups, Homomorphisms, Fundamental theorem of homomorphism and related theorems. Cyclic Groups.

**Section- B**

**Rings:** Definition and examples of Rings, Elementary properties of Rings. Sub-rings, Homomorphism, ideals and Quotient Rings, Field of Quotient of Integral domain, division rings . Euclidean Rings, Principal ideals, examples.

**Recommended books:**

1. Text book on Algebra and Theory of equations by Chandrika Prasad.Pothishala Pvt. Ltd.
2. Herstein, I.N.: Topics in Algebra
3. Linear Algebra by Schaum Outline series.

4. Surjeet Singh and Qazi Zameeruddin: Modern Algebra (Relevant portion) **B.A/B.Sc.- V TH Semester**

**MATHEMATICS**

**Paper II : Discrete Mathematics- I**

**Maximum Marks: 50 EXT:- 40 / INT: 10 Time allowed: 3 Hrs.**

**Teaching hours: 50 Minimum Pass Marks: 35%**

**Lectures to be delivered: 5 periods (of 45 minutes duration) per week**

**Instructions for paper-setters**

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and Section C will consist of one compulsory question having ten short answer type questions covering the entire syllabus uniformly. All questions will carry equal marks.

**Instructions for the candidates**

Candidates are required to attempt five questions in all selecting two questions from each section A and B and compulsory question of Section C. All questions will carry equal marks.

**Section-A**

Sets and propositions-Cardinality, Mathematical induction, Principle of inclusion and exclusion.

Computability and Formal Languages-Ordered Sets. Languages. Phrase Structure Grammars. Types of Grammars. Types of Grammars and Languages.

Permutation. Combinations and Discrete Probability. Relations and Function-Binary Relations. Equivalence Relations and Partitions. Partial Order Relations and Lattices. Chains and Antichains. Pigeon Hole Principle

**Section-B**

Graphs and Planar Graphs-Basic Terminology. Multigraphs. Weighted Graphs. Paths and Circuits Shortest paths. Eulerian Paths and Circuits. Travelling Salesman Problem. Planar Graphs. Trees. Finite State Machines-Equivalent Machines. Finite State Machines as Language Recognizers.

***Recommended text***

1. C. L. Liu, *Elements of Discrete Mathematics* (Second Edition), McGraw Hill, International Edition, Computer Science Series, 1986.

***References***

1. J. Glen Brookshear, *Computer Science: An Overview*, Addition-Wesley.

2. Stanley B. Lippyman, Josee Lojoie, *C Primer* (3rd Edition), Addison-Wesley.

**B.A/B.Sc.- V TH Semester**

**MATHEMATICS**

**Optional Paper**

**Opt.-I : : MATHEMATICAL METHODS- I**

**Maximum Marks: 50 EXT:- 40 / INT: 10 Time allowed: 3 Hrs.**

**Teaching hours: 50 Minimum Pass Marks: 35%**

**Lectures to be delivered: 5 periods (of 45 minutes duration) per week**

**Instructions for paper-setters**

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and Section C will consist of one compulsory question having ten short answer type questions covering the entire syllabus uniformly. All questions will carry equal marks.

**Instructions for the candidates**

Candidates are required to attempt five questions in all selecting two questions from each section A and B and compulsory question of Section C. All questions will carry equal marks.

**Section-A**

**Fourier series :**

Fourier series, Theorems, Dirichlet's conditions, Fourier series for even and odd

functions, Half range Fourier series, Other forms of Fourier series

**Section-B:**

**Laplace transforms:**

Definition of Laplace transform, linearity property- Piecewise continuous function.

Existence of Laplace transform, Functions of exponential order and of class A. First

and second shifting theorems of Laplace transform, Change of scale property- Laplace

transform of derivatives, Initial value problems, Laplace transform of integrals,

Multiplication by *t*, Division by *t*, Laplace transform of periodic functions and error

function, Beta function and Gamma functions. Definition of Inverse Laplace

transform, Linearity property, First and second shifting theorems of inverse Laplace

transform, Change of scale property, Division by p, Convolution theorem, Heaviside’s

expansion formula (with proofs and applications).

**Prescribed text Book:**

1. Shanthi Narayan and P.K Mittal: Scope as in A course of Mathematical Analysisby, Published by S. Chand & Company,
2. A.R. Vasishtha & Dr. R.K.Gupta:Scope as in Integral transformsby Published by Krishna Prakashan Media Pvt. Ltd. Meerut.

**B.A/B.Sc.- V TH Semester**

**MATHEMATICS**

**Optional Paper**

**Opt.-II : Number Theory - I**

**Maximum Marks: 50 EXT:- 40 / INT: 10Time allowed: 3 Hrs.**

**Teaching hours: 50 Minimum Pass Marks: 35%**

**Lectures to be delivered: 5 periods (of 45 minutes duration) per week**

**Instructions for paper-setters**

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and Section C will consist of one compulsory question having ten short answer type questions covering the entire syllabus uniformly. All questions will carry equal marks.

**Instructions for the candidates**

Candidates are required to attempt five questions in all selecting two questions from each section A and B and compulsory question of Section C. All questions will carry equal marks.

**Section-A**

Divisibility, Greatest common divisor, Fundamental Theorem of arithmetic, congruences, residue classes and reduced residue classes, Euler-Fermat theorem, Wilsons's theorem, Linear congruences, Chinese Remainder theorem.

**Section-B**

An Application to cryptography, primitive roots, indices, quadratic residues, Legendre Symbol, Euler's criterion, Gauss Lemma., Quadratic reciprocity Law, Jacobi Symbol. Arithmetic functions (n), d(n), (n), (n), Mobius inversion Formula.

*References*

1. David M.Burton, *Elementary Number Theory*, 3rd Edition WmC, Brown Publishers (scope as in Chapters I-II).

2. Niven & Zuckeman, *Introduction to Number Theory*, Wiley Eastern (Scope as in Chapters 1-7).

3. T.N. Apostal, *Introduction to Analytic Number Theory*, Springer Verlag. (Scope as in Chapters 1-7).

4. Hardy & Wright, *Number Theory*, Oxford Univ. Press (Scope as in Chapter 19).

5. H. Davertport, *Higher Arithmetic,* Camb. Uni. Press.

6. E. Landau, *Elementary Number Theory*, Chelsea, Part-III.

**B.A/B.Sc.- VI TH Semester**

**MATHEMATICS**

**Paper-III: ALGEBRA - II**

**Maximum Marks: 50 EXT:- 40 / INT: 10**

**Time allowed: 3 Hrs.**

**Teaching hours: 50 Minimum Pass Marks: 35%**

**Lectures to be delivered: 5 periods (of 45 minutes duration) per week**

**Instructions for paper-setters**

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and Section C will consist of one compulsory question having ten short answer type questions covering the entire syllabus uniformly. All questions will carry equal marks.

**Instructions for the candidates**

Candidates are required to attempt five questions in all selecting two questions from each section A and B and compulsory question of Section C. All questions will carry equal marks.

**Section-A**

Vector spaces, Examples, Linear Dependence, Linear Combinations, Bases and Dimension, Subspaces, Quotient spaces , Direct Sum of vector spaces, Dimension of a direct sum, Dual of a vector space. Matrices and change of basis.

**Section-B**

Linear transformation, Algebra of linear transformations,Matrices as linear mappings, Kernal and image, Rank and Nullity theorem, Singular and non-singular linear mappings, Isomorphism, Composition of linear mappings, Polynimials and linear operators, Square matrices as linear operators, matrix represtation of a l;inear operator, Change of basis,characteristic and minimal polynomial for linear operators.

**Recommended books:**

1. Text book on Algebra and Theory of equations by Chandrika Prasad.Pothishala Pvt. Ltd.
2. Herstein, I.N.: Topics in Algebra
3. Linear Algebra by Schaum Outline series.
4. Surjeet Singh and Qazi Zameeruddin: Modern Algebra (Relevant portion)

**B.A/B.Sc.- VI Semester**

**MATHEMATICs**

**Paper-IV: Discrete Mathematics - II**

**Maximum Marks: 50 EXT:- 40 / INT: 10**

**Time allowed: 3 Hrs.**

**Teaching hours: 50 Minimum Pass Marks: 35%**

**Lectures to be delivered: 5 periods (of 45 minutes duration) per week**

**Instructions for paper-setters**

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and Section C will consist of one compulsory question having ten short answer type questions covering the entire syllabus uniformly. All questions will carry equal marks.

**Instructions for the candidates**

Candidates are required to attempt five questions in all selecting two questions from each section A and B and compulsory question of Section C. All questions will carry equal marks.

**Section - A**

Analysis of Algorithms-Time Complexity. Complexity of Problems. Discrete Numeric Functions and Generating Functions. Recurrence Relations and Recursive Algorithms Linear Recurrence Relations with Constant Coefficients. Homogeneous Solutions. Particular Solution. Total Solution. Solution by the Method of Generating Functions.

**Section-B**

Brief review of Groups and Rings. Boolean AIgebras-Lattices and Algebraic Structures. Duality. Distributive and Complemented Lattices. Boolean Lattices and Boolean Algebras. Boolean Functions and Expressions. Prepositional Calculus. Design and Implementation of Digital Networks. Switching Circuits.

*Recommended text*

1. C. L. Liu, *Elements of Discrete Mathematics* (Second Edition), McGraw Hill, International Edition, Computer Science Series, 1986.

*References*

1. J. Glen Brookshear, *Computer Science: An Overview*, Addition-Wesley.

2. Stanley B. Lippyman, Josee Lojoie, *C Primer* (3rd Edition), Addison-Wesley.

**B.A/B.Sc.- VI TH Semester**

**MATHEMATICS**

**Optional Paper**

**Opt.-III : MATHEMATICAL METHODS - II**

**Maximum Marks: 50 EXT:- 40 / INT: 10**

**Time allowed: 3 Hrs.**

**Teaching hours: 50 MinimumPass Marks: 35%**

**Lectures to be delivered: 5 periods (of 45 minutes duration) per week**

**Instructions for paper-setters**

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and Section C will consist of one compulsory question having ten short answer type questions covering the entire syllabus uniformly. All questions will carry equal marks.

**Instructions for the candidates**

Candidates are required to attempt five questions in all selecting two questions from each section A and B and compulsory question of Section C. All questions will carry equal marks.

**Section-a:**

**Fourier transforms :** Dirichlet's conditions, Fourier integral formula (without proof),

Fourier transform, Inverse Theorem for Fourier transform, Fourier sine and cosine

transforms and their inversion formulae. Linearity property of Fourier transforms,

Change of scale property, Shifting theorem, Modulation theorem, Convolution

theorem of Fourier transforms, Parseval's identity, Finite Fourier sine transform,

Inversion formula for sine transform, Finite Fourier cosine Transform, Inversion

formula for cosine transform.

**Section-b:**

**Applications of Laplace and Fourier transforms :**

Applications of Laplace transforms to the solution of ordinary differential equations

with constant coefficients and variable coefficients, Simultaneous ordinary differential

equations, Second order Partial differential equations ( Heat, wave and laplace).

**Prescribed text Book:**

1. Shanthi Narayan and P.K Mittal: Scope as in A course of Mathematical Analysisby, Published by S. Chand & Company,
2. A.R. Vasishtha & Dr. R.K.Gupta:Scope as in Integral transformsby Published by Krishna Prakashan Media Pvt. Ltd. Meerut.

**B.A/B.Sc.- VI TH Semester**

**MATHEMATICS**

**Optional Paper**

**Opt.-IV : Number Theory - II**

**Maximum Marks: 50 EXT:- 40 / INT: 10**

**Time allowed: 3 Hrs.**

**Teaching hours: 50 MinimumPass Marks: 35%**

**Lectures to be delivered: 5 periods (of 45 minutes duration) per week**

**Instructions for paper-setters**

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and Section C will consist of one compulsory question having ten short answer type questions covering the entire syllabus uniformly. All questions will carry equal marks.

**Instructions for the candidates**

Candidates are required to attempt five questions in all selecting two questions from each section A and B and compulsory question of Section C. All questions will carry equal marks.

**Section-A**

The Diophantine equations . Farey sequences, continued Fractions, Approximation of reals by rationals, Pell's equations. The Partitions. Minkowski's theorem in Geometry of Numbers and its application to Diophantine inequalities.

**Section-B**

Binary quadratic forms, Hermite's theorem on minima of positive definite quadratic forms and its applications to representation of a number as a sum of two, three and four squares. Order of magnitude and average order of arithmetical functions, Euler summation formula, Abel's Identity, Elementary results on distribution of primes.

*References*

1. David M.Burton, *Elementary Number Theory*, 3rd Edition WmC, Brown Publishers (scope as in Chapters I-II).

2. Niven & Zuckeman, *Introduction to Number Theory*, Wiley Eastern (Scope as in Chapters 1-7).

3. T.N. Apostal, *Introduction to Analytic Number Theory*, Springer Verlag. (Scope as in Chapters 1-7).

4. Hardy & Wright, *Number Theory*, Oxford Univ. Press (Scope as in Chapter 19).

5. H. Davertport, *Higher Arithmetic,* Camb. Uni. Press.

6. E. Landau, *Elementary Number Theory*, Chelsea, Part-III.

**SCHEME**

**B.Sc. (Physics) Part-III (Vth and VIth Semester)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Code** | **Title of Paper** | **Total**  **Teaching**  **Hours** | **Max Marks** | | | **Examination**  **Time (Hours)** |
| **Semester -V** | |  | **Total** | **Ext.** | **Int.** |  |
| Paper A | Condensed Matter Physics-I | 30 | 40 | 30 | 10 | 3 Hours |
| Paper B | Electronics-I (Electronics and Solid State Devices) | 30 | 40 | 30 | 10 | 3 Hours |
| Paper C | Nuclear and Radiation Physics | 30 | 40 | 30 | 10 | 3 Hours |
|  | Practicals | 60 | 30 | 22 | 08 | 3 Hours |
| **SEMESTER -VI** | |  |  |  |  |  |
| Paper A | Condensed Matter Physics-II | 30 | 40 | 30 | 10 | 3 Hours |
| Paper B | Electronics-II | 30 | 40 | 30 | 10 | 3 Hours |
| Paper C | Nuclear and Particle Physics | 30 | 40 | 30 | 10 | 3 Hours |
|  | Practicals | 60 | 30 | 22 | 08 | 3 Hours |

# General Instructions

|  |  |
| --- | --- |
| 1) | There will be three papers of theory and one laboratory (practical) course. |
| 2) | The number of lectures per week will be three for each theory paper. |
| 3) | The number of lectures per week will be six for practicals. |
| 4) | The examination time for each theory will be 3 hours. |
| 5) | The examination time for practical will also be 3 hours. |
| 6) | The use of non programmable calculator will be allowed in the examination centre but this will not be provided by the University/College. |
| 7) | Each theory paper will consist of three sections A, B and C. Section C is compulsory |
| 8) | Use of scientific non programmable calculator is allowed in practicals also. |

**SECTION A**

There will be four questions. Each question will carry five marks. Two questions are to be attempted

**SECTION B**

There will be four questions. Each question will carry five marks. Two questions are to be attempted.

**SECTION C**

There will be seven questions of short answer type covering the whole syllabi. Each question will carry two marks. Any five question to be attempted.

**SEMESTER V**

**PAPER A: CONDENSED MATTER PHYSICS-I**

Maximum Marks: External 30 Time Allowed: 3 Hours

Internal 10 Total Teaching Hours: 30

Total 40 Pass Marks: 35%

Out of 40 Marks, internal assessment (based on two mid-semester tests/ internal examination, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

# Instruction for the Paper Setter

# The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candidate is to attempt any five questions), which will cover the entire syllabus uniformly. Each question of sections A and B carry 05 marks. Section C will carry 10 marks.

# 

# Instruction for the candidates

1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and Consist of seven questions (Candidate is to attempt any five questions).

2) Use of non programmable calculator is allowed in the examination centre but this will not be provided by the University/College.

**Section - A**

Crystal Structure. Symmetry operations for a two dimensional crystal. Two dimensional Bravais lattices, Three dimensional Bravais lattices" Basic primitive cells. Crystal planes and Miller indices. Diamond and NaCI structure. Packing fraction for Cubic and hexagonal closed packed structure.

**Section - B**

Crystal Diffraction: Bragg's Law, Experimental methods for crystal structure studies, laue equations, Reciprocal lattices of SC, BCC and FCC, Bragg's Law in reciprocal lattice. Brillouin zones and its derivation in two dimensions, Structure factor and atomic form factor.

**Text Books**

1. Introduction to Solid State Physics by C. Kittel (Wiley Eastern)

2. Elements of Modern Physics by S. H. Patil (TMGH, 1985)

**Reference Book**

1. Solid State Physics by Puri and Babbar.

**PAPER B: ELECTRONICS-I (ELECTRONICS AND SOLID STATE DEVICES)**

Maximum Marks: External 30 Time Allowed: 3 Hours

Internal 10 Total Teaching Hours: 30

Total 40 Pass Marks: 35%

Out of 40 Marks, internal assessment (based on two mid-semester tests/ internal examination, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

# Instruction for the Paper Setter

# The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candidate is to attempt any five questions), which will cover the entire syllabus uniformly. Each question of sections A and B carry 05 marks. Section C will carry 10 marks.

# 

# Instruction for the candidates

1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and Consist of seven questions (Candidate is to attempt any five questions).

2) Use of non programmable calculator is allowed in the examination centre but this will not be provided by the University/College.

**Section - A**

Concept of current and voltage sources, p-n junction, Biasing of diode, V-A characteristics. Diode equation, Breakdown diodes: Zener breakdown and avalanche breakdown, Zener diode. Rectification: half wave, full wave rectifiers and bridge rectifiers, Qualitative analysis of Filter circuits (RC LC and π filters) Efficiency, Ripple factor, Voltage regulation. Voltage multiplier circuits.

**Section - B**

Junction transistor: structure and working, relation between different currents in transistors, Sign conventions. Amplifying action, Different configurations of a transistor and their comparison, CB and CE characteristics.

Structure, Characteristics, operation of FET, JFET and MOSFET, Pinch off voltage, Enhancement and Depletion mode, Comparison of JFETs and MOSFETs, Difference in field effect transistor and junction type transistor.

Photo-conductive devices: Photo-conductive cell, Photodiode, Solar cell, LED, LCD.

**Text Books**

1. Basic Electronics and Linear Circuits by N. N. Bhargave, D.C. Kulshreshtha and S. C. Gupta

2. Electronic Devices and Circuits: J. B. Gupta (Publ. KATARIA & SONS)

3. Electronic Devices and Circuits: G. K. Mithal, Khanna Publishers

4. Fundamentals of Electronics by D. Chatopadhyay, P.C. Rakshit, B. Saha and N.N.Purkit.

**Reference Book**

Basic Electronic by D.C.Tayal (Himalaya Pub.)

**PAPER C: NUCLEAR AND RADIATION PHYSICS**

Maximum Marks: External 30 Time Allowed: 3 Hours

Internal 10 Total Teaching Hours: 30

Total 40 Pass Marks: 35%

Out of 40 Marks, internal assessment (based on two mid-semester tests/ internal examination, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

# Instruction for the Paper Setter

# The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candidate is to attempt any five questions), which will cover the entire syllabus uniformly. Each question of sections A and B carry 05 marks. Section C will carry 10 marks.

# 

# Instruction for the candidates

1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and Consist of seven questions (Candidate is to attempt any five questions).

2) Use of non programmable calculator is allowed in the examination centre but this will not be provided by the University/College.

**Section - A**

Constituents of nucleus and their intrinsic properties, Qualitative facts about size, mass, density, energy, charge. Binding energy, angular momentum, magnetic moment and electric quadruple moments of the nucleus, Wave mechanical properties of nucleus, average binding energy and its variation with mass numbers, Properties of nuclear forces, Non existence of electrons in the nucleus and neutron-proton model, Liquid drop model and semi empirical mass formula, Conditions of nuclear stability, Fermi gas model. Nuclear shell model. Experimental evidence of magic numbers and its explanation.

**Section - B**

Radioactivity. Modes of decay and successive radioactivity. Alpha emission. Electron emission, Positron emission. Electron capture, Gamma-ray emission, Internal conversion, Qualitative discussion of alpha, beta and gamma spectra, Geiger-Nuttal rule, Neutrino hypothesis of beta decay. Evidence of existence of neutrino, Qualitative discussion of alpha and beta decay theories, Nuclear reactions. Reaction cross section, Conservation laws. Kinematics of nuclear reaction, Q-value and its physical significance, Compound nucleus, Possible reaction with high energy particles.

**Text Books**

1. An Introduction to Nuclear Physics by M.R. Bhiday and V.A. Joshi (Orient Longman)
2. Introductory Nuclear Physics by D.C.Tayal (Himalaya Pub.)

**Reference Books**

1. Nuclear Physics by I. Kaplan (Addision-Wiley Pub. Co. Inc.)
2. Nuclear Physics by Burcham (Indian Ed.)
3. Concepts of Nuclear Physics by B.L. (Cohen (TMI Ed.)

**Semester- V**

**PRACTICALS**

Maximum Marks: External 22 Time Allowed: 3 Hours

Internal 08 Pass Marks: 35%

Total 30 Total Teaching Hours: 60

1. The student will be asked to perform one experiment out of the experiments mentioned in the syllabus.

2. The distribution of marks is as follows:

(i) One full experiment requiring the student to take some data, analyse it and draw conclusions-(candidates are expected to state their results with limits of error. (10)

(ii) Brief theory (04)

(iii) Viva-Voce (04)

(iv) Record (Practical File) (04)

3 There will be one session of 03 hours duration. The paper will consist of 06 experiments out of which an examinee will mark 04 experiments and one of these is to be allotted by the external examiner.

4 Number of candidates in a group for practical examination should not exceed 12.

5. In a single group no experiment is allotted to more than three students in any group.

6. The student should determined Standard Deviations and probable error in the calculations whereas needed.

**LIST OF EXPERIMENTS**

|  |  |
| --- | --- |
|  | Measurement of reverse saturation current in p-n junction diode at various temperatures and to find the approximate value of energy gap. |
|  | To draw forward and reverse bias characteristics of a p-n junction diode and draw a load line. |
|  | Study of a diode as clipping element. |
|  | To show the variation of resistance of a thermistor with temperature |
|  | To measure the efficiency and ripple factors for a) Half-wave (b) full wave and (C) bridge rectifier circuits. |
|  | To study the reduction in the ripple in the rectified output with RC. LC and - filters. |
|  | To draw the characteristics of a Zener diode |
|  | To study the stabilization of output voltage of a power supply with Zener diode. |
|  | To Plot common Emitter Characteristics of a transistor (pnp or npn) |
|  | To study the response of RC circuit to various input voltage (square, sine and triangular) |
|  | To draw output and mutual Characteristics of an FET and determine its parameters |

**Text and Reference Books**

1. A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal.

2. B.Sc. Practical Physics, C.L. Arora.

**SEMESTER VI**

**PAPER A: CONDENSED MATTER PHYSICS-II**

Maximum Marks: External 30 Time Allowed: 3 Hours

Internal 10 Total Teaching Hours: 30

Total 40 Pass Marks: 35%

Out of 40 Marks, internal assessment (based on two mid-semester tests/ internal examination, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

# Instruction for the Paper Setter

# The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candidate is to attempt any five questions), which will cover the entire syllabus uniformly. Each question of sections A and B carry 05 marks. Section C will carry 10 marks.

# 

# Instruction for the candidates

1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and Consist of seven questions (Candidate is to attempt any five questions).

2) Use of non programmable calculator is allowed in the examination centre but this will not be provided by the University/College.

**Section - A**

Lattice vibrations, Concepts of phonons, Scattering of protons by phonons. Vibration of mono-atomic, di-atomic, linear chains. Density of modes, Einstein and Debye models of specific heat, Free electron model of metals. Free electron, Fermi gas and Fermi energy.

**Section - B**

Band theory, Kronig-Penney Model. Metals and insulators, Conductivity and its variation with temperature in semiconductors, Fermi levels in intrinsic and extrinsic semiconductors, Qualitative discussion of band gap in semiconductors, superconductivity, Magnetic field effect in superconductors, BCS theory. Thermal properties of superconductors

**Text Books**

1. Introduction to Solid State Physics by C. Kittel (Wiley Eastern)

2. Elements of Modern Physics by S. H. Patil (TMGH, 1985)

**Reference Book**

1. Solid State Physics by Puri and Babbar.

**PAPER B: ELECTRONICS-II**

Maximum Marks: External 30 Time Allowed: 3 Hours

Internal 10 Total Teaching Hours: 30

Total 40 Pass Marks: 35%

Out of 40 Marks, internal assessment (based on two mid-semester tests/ internal examination, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

# Instruction for the Paper Setter

# The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candidate is to attempt any five questions), which will cover the entire syllabus uniformly. Each question of sections A and B carry 05 marks. Section C will carry 10 marks.

# 

# Instruction for the candidates

1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and Consist of seven questions (Candidate is to attempt any five questions).

2) Use of non programmable calculator is allowed in the examination centre but this will not be provided by the University/College.

**SECTION-A**

Thyristor, SCR, TRIAC, DIAC: Construction, Characteristics and Operation; Comparison between transistors and thyristors; Difference between SCR and TRIAC.

UJT: its construction, Equivalent circuit, Characteristics and parameters, uses.

Thermistor: Types, Construction, Characteristics, Uses, Advantages over other temperature sensing devices

IMPATT and TRAPATT devices, PIN diode: Construction, Charatersitics, Applications.

**SECTION-B**

Gunn effect and diodes: Mechanism, Characteristic, Negative differential resistivity and Domain formation

Tunnel diode: Tunneling Phenomenon, Operation, Applications. Merits and Drawbacks

Transistor biasing: Stabilization of operating point, Fixed bias, Collector to base bias, Bias circuit with emitter resistor, Voltage divider biasing circuit.

CE amplifier: Working and analysis using h-parameters, Equivalent circuits, Determination of current gain, Power gain, Input impedance, FET amplifier: Voltage, Current and Power gain

Feed back in amplifiers: Types & advantage of negative feedback. Emitter follower as negative feed back circuit.

**Text Books**

1. Basic Electronics and Linear Circuits by N. N. Bhargave, D.C. Kulshreshtha and S. C. Gupta

2. Electronic Devices and Circuits: J. B. Gupta (Publ. KATARIA & SONS)

3. Electronic Devices and Circuits: G. K. Mithal, Khanna Publishers

4. Fundamentals of Electronics by D. Chatopadhyay, P.C. Rakshit, B. Saha and N.N.Purkit.

**Reference Book**

Basic Electronic by D.C.Tayal (Himalaya Pub.)

**PAPER C: NUCLEAR AND PARTICLE PHYSICS**

Maximum Marks: External 30 Time Allowed: 3 Hours

Internal 10 Total Teaching Hours: 30

Total 40 Pass Marks: 35%

Out of 40 Marks, internal assessment (based on two mid-semester tests/ internal examination, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

# Instruction for the Paper Setter

# The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candidate is to attempt any five questions), which will cover the entire syllabus uniformly. Each question of sections A and B carry 05 marks. Section C will carry 10 marks.

# 

# Instruction for the candidates

1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and Consist of seven questions (Candidate is to attempt any five questions).

2) Use of non programmable calculator is allowed in the examination centre but this will not be provided by the University/College.

**SECTION-A**

Energy loss due to ionization (Bethe’s formula), Energy loss of electrons, Bremsstrahlung, Interactions of gamma rays with matter. Radiation loss by fast electrons, Radiation length, Electron-positron annihilation, Cyclotron. Betatron, Qualitative discussion of Synchrotron, Collider machines and linear accelerator.

**SECTION-B**

Ionization chamber, Proportional counter, GM counter, Scintillation counter, Solid state detectors, Elementary particles and their masses, Decay modes, Classification of these particles, types of interactions. Conservation laws and quantum numbers, Concepts of isospin. Strangeness, Parity, Charge conjugation. Antiparticles, Gell-Man method, Decay and strange particles. Particle symmetry, Introduction to quarks and qualitative discussion of the quark model.

**Text Books**

1. An Introduction to Nuclear Physics by M. R. Bhiday and V. A. Joshi (Orient Longman)

2. Introductory Nuclear Physics by D.C.Tayal (Himalaya Pub.)

**Reference Books**

1. Nuclear Physics by I. Kaplan (Addision-Wiley Pub. Co. Inc.)
2. Nuclear Physics by Burcham (Indian Ed.)
3. Concepts of Nuclear Physics by B.L. Cohen (TMI Ed.)
4. Particle Physics, M. P. Khanna (Prentice Hall of India)

**SEMESTER VI**

**PRACTICALS**

Maximum Marks: External 22 Time Allowed: 3 Hours

Internal 08 Pass Marks: 35%

Total 30 Total Teaching Hours: 60

1. The student will be asked to perform one experiment out of the experiments mentioned in the syllabus.

2. The distribution of marks is as follows:

(i) One full experiment requiring the student to take some data, analyse it and draw conclusions-(candidates are expected to state their results with limits of error. (10)

(ii) Brief theory (04)

(iii) Viva-Voce (04)

(iv) Record (Practical File) (04)

3 There will be one session of 03 hours duration. The paper will consist of 06 experiments out of which an examinee will mark 04 experiments and one of these is to be allotted by the external examiner.

4 Number of candidates in a group for practical examination should not exceed 12.

5. In a single group no experiment is allotted to more than three students in any group.

6. The student should determined Standard Deviations and probable error in the calculations whereas needed.

**LIST OF EXPERIMENTS**

|  |  |
| --- | --- |
|  | To measure the magnetic susceptibility of FeCl2 solution by Quinck's method |
|  | To trace the B-H curves for different materials using CRO and find the magnetic parameters from these. |
|  | Study of a diode as clamping element |
|  | To Plot common base Characteristics and determine h-parameters of a given transistor |
|  | To study the characteristics of a thermistor and find its parameters. |
|  | To study the gain of an amplifier at different frequencies and to find band width and gain bandwidth product. |
|  | To draw the plateau of a GM counter and find its operating voltage |
|  | To study the statistical fluctuations of G.M. Counter to find its standard deviation. |
|  | To study the absorption of beta particles in aluminum using GM counter and determine the absorption coefficient of beta particles from it. |
|  | To study the energy resolution and calibration of a scintillation counter. |
|  | To plot the complete gamma ray spectrum of 137Cs and mark the different peaks of the spectrum |

**Text and Reference Books**

1. A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal.

2. B. Sc. Practical Physics, C. L. Arora.

**B.Sc.-III (Chemistry), Syllabus**

**SEMESTER V**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper** | **Title** | **Max. Marks** | **Minimum Pass Marks** |
| I | INORGANIC CHEMISTRY | 35 | 12 |
| II | ORGANIC CHEMISTRY | 35 | 12 |
| III | PHYSICAL CHEMISTRY | 35 | 12 |
| I | PRACTICAL CHEMISTRY-I | 45 | 16 |

**SEMESTER VI**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper** | **Title** | **Max. Marks** | **Minimum Pass Marks** |
| I | INORGANIC CHEMISTRY | 35 | 12 |
| II | ORGANIC CHEMISTRY | 35 | 12 |
| III | PHYSICAL CHEMISTRY | 35 | 12 |
| II | PRACTICAL CHEMISTRY-II | 45 | 16 |

**CHEMISTRY**

**SEM-V**

**PAPER I : INORGANIC CHEMISTRY**

Max. Marks: 35 Pass Marks: 35%

Semester Paper=26 Time: 3 hrs

Internal Assessment=9 30 Hrs (2 Hrs/Week)

3 Periods/Week

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions (Section C all questions being compulsory) selecting two questions from each of A & B Sections.

**SECTION-A**

**I. Metal-ligand Bonding in Transition Metal Complexes.** 10 Hrs.

Limitations of valence bond theory, an elementary idea of crystal- field theory, crystal field splitting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal-field parameters.

**II. Thermodynamic and Kinetic Aspects of Metal Complexes** 5 hrs.

A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes.

**SECTION -B**

**III. Magnetic Properties of Transition Metal Complexes** 7 Hrs.

Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only formula, L-S coupling, Correlation of µs and µeff values, orbital contribution to magnetic moment, application of magnetic moment data for 3d-metal complexes.

**IV. Electronic Spectra of Transition Metal Complexes.** 8 Hrs.

Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectrochemical series. Orgel-energy level diagram for d1 and d9 states, discussion of electronic spectrum of [Ti (H2 O)6]3+ complexion.

**CHEMISTRY**

**SEM-V**

**PAPER I: ORGANIC CHEMISTRY**

Max. Marks: 35 Pass Marks: 35%

Semester Paper=26 Time: 3 hrs

Internal Assessment=9 30 Hrs (2 Hrs/Week)

3 Periods/Week

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions (Section C all questions being compulsory) selecting two questions from each of A & B Sections.

**SECTION-A**

**I. Spectroscopy 8 hrs.**

Nuclear magnetic resonance ( NMR) spectroscopy.

Proton magnetic resonance (1H NMR) spectroscopy, nuclear shielding and deshielding, chemical shift and molecular structure, spin-spin splitting and coupling constants, areas of signals interpretation of PMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1,1,2 tribromoethane, ethyl acetate, toluene and acetophenone.

**II. Electromagnetic spectrum: Absorption Spectra** **7hrs.**

Ultraviolet (UV) absorption spectroscopy-absorption laws (Beer-Lambert's law, Molar absorptivity, presentation and analysis ofUV Spectra, types of electronic transitions, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated enes and enones.

**SECTION - B**

**III Infrared (IR) 5 hrs.**

Infrared (IR) absorption spectroscopy-molecular vibrations, Hooke's law, Selection rules, intensity and position of IR bands, measurement of lR spectrum, fingerprint region, characteristic absorption of various functional groups and Interpretation of IR spectra of simple organic compounds.

Problems pertaining to the structure elucidation of simple organic compounds using UV, IR, and PMR spectroscopic techniques.

**IV. Organometallic Compounds 5 hrs.**

Organomagnesium Compounds The Grignard reagents formation, structure and chemical reactions.

Organozinc compounds: formation and chemical reactions.   
Organolithium compounds: formation and chemical reactions.

**V. Organosulphur Compounds 5 hrs.**

Nomenclature, structural features, methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, and sulphonamides.

**CHEMISTRY**

**SEM-V**

**PAPER III: PHYSICAL CHEMISTRY**

Max. Marks: 35 Pass Marks: 35%

Semester Paper=26 Time: 3 hrs

Internal Assessment=9 30 Hrs (2 Hrs/Week)

3 Periods/Week

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions (Section C all questions being compulsory) selecting two questions from each of A & B Sections.

**SECTION-A**

**I. Elementary Quantum Mechanics** 15 Hrs.

Black-body radiations, Planck's radiation law, photoelectric effect, heat capacity of solids.

Sinusoidal wave equation Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in a one dimensional box.

Schrodinger wave equation for H-atom, separation into three equations (without derivation), quantum numbers and their importance, hydrogen like wave functions, radial wave functions, angular wave functions.

**SECTION-B**

**II. Spectroscopy 15 hrs.**

**Introduction:**

Electromagnetic radiation, regions of spectrum, basic features of different spectrometers, statement of Born-Oppenheimer approximation, degrees of freedom.

**Rotational Spectrum:**

Diatomic molecules. Energy levels of a rigid rotor (semi-classical principles), selection rules, spectral intensity, determination of bond length, qualitative description of non-rigid rotor, isotope effect.

**Vibrational Spectrum:**

Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.

**B.Sc. III, Semester V**

**PRACTICALS**

Max. Marks : 45 Time: 4 Hrs.

6 Periods/Week

**INSTRUCTIONS FOR EXAMINERS AND CANDIDATES**

Candidate are required to prepare inorganic complex and synthesise organic compound. The candidate will perform experiments. Distribution of marks will be as under:

1. Viva-Voce = 10
2. Note Books = 5
3. Inorganic Complex = 15 (5 for initial write up)
4. Organic Synthesis = 15 (5 for initial write up)

Total 45

**Synthesis and Analysis**

(a) Preparation of sodium trioxalatoferrate(III), Na3 *[Fe(C2O4*)3] and determination of its composition by permagnometry.   
(b) Preparation of Ni-DMG complex, [Ni (DMG)2]2+

(c) Preparation of copper tetra-ammine complex. [Cu (NH3) 4] S04.   
(d) Preparation of cis-and trans-bis(oxalato)diaquachromate(III) ion.

**Synthesis or Organic Compounds**

(a) Iodoform from ethanol and acetone

(b) Aromatic electrophlic substitution of benzene

1. p-nitroacetanilide
2. 2,4,6-tribromophenol   
   Diazotization/Coupling
3. Preparation of methyl orange and methyl red
4. Preparation of benzoic acid from toluene
5. Reduction

Preparation of m-nitroaniline from m-dinitrobenzene

**CHEMISTRY**

**SEM-VI**

**PAPER I: INORGANIC CHEMISTRY**

Max. Marks: 35 Pass Marks: 35%

Semester Paper=26 Time: 3 hrs

Internal Assessment-9 30 Hrs (2 Hrs/Week)

3 Periods/Week

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions (Section C all questions being compulsory) selecting two questions from each of A & B Sections.

**SECTION-A**

**I. Hard and Soft acids and Bases (HSAB)** 5 Hrs.

Classification of acids and bases as a hard and soft, Pearson's HSAB concept, acid-base strength and hardness and softness. Symbiosis, theoretical basis of hardness and softness, electronegativity and hardness and softness.

**II. Bioinorganic Chemistry** 10 Hrs.

Essential and trace elements in biological processes, metalloporphyrins with special reference to haemoglobin and myoglobin. Biological role of alkali and alkaline earth metal ions with special reference to Ca+2, Nitrogen fixation.

SECTION-B

**III. Silicones and Phosphazenes** 5 Hrs.

Silicones and Phosphazenes as examples of inorganic polymers,nature of bonding in triphosphazenes.

**IV. Organometallic Chemistry** 10 Hrs.

Definition, Nomenclature and classification of organometallic compounds. Preparation, properties, bonding and applications of alkyls of' Li, Al, Hg, Sn and Ti, a brief account of metal-ethylene complexes and homogeneous hydrogenation, mononuclear carbonyls and the nature of bonding in metal carbonyls.

**CHEMISTRY**

**SEM-VI**

**PAPER II: ORGANIC CHEMISTRY**

Max. Marks: 35 Pass Marks: 35%

Semester Paper=26 Time: 3 hrs

Internal Assessment-9 30 Hrs (2 Hrs/Week)

3 Periods/Week

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions (Section C all questions being compulsory) selecting two questions from each of A & B Sections.

**SECTION-A**

**I. Heterocyclic Compounds 7 hrs.**

Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on mechanism of electrophlic substitution. Mechanism of nucleophlic substitution reaction in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole.

Introduction to condensed five and six membered heterocycles.Preparation and reactions of indole, quinoline and isoquinoline wi th special reference to Fischer indole synthesis, Skraup synthesis and Bischler- Napieralski synthesis. Mechanism of electrophlic substitution reactions of indole, quinoline and isoquinoline.

**II. Synthesis of Polymers 3 hrs.**

Ziegler-Natta polymerziation and vinyl polymers. Condensation or step growth polymerziation. Urea formaldhehyde resins, epoxy resins and polyurethanes. Natural and synthetic rubbers.

**III. Organic Synthesis Via Enolatcs**

Acidity of α-hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate: the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate. Alkylation and acylation of enamines.

**SECTION - B**

**IV. Carbohydrates 7 hrs.**

Classification and nomenclature, Monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses.

Configuration of monosaccharides. Erythro and threodiastereomers. Conversion of glucose into mannose. Formation of glycosides, ethers, and esters. Determination of ring size of monosaccharides. Cyclic structure of D ( + )-glucose. Mechanism of mutarotation.

Structures of ribose and deoxyribose.

An introduction to disaccharides ( maltose, sucrose and lactose) and polysaccharide starch and cellulose without involving structure determination.

**V. Amino Acids, Pcptidcs, Proteins and Nucleic Acids 8 hrs.**

Classification, structure and stereochemistry of amino acids. Acid base behaviour, isoelectric point and electrophoresis. Preparation and reactions of α-amino acids.

Structure and nomenclature of peptides and proteins. Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides. Classical levels of protein structure. Protein denaturation/renaturation.

Nucleic acids: Introduction, Constituents of nucleic acids Ribonucleosides and ribonucleotides. The double helical structure of DNA.

**CHEMISTRY**

**SEM-VI**

**PAPER III: PHYSICAL CHEMISTRY**

Max. Marks: 35 Pass Marks: 35%

Semester Paper=26 Time: 3 hrs

Internal Assessment-9 30 Hrs (2 Hrs/Week)

3 Periods/Week

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions (Section C all questions being compulsory) selecting two questions from each of A & B Sections.

**SECTION-A**

**I. Raman Spectrum : 15 hrs.**

Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

**II. Electronic Spectrum :**

Concept of potential energy curves for bonding and antibondingmolecular orbitals, qualitative description of selection rules and Franck-Condon principle. Qualitative description of σ, π and n M.O. their energy levels and their respective transitions.

**IV. Solid State 15 hrs.**

Definition of space lattice and unit cell.

Laws of crystallography-(i) Law of constancy of interfacial angles. (ii) Law of rationality of indices (iii) Law of symmetry elements in crystals.

X-ray diffraction by crystals. Derivation of Bragg's equation. Determination of crystal structure ofNaCI, KCI and CsCI (Laue's method and powder method).

**SECTION-B**

**III. Photochemistry**

Interaction of radiation with matter, difference between thermal and photochemical process. Laws of photochemistry: Grothus-Drapperlaw, Stark-Einstein law, Jablonski diagram depiciting various processes occurring in the excited state, qualitative description of fluorescence, non- radiative processes (internal conversion, intersystem crossing), quantumyield, photosensitized reactions- energy transfer processes (simple examples). Basic concepts of Laser and Maser. Photochemistry of vision and colour.

**B.Sc. III, Semester VI**

**Practical Chemistry**

Max. Marks : 45 Time: 4 hrs

6 Periods/Week

**INSTRUCTIONS FOR EXAMINERS AND CANDIDATES**

Candidate are required to prepare perform column Chromatography experiment and the physical experiments. The candidate will perform experiments from physical, chemistry. Distribution of marks will be as under:

1. Viva-Voce = 10
2. Note Books = 5
3. Column Chromatography = 5
4. Models = 5
5. Physical Experiments = 20\* (5 for initial write up both experiments)

\* (Full credit may be given for error upto 10% and one mark may be deducted for additional 5% error.)

**Laboratory Techniques**

1. Column Chromatography

2. Separation of fluorescein and methylene blue.   
3. Separation of leaf pigments from spinach leaves.

4. Physical Experiments

(a) To determine the strength of the given acid conductometrically using standard alkali solution.

(b) To determine the solubility and solubility product of a given sparingly soluble electrolyte conductometrically.

(c) To study the saponification of ethyl acetate conductometrically.

(d) To determine the ionisation constant of a weak acid conductometrically.

(e) To determine the strength of the given acid solution pH- metrically by using standard alkali solution.

(f) To determine the molar refraction of methanol, ethanol and propanol.

(g) To study the distribution of benzoic acid between benzene and water, and ether and

water.

(h) Knowledge of Stereochemical Study of Organic Compounds.   
 Rand S configuration of optical isomers.

E, Z configuration of geometrical isomers.

Conformational analysis of cyclohexanes and substituted cyclohexanes.

BOOKS SUGGESTED (THEORY COURSES)

1. *Basic Inorganic Chemistry,* F.A. Cotton, G Willdson and P.L. Gaus, Wiley.
2. *Concise Inorganic Chemistry,* J.D. Leee, ELBS.
3. *Concept of models of Inorganic Chemistry,* B. Douglas, D. McDaniel, and J. Alexander, Jolin Wiley.
4. *Inorganic Chemistry,* D. E. Shriver, P. W. Atkins and C.H. Langford, Oxford.
5. *Inorganic Chemistry,* W. W. Porterfield Addison-Welsey.
6. *Inorganic Chemistry,* A. G Sharpe, ELBS
7. *Inorganic Chemistry,* G. L. Miessler and D. A. Tarr, Prentice Hall.
8. *Inorganic Chemistry,* Morrison and Boyd, Prentice-Hall.
9. *Inorganic Chemistry,* L.G Wade Jr. Prentice-Hall.
10. *Fundamentals of Organic Chemistry,* Solomons, John Wiley.
11. *Organic Chemistry,* Vol. I, II & III, S.M. Mukherji, S.P. Singh and R.P. Kapoor, Wiley Eastern Ltd. (New Age International).
12. *Organic Chemistry,* F.A Carey, McGraw-Hill, Inc.
13. *Introduction to Organic Chemistry,* Streitwieser, Healthcock and Kosover and Kosover, Macmillan.
14. *Physical Chemistry,* G.M. Barrow, International Student edition, McGraw Hill.
15. *University General Chemistry,* C.N.R. Rao. Macmillan.
16. *Physical Chemistry,* R.A Alberty, Wiley Eastern Ltd.
17. *The Elements of Physical Chemistry,* P. W. Atkins, Oxford.
18. *Physical Chemistry Through Problems,* S.K. Dogra and S. Dogra, Willey Eastern Ltd.
19. Fundamentals of Photochemistry, Rohtga and Mukherji.

*BOOKS SUGGESTED (LABORATORY COURSES)*

1. *Vogel's Qualitative Inorganic Analysis,* revised, Svehla, Orienl P Longman.
2. *Vogel's Text book of Quantitative Inorganic Analysis* (revised), J.Bassett, R. C. Denney, 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, Brauer, Academic Press.
6. *Inorganic Synthesis,* Mc-Graw Hill.
7. *Experimental Organic Chemistry,* Vol. I & II, P. R. Singh, D.S. Gupta, and Bajpai, Tata Mc-Graw Hill.
8. *Laboratory Manual In Organic Chemistry,* R. K. Bansal, Wiley Eastern.
9. *Vogel's Textbook of Practical Organic Chemistry,* B. S. Furniss, Al Hannaford, V. frogers, P.W.G. Smith and AR. Tatchell, ELBS
10. *Experiments in General Chemistry,* C.N.R. Rao and U.C. Agarwal, East-West Press.
11. *Experiments in Physical Chemistry,* R.C. Das, and B. Behra, Tata Mc-graw Hill.
12. *Advanced Practical Physical Chemistry,* J.B. Yadav, Goel Publishing House.
13. Advanced Exp. Chemistry, Vol. I-Physical, J.N. Gurutu and R. Kapoor, S. Chand & Co.
14. Selected Exp. in Physical Chemistry, N.G. Mukherjee, J.N. Ghose & Sons.
15. Exp. in Physical Chemistry, J.C. Ghosh, Bharti Bhavan.

**ਬੀ.ਏ./phn?;H਷ੀ Gkr shik,ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ (;w?;No gzitK ਅਤੇ ਛੇਵਾਂ)**

**gμikph bkIwh**

/ **(;w?;No gzitK)**

e[b nze L 100 gk; j'D bJh nze L 35

nzdo{Bh w[bKeD L 25 nze nzdo{Bh w[bKeD ftu'A gk; j'D bJh nze L 09

pkjoh gohfynkL 75 nze pkjoh gohfynk ftu'A gk; j'D bJh nze L 26

;wK L 3 xzN/ nfXnkgBL 50 ghohnv

**f;b/p; ns/ gkm-g[;seK**

**ਭਾਗ -ੳ**

1H ਨਾਵਲ :**J/j[ jwkok ihtDk**, dbhg e"o fNtkDk। 12+08&20 nμe

**ਭਾਗ -ਅ**

2H b/y ouBk (ftfdne ns/ ;fGnkukoe ftfPnK pko/ 500 PpdK dh) 09 nμe

3H ftnkeoB

(T) BkT[A tkeμP L gfoGkPk, pDso ns/ gqeko

(n) fefonk tkeμP L gfoGkPk, pDso ns/ gqeko 12 nμe

(ੲ) ਵਵਸਾਰਕ ਵਵਆਕਰਨਕ ਵਵਸ਼ਲੇ਷ਣ 04 ਅੰਕ

**ਭਾਗ -ੲ**

ਉ਩ਰੋਕਤ ਵ਷ਲੇਬ਷ ਅਧਾਰਤ ਷ੰਖੇ਩ ਉੱਤਰਾਂ ਵਾਲੇ 15 ਩ਰਸ਼ਨ। 15×2&30 nμe

**nμe tμv ns/ g/go ;?No bJh jdkfJsK**

1H Bktb dk ftPk t;s{$;ko/ਕਲਾ ਩ੱਖ (d' ftu'A fJe) 12 nμe

2. ਩ਾਤਰ ਵਿਤਰਣ (d' ftu'A fJe) 08ਅੰਕ

3H b/y L fsμB ftu'A fe;/ fJe ftP/ T[¤s/ (ਵਤੰਨ ftu'A fJe) 09 nμe

4H Bμpo 3 T[¤s/ fBoXkos ftnkeoB ftu'A toDBkswe gqPB (d' ftu'A fJe) 12nμe

5H fBoXkos gkm g[;se ftu'A ਿਾਰ tkeK dh GkPk dk fttjkoe ftnkeoBe ftPb/PD।

(fJj gqPB Bμpo 3 ftu fBoXkfos ftnkeoB tkb/ g¤yK T[¤s/ jh nkXkos j't/rk) 04 nμe

6. ਨਾਵਲ ਅਤੇ ਵਵਆਕਰਨ ਕਰਨ ਵਾਲੇ ਭਾਗ ਵਵਿੋਂ ਕਰਮਵਾਰ 08 ਅਤੇ 07 (ਕੁਲ 15)਷ੰਖੇ਩ ਉਤਰਾਂ ਵਾਲੇ ਩ਰਸ਼ਨ

਩ੁੱਛੇ ਜਾਣਗੇ। ਩ਰੀਵਖਆਰਥੀਆਂ ਨੇ ਷ਾਰੇ ਩ਰਸ਼ਨਾਂ ਷ੰਖੇ਩ ਉਤਰ ਦੇਣੇ ਸੋਣਗੇ। ਸਰੇਕ ਩ਰਸ਼ਨ ਦੇ ਦੋ ਅੰਗ ਸੋਣਗੇ। 15×2&30 nμe

**;jkfJe gkm-;kw¤roh**

1H d[Bh uμdo, gμikph GkPk dk ftnkeoB, gμikp :{Bhtof;Nh, uμvhrVQ, 1964

2H vkH joehos f;μx, o{gKsoh ftnkeoD, gμikp ;N/N :{Bhtof;Nh N?e;N p[¤e p'ov uμvhrVQ।

3H g[nko, i'frμdo f;μx ns/ j'o, gμikph GkPk dk ftnkeoB, Gkr-III, gμikph GkPk nekdwh, ibμXo, 1994

4H vk. joehos f;μx s/ frnkBh bkb f;μx, ekfbi gμikph ftnkeoD s/ b/y-wkbk, gμikp ;N/N :{Bhtof;Nh N?e;N p[¤e p'ov, uμvhrVQ।

5H vkH pbd/t f;μx uhwk, gμikph GkPk ftfrnkBL seBheh Ppdktbh dk e'P, gμikph :{Bhtof;Nh gfNnkbk।

6H vkH pbd/t f;μx uhwk , gμikph tke gqpμXL pDso ns/ ekoi, gμikph :{Bhtof;Nh, gfNnkbk।

7H p{Nk f;zx pokV, gzikph Gk;ak ns/ ;kfjs L Gk;akJh ;o'eko, dhge gpfb;aoia, ibzXo, 2010

8H p{Nk f;zx pokV, gzikph Gk;ak L ;q's s/ ;o{g, tkfo;;akj ckT[Iv/;aB, nzfwas;o, 2004H

9 p{Nk f;zx pokV, gzikph ftnkeoB L f;XKs s/ ftjko, u/sBk gqek;aB, b[fXnkDk, 2008H

**ਬੀ.ਏ./phn?;H਷ੀ. Gkr shik,ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ (;w?;No gzitK ਅਤੇ ਛੇਵਾਂ)**

**2016^17, 2017^18, 2018^19 ਷ੈਸ਼ਨ bJh**

**਩ੰਜਾਬੀ ਲਾਜ਼ਮੀ**

**ਸਮੈਸਟਰ S/tK**

ਕੁਲ ਅੰਕ : 100 ਪਾਸ ਅੰਕ : 35

**ਅੰਦਰੂਨੀ ਩ਰੀਖਿਆ ਦੇ ਅੰਕ** : 25 **ਅੰਦਰੂਨੀ ਩ਰੀਖਿਆ ਖ ਿੱਚੋਂ ਩ਾਸ ਅੰਕ** : 09

ਬਾਹਰੀ ਪਰੀਖਿਆ ਦੇ ਅੰਕ : 75 ਬਾਹਰੀ ਪਰੀਖਿਆ ਖ ਿੱਚੋਂ ਪਾਸ ਅੰਕ : 26

ਸਮਾਂ: 3 ਘੰਟੇ **ਅਖਧਆ਩ਨ :** 50 **਩ੀਰੀਅਡ**

**਩ਾਠਕਰਮ ਅਤੇ ਩ਰਸ਼ਨ ਩ਿੱਤਰ ਦੀ ਰੂ਩- ਰੇਿਾ**

**ਭਾਗ ੳ**

**b'eXkok dh G{fwek**, ;μgkde L vkH G[fgμdo f;μx yfjok ns/ vkH ;[oihs f;μx।

**ਭਾਗ ਅ**

ਅ- 1 ;ob nμro/Ih g?oQ/ dk ;ob gμikph ftu nB[tkd

n^ 2 **ftnkeoD**

(i) tke L gfoGkPk ns/ fe;wK

(ii) ekoe ns/ ekoeh ;μpμX

(iii) ਵketkswe i[rsK L w/b ns/ nfXeko

(iv) ਖ ਹਾਰਕ ਖ ਆਕਰਨਕ ਖ ਸ਼ਲੇਸਣ

**ਭਾਗ ੲ**

ਸਮੁਚੇ ਪਾਠਕਰਮ ਖ ਿੱਚੋਂ ਸੰਿੇਪ ਉਤਰਾਂ ਾਲੇ ਪਰਸ਼ਨ

**ਅੰਕ ੰਡ ਅਤੇ ਩ੇ਩ਰ ਸੈੈੱਟਰ / ਩ਰੀਖਿਆਰਥੀ ਲਈ ਹਦਾਇਤਾਂ**

1H Gkr T ftZu'A fe;/ fJe b/y dk ftPk t;s{$;ko (d' ftu'A fJe) 12 nμe

2H Gkr n^ 1 ;ob nμro/Ih g?oQ/ dk gμikph ftu nB[tkd 09 nμe

3H Gkr n^ 2 ftZu'A fBoXkos ftnkeoB ftu'A toDBkswe gqPB (d' ftu'A fJe) 12 nμe

4H Gkr J ftu **b'eXkok dh G{fwek** g[;se ftu'A S/ tkeK dh GkPk dk fttjkoe ftnkeoBe ftPb/PD।(fJj gqPB n^2ftu fBoXkfos ftnkeoB tkb/ g¤yK T[¤s/ jh nkXkos j't/rk। 6×2 =12 nze

5. ਭਾਗ-ੲ ਖ ਚ ਪਾਠ ਪੁਸਤਕ ਅਤੇ ਖ ਆਕਰਨ ਾਲੇ ਭਾਗ ਖ ਚੋਂ ਸੰਿੇਪ ਉਤਰਾਂ ਾਲੇ 15 ਪਰਸ਼ਨ ਪੁਛੇ ਜਾਣਗੇ। ਪਰੀਖਿਆਰਥੀ ਨੇ ਸਾਰੇ ਪਰਸ਼ਨਾਂ ਦੇ ਉਤਰ ਦੇਣੇ ਹੋਣਗੇ। ਹਰੇਕ ਪਰਸ਼ਨ ਦੇ 2 ਅੰਕ ਹੋਣਗੇ। 15×2 =30 nze

**;jkfJe gkm-;kw¤roh**

1H d[Bh uμdo, gμikph GkPk dk ftnkeoB, gμikp :{Bhtof;Nh, uμvhrVQ, 1964

2H vkH joehos f;μx, o{gKsoh ftnkeoD, gμikp ;N/N :{Bhtof;Nh N?e;N p[¤e p'ov uμvhrVQ।

3H g[nko, i'frμdo f;μx ns/ j'o,gμikph GkPk ਦਾ ftnkeoB Gkr-III, gμikph GkPk nekdwh, ibμXo, 1994

4H vk. joehos f;μx s/ frnkBh bkb f;μx, ekfbi gμikph ftnkeoD s/ b/y-wkbk, gμikp ;N/N :{Bhtof;Nh N?e;N p[¤e p'ov, uμvhrVQ।

5H vkH pbd/t f;μx uhwk, gμikph GkPk ftfrnkBL seBheh Ppdktbh dk e'P, gμikph :{Bhtof;Nh gfNnkbk।

**B.A/B.Sc. Part III (COMPUTER APPLICATION)**

**Semester – V**

|  |  |  |  |
| --- | --- | --- | --- |
| Paper | Title | Max. Marks | Exam Duration |
| BAP-301 | **OBJECT ORIENTED PROGRAMMING USING C++** | 60 | 3 Hours |
| BAP-302 | LAB-I Practical Based on BAP-301 | 40 | 3 Hours |

**Semester VI**

|  |  |  |  |
| --- | --- | --- | --- |
| Paper | Title | Max. Marks | Exam Duration |
| BAP-303 | **Introduction to Computer Network & Internet Programming** | 60 | 3 Hours |
| BAP-304 | LAB-II Practical based on BAP-303 | 40 | 3 Hours |

**B.A/B.Sc. Part III (COMPUTER APPLICATION)**

**Fifth Semester**

**PAPER-BAP-301 : OBJECT ORIENTED PROGRAMMING USING C++**

Max. Marks : 60 Maximum Time: 3 hours

Min. Pass Marks: 35% Lecturers to be delivered: 75 hrs

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B & C. Sections A & B will have four questions from the respective sections of the syllabus and will carry 40% marks each. Section C will have 6-12 short-answer type questions, which will cover the entire syllabus uniformly and will carry 20% marks in all.

**INSTRUCTIONS FOR THE CANDIDATES**

1. Candidates are required to attempt two question each from the sections A & B of the question paper and the entire section C.

2. Use of non-programmable scientific calculator is allowed.

**Section-A**

**Evolution of OOP :** Procedure Oriented Programming, OOP Paradigm, Advantages and disadvantages of OOP over Functional Programming Approach.

**Characteristics of Object Oriented Language :** Classes, Objects, Inheritance, Reusability, User defined Data Types, Polymorphism and Exception Handling.

**Introduction to C++ :** Structure of C++ Program, Identifier and keywords, Constants, Data Types, C++ Operators, Type Compatibility, Variable Declaration, Reference Variable, Statements, Expressions, Manipulators. Input and Output Statements.

**Control Statements:** Conditional Expression, Loop Statements,

**Storage Class Specifiers :** Automatic, Static, Register, Extern. Array, Pointer Arithmetic, Structures, Pointers and Structures, Unions, Bit Field Typed Enumerations.

**Function in C++ :** Function Prototyping, Defining a function, Types of functions.

**Methods of Parameter passing :** by value, by address, by reference, Recursion,

**Function Overloading :** Virtual functions, pure virtual functions,

operator overloading.

**Section-B**

**Classes :** Data members and member functions, objects, arrays of class objects, Objects as function arguments, nested classes, inline member functions, static data members and static member functions, friend functions, dynamic memory allocation.

**Constructors and Destructors:** Default parameterized and copy constructors, multiple constructors in classes dynamic constructors. Rules for constructors and destructors, Const. objects.

**Inheritance:** single inheritance, inheriting private members, types of derivation, multiple inheritance, multi-level inheritance, hierarchical inheritance, hybrid inheritance, container classes and member access control. Abstract class.

Polymorphism : Methods of achieving polymorphic behaviour.

**Pointers:** Pointers and classes, pointer to object, this pointer.

**References**:

1. Herbert Schildt, The Complete Reference C++, Tata McGraw-Hill, 2001
2. Deitel and Deital, C++ How to program, Pearson Education 2001.
3. Robert Lafore, *Object Oriented Programming in Turbo C++*, Galgotia Publications, 1994.
4. Bajane Stautrup, *The C++ Programming Language*, Addition,-Wesley Publication Co., 2001.
5. Stanley B. Lippman, Losee Lajoic, C++. Primer; Pearson Education, 2002
6. E. Balagurusamy, *Object-Oriented Programming with C++*, Tata McGraw-Hill, 2001
7. D. Ravichandran, Programming with C++ - 2nd edition, Tata McGraw-Hill Publishing Company Ltd.

**Paper BAP-302 : PRACTICAL BASED ON BAP-301**

Max. Marks : 40 Practical units to be conducted: 75

Min. Pass Marks: 35% Time allowed: 3 Hours

The laboratory course will comprise of exercises to supplement what is learnt under Paper **OBJECT ORIENTED PROGRAMMING USING C++**

The break-up of marks for the practical will be as under:

Lab Record : 05 marks

Viva Voce : 10 marks

Programe Development and Execution : 25 marks

**\**

**B.A/B.Sc. Part III (COMPUTER APPLICATION)**

**Sixth Semester**

**Paper BAP-303 - Introduction to Computer Network and Internet Programming**

Max. Marks : 60 Maximum Time: 3 hours

Min. Pass Marks: 35% Lecturers to be delivered: 75 hrs

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B & C. Sections A & B will have four questions from the respective sections of the syllabus and will carry 40% marks each. Section C will have 6-12 short-answer type questions, which will cover the entire syllabus uniformly and will carry 20% marks in all.

**INSTRUCTIONS FOR THE CANDIDATES**

1. Candidates are required to attempt two question each from the sections A & B of the question paper and the entire section C.

2. Use of non-programmable scientific calculator is allowed.

**Section-A**

**Computer networks-** Hardware, Software, users, goals and applications of computer networks.

Types of Network: Local area networks, wide area networks, metropolitan area networks and value added networks - their features.

Transmission media: Magnetic media, twisted pair, coaxial cables, fibre optics, radio transmission, microwave transmission, infrared waves and Line of sight transmission, Cellular radio and communication Satellites.

**Internet:** What is Internet, its advantages, disadvantages, internet facilities through WWW and HTML, Internet Protocols, TCP/IP, FTP, newsgroups, remote logins, chat groups etc.

WWW: the client side, the server side, web browsers, web pages, locating information on the web.

E-Mail: architecture, various aspects, the user agent, message format, message transfer, e-mail privacy.

Network Security: Various threats, prevention and solutions.

**Section-B**

**HTML:** Introduction to HTML, SGML, Internet and Web structure of HTML document.

Starting an HTML document: Head element, body element, style element, Script element, Text formatting, using lists to organise information.

Organising Data with Table: Basic table Structures, individual cells and headings, vertical controls, database considerations, displaying real data with a table.

Table Layout and Presentation: Table Syntax, two column layout, staggered body with an index, traditional newspaper layout.

**Uniform Resource Locators (URLs):** Absolute URLs, Relative URLs, fragment URLs, Types of URL Schemes- HTTP, mailto, news, FTP, Telnet, File etc.

Using Hyper Links and Anchors: Uses to Hyper Links, Structure of Hyper Links, Links to specialised contents.

Images: Adding Images to web page, using images as links, creating menus with image maps, image formats-GIF, JPEG etc.

HTML Forms: Understanding forms, creating simple GO button, fill-in-form page, form security, INPUT element, BUTTON element, SELECT element, TEXT AREA element, LABEL element, FIELDSET and LEGEND elements.

**REFERENCES :**

1. Andrew S. Tanenbaum, “Computer Networks”, Third Edition, PHI Publications, 1997.
2. Corner, Internetworking with TCP-IP: Principles, Protocols and Architecture, Prentice Hall
3. Bertsellas and R. Gallager, “Data Networks”, 2nd Edition, Prentice Hall, 1992.
4. Stephan Mack, Janan Platt, HTML 4.0 No Experience Required, BPB Publicatiown.
5. Rick Darnell et al, HTML 4 Unleashed, Tech media Publications.

**Paper BAP-304 : PRACTICAL BASED ON PAPER BAP\_303**

Max. Marks : 40 Practical units to be conducted: 75

Min. Pass Marks: 35% Time allowed: 3 Hours

The laboratory course will comprise of exercises to supplement what is learnt under Paper **Introduction to Computer Network & Internet Programming** Lab exercises should cover alteast following topics:

HTML, Tables and Forms, Applying Style Sheets to HTML, General Commands of Java Script.

The break-up of marks for the practical will be as under:

Lab Record : 05 marks

Viva Voce : 10 marks

Programe Development and Execution : 25 marks