ANNEXURE-52 B.Sc Phy Sci

Bhagat Phool Singh Mahila Vishwavidyalaya Khanpur Kalan

Scheme and Syllabus of Physics Subject for 4 Year UG Programme
Bachelor of Physical Science
w.e.f. Academic session 2024-25

Scheme of Examination for 1st semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-PHY-101	DSC	Mechanics	3	2	0	4	20	10	50	20	100
2	B-PHY-102	MIC	Elementary Mechanics	2	0	0	2	15	0	35	0	50
3	B-PHY-103	MDC	Physics Fundamentals-I	2	2	0	3	15	10	35	15	75

Scheme of Examination for 2nd semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-PHY-201	DSC	Electricity and Magnetism& EMTheory	3	2	0	4	20	10	50	20	100
2	B-PHY-202	MIC	Elementary Electricity and Magnetism& EMTheory	2	0	0	2	15	0	35	0	50
3	B-PHY-203	MDC	Physics Fundamentals-II	2	2	0	3	15	10	35	15	75

Scheme of Examination for 3rd semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-PHY-301	DSC	Thermodynamics & Statistical Physics	3	2	0	4	20	10	50	20	100
2	B-PHY-302	MIC	Semiconductor Devices	3	2	0	4	20	10	50	20	100
3	B-PHY-303	MDC	Elements of Modern Physics	2	2	0	3	15	10	35	15	75

Scheme of Examination for 4th semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-PHY-401	DSC	Waves and Optics	3	2	0	4	20	10	50	20	100
2	B-PHY-402	MIC (VOC)	Introduction of quantum mechanics	3	2	0	4	20	10	50	20	100

Scheme of Examination for 5th semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-PHY-501	DSC	Atomic Spectroscopy	3	2	0	4	20	10	50	20	100
2	B-PHY-502	MIC-VOC	Physics of Nano Materials	3	2	0	4	20	10	50	20	100

Scheme of Examination for 6th semester												
Sr. No	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-PHY-601	DSC	Nuclear Physics	3	2	0	4	20	10	50	20	100
2	B-PHY-602	MIC	Laser Physics	3	2	0	4	20	10	50	20	100
3	B-PHY-603	MIC (VOC)	Modern Physics	3	2	0	4	20	10	50	20	100

Scheme of Examination for 7th semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-PHY-701	DSC-H1	Advanced Mathematical Physics	3	2	0	4	20	10	50	20	100
2	B-PHY-702	DSC-H2	Digital Electronics	3	2	0	4	20	10	50	20	100
3	B-PHY-703	DSC-H3	Quantum Mechanics	3	2	0	4	20	10	50	20	100
4	B-PHY-704	DSC-H4	Molecular Physics	3	2	0	4	20	10	50	20	100
5	B-PHY-705	DSC-H5	Condensed Matter Physics-1	3	2	0	4	20	10	50	20	100
6	B-PHY-706	MIC	Renewable Energy and Energy Harvesting	3	2	0	4	20	10	50	20	100

Scheme of Examination for 8th semester (4 year UG Hons.)												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-PHY-801	DSC-H6	Electrodynamics and Plasma Physics	3	2	0	4	20	10	50	20	100
2	B-PHY-802	DSC-H7	Advance Quantum Mechanics	3	2	0	4	20	10	50	20	100
3	B-PHY-803	DSC-H8	Material Science	3	2	0	4	20	10	50	20	100
4	B-PHY-804	DSC-H9	Solid State Physics-	3	2	0	4	20	10	50	20	100
5	B-PHY-805	DSC-H10	Characterization Techniques	3	2	0	4	20	10	50	20	100
6	B-PHY-806	MIC	Sensors and Transducers	3	2	0	4	20	10	50	20	100

Scheme of Examination for 8th semester (4 years UG Hon. with Research)												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-PHY-801	DSC-H6	Material Science	4	0	0	4	30	0	70	0	100
2	B-PHY-802	DSC-H7	Modern Characterization Techniques	4	0	0	4	30	0	70	0	100
3	B-PHY-803	MIC	Research Methodology	4	0	0	4	30	0	70	0	100
4	B-PHY-804	Dissertation	Research Project/ Dissertation				12					300

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Mechanics
B-PHY-101

Total Credits: 4
L - T - P
3 - 0 - 2

External Theory Marks: 50
Internal Assessment Marks: 20
Time allowed: 3Hrs

Course outcomes:
CO1:Understand the dynamics of system of particles, conservation of energy and momentum application of both translational and rotational dynamics motions simultaneously in rolling with slipping
CO2: Differentiate between elastic and plastic body. Elastic constants, determination and their physical significance. Torque and its significance.
CO3: Familiar about the special theory of relativity and its applications. Michelson's Morley experiments and its finding.
CO4: Analyze the two body Central Force problem and its application.

Unit – I

Fundamentals of Dynamics: Rigid body, Moment of Inertia, Radius of Gyration, Theorems of perpendicular and parallel axis (with proof), Moment of Inertia of ring, Disc, Angular Disc, Solid cylinder, Solid sphere, Hollow sphere, Rectangular plate, Square plate, Solid cone, Triangular plate, Torque, Rotational Kinetic Energy, Angular momentum, Law of conservation of angular momentum, Rolling motion, condition for pure rolling, acceleration of body rolling down an inclined plane, Fly wheel, Moment of Inertia of an irregular body.

Unit – II

Elasticity: Deforming force, Elastic limit, stress, strain and their types, Hooke's law, Modulus of rigidity, Relation between shear angle and angle of twist, elastic energy stored/volume in an elastic body, Elongation produced in heavy rod due to its own weight and elastic potential energy stored in it, Tension in rotating rod, Poisson's ratio and its limiting value, Elastic Constants and their relations. Torque required for twisting cylinder, Hollow shaft is stiffer than solid one. Bending of beam, bending moment and its magnitude, Flexural rigidity, Geometrical moment of inertia for beam of rectangular cross-section and circular cross-section. Bending of cantilever (loaded by a weight W at its free end), weight of cantilever uniformly distributed over its entire length. Dispersion of a centrally loaded beam supported at its ends, determination of elastic constants for material of wire by Searle's method.

Unit – III

Special Theory of Relativity: Michelson's Morley experiment and its outcomes, Postulates of special theory of relativity, Lorentz Transformations, Simultaneity and order of events, Lorentz contraction, Time dilation, Relativistic transformation of velocity, relativistic addition of velocities, variation of mass-energy equivalence, relativistic Doppler effect, relativistic kinematics, transformation of energy and momentum, transformation of force, Problems of relativistic dynamics.

Unit – IV

Gravitation and central force motion: Law of gravitation, Potential and field due to spherical shell and solid sphere. Motion of a particle under central force field, Two body problem and its reduction to one body problem and its solution, compound pendulum or physical pendulum in form of elliptical lamina and expression of time period, determination

of g by means of bar pendulum, Normal coordinates and normal modes, Normal modes of vibration for given spring mass system, possible angular frequencies of oscillation of two identical simple pendulums of length (l) and small bob of mass (m0 joined together with spring of spring constant (k).

Instructions for External Theory Paper Setter/Examiner:

Nine questions will be set in total. Question no. 1 will be compulsory and based on the conceptual aspects of the entire syllabus. This question may have 4 parts and the answer should be in brief but not in Yes/No. Four more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts. All questions will carry equal marks.20% numerical problems are to be set.

Use of scientific (non-programmable) calculator is allowed.

Recommended Readings:

1. Mechanics "Berkeley Physics Course Vol. I", Charles Kittel, Tata McGraw-Hill
2. Mechanics, D.S. Mathur, S. Chand and Company Limited, 2000
3. Elements of Properties of Matter, D.S. Mathur, S .Chand & Com. Pt. Ltd., New Delhi
4. Physics, Resnick, Halliday & Walker, Wiley
5. An introduction to mechanics, D. Kleppner, R.J. Kolenkow, 1973, McGraw-Hill.
6. Properties of Matter, R. Murgeshan, S. Chand & Com. Pt. Ltd., New Delhi
7. Classical Mechanics, J.C. Upadhyaya, Himalaya Publishing House.
8. B.Sc. Practical Physics, C.L. Arora, S. Chand Publisher, New Delhi
9. Advanced Level Practical Physics, M. Nelkon and Ogborn, Henemann Education Books Ltd., New Delhi
10. Practical Physics, S.S. Srivastava and M.K. Gupta, Atma Ram & Sons, Delhi
11. Practical Physics, S.L. Gupta and V. Kumar, Pragati Prakashan Meerut
12. Modern Approach to Practical Physics, R.K. Singla, Modern Publishers, Jalandha

Practical

External Practical Marks: 20
Internal Assessment Marks: 10
Time allowed: 3 Hrs

Course Outcomes:
CO1: Learn to present observations, results, analysis and different concepts related to experiments of Mechanics.

Practical

1. Measurement of length (or diameter) using Vernier Caliper, screwgauge and travelling microscope.
2. To study the random error in observations.
3. To determine the area of window using a sextant.
4. Moment of Inertia of a Fly Wheel
5. Moment of Inertia of irregular body using a Torsion Pendulum.
6. Young's Modulus by Bending of Beam.
7. Modulus of rigidity of material of wire by Maxwell's Needle.
8. Elastic constants by Searle's method.
9. To determine the value of 'g' by using Bar pendulum.
10. To find the Poisson ratio of rubber by Rubber tube method.
11. To compare Moment of Inertia of a solid Sphere, Hollow Sphere andsolid Disc of same mass with the help of Torsion Pendulum.
12. To determine the bending moment of a cantilever beam withuniformly distributed load, uniformly varying load and point load.

Instructions for External Practical Paper Setter/Examiner:
Student will perform at least six experiments in complete semester. Practical group consists of 15 students for B.Sc 1st & 20 students for B.Sc. II, III, IV, V.
The examiner will allot four practical at the time of end term examination. Out of four students should perform one experiment allotted by examiner.

Elementary Mechanics
B-PHY-102

Total Credits : 2
L - T - P
2- 0 - 0

External Theory Marks: 35
Internal Assessment Marks: 15
Time allowed : 1.5 Hrs

Course outcomes:

CO1: Understand the dynamics of system of particles, Determination of moment of inertia using Theorems of parallel and perpendicular axis.

CO2: Familiar about the special theory of relativity and its applications. Michelson's Morley experiment and its findings. Learn to present observations, results, analysis and different concepts related to experiments of Mechanics.

Unit – I

Fundamentals of Dynamics: Rigid body, Moment of Inertia, Radius of Gyration, Theorems of perpendicular and parallel axis (with proof), Moment of Inertia of ring, Disc, Angular Disc, Solid cylinder. Newton's laws of motion. Universal law of gravitation and its importance, acceleration due to gravity and free fall of a body; mass and weight of an object on earth and moon, Measurement of length (or diameter) using vernier caliper, screwgauge.

Unit – II

Special Theory of Relativity: Michelson's Morley experiment and its outcomes, Postulates of special theory of relativity, Lorentz Transformations, Lorentz contraction, Time dilation, Relativistic transformation of velocity, relativistic addition of velocities, variation of mass-energy equivalence

Instructions for External Theory Paper Setter/Examiner :

The examiner will set 5 questions asking two questions of 12 marks from each unit and one compulsory question of 11 marks by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 3 questions, selecting one question from each unit and the compulsory question.20% numerical problems are to be set. Use of scientific (non-programmable) calculator is allowed.

Recommended Readings:

1. Mechanics, D.S. Mathur, S. Chand and Company Limited, 2000
2. Elements of Properties of Matter, D.S. Mathur, S .Chand & Com. Pt. Ltd., New Delhi
3. Physics, Resnick, Halliday & Walker, Wiley
4. Physics for scientists and Engineers with Modern Phys., J.W. Jewett, R.A. Serway, 2010,Cengage Learning
5. An introduction to mechanics, D. Kleppner, R.J. Kolenkow, 1973, McGraw-Hill.
6. Properties of Matter, R. Murgeshan, S. Chand & Com. Pt. Ltd., New Delhi
7. Classical Mechanics, J.C. Upadhyaya, Himalaya Publishing House
8. B.Sc. Practical Physics, C.L. Arora, S. Chand Publisher, New Delhi
9. Advanced Level Practical Physics, M. Nelkon and Ogborn, Henemann Education BooksLtd., New Delhi
10. Practical Physics, S.S. Srivastava and M.K. Gupta, Atma Ram & Sons, Delhi

Physics Fundamentals -1
B-PHY-103

Total Credits : 3
L - T - P
2 - 0 - 2

External Theory Marks: 35
Internal Assessment Marks : 15
Time allowed : 2 Hrs

Course outcomes:

CO1: Have knowledge about the nature, scope and impact ofphysics on technological Development of the society.

CO2: Understand and describe motion of an object in onedimension. Understand and describe the laws of motion and their applications in daily life.

CO3: Understand and appreciate the importance of laws of gravitation and the physics behind floating of objects.

Unit – I

Physics-Nature, scope & excitement, Major discoveries in physics, major contribution by Indian Physicists, Fundamental physical constants, Physics in relation to other sciences, impact of physics on society and on latest development in science & technology.
System of Measuring Units-Need for measurement, measuring process, concept of mass, length, time; Fundamental and derive units, system of units, concepts of error, types of error (only definition), Accuracy and precision in measurement, least count and applications of measuring instruments -Vernier caliper, Screw Gauge.

Unit – II

Motion of objects in one dimension- position of the object, origin/reference point, frame of reference, definitions and examples of motion in one, two and three dimension, Scalar and Vector quantities, description of motion along a straight line- distance and displacement, uniform motion and non- uniform motion, average and instantaneous speed, average and instantaneous velocity, acceleration; graphical analysis of straight line motion- distance- time graph, velocity-time graph, equation of motions and their applications.

Unit – III

Causes of motion- concept of force, Newton's 1st law of motion, inertia andmass; Newton's 2nd law of motion, momentum and force; 3rd law of motion, daily life applications of Newton's laws of motion.
Universal law of gravitation and its importance, acceleration due to gravity and free fall of a body; mass and weight of an object on earth and moon, concept of thrust and pressure and importance in daily life, buoyancy and Archimedes principle-the physics behind floating of objects on water.

Instructions for External Theory Paper Setter/Examiner :
The examiner will set 7 questions asking two questions of 09 marks from each unit and one compulsory question of 08 marks by taking course learning outcomes (COs) into consideration. The compulsory question (Question No. 1) will contain 04 parts covering entire syllabus. The examinee will be required to attempt 4 questions, selecting one question from each unit and the compulsory question. 20% numerical problems are to be set. Use of scientific (non-programmable) calculator is allowed.

Recommended Readings:

1. Modern Physics (2nd edition), by S.L. Kakani and Shubhra Kakani, Viva Books, New Delhi.

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2. Physics for Scientists and Engineers with Modern Physics, 7th edition, by Raymond A. Serway and John W. Jewett, Jr., Thomson Higher Education 10 Davis Drive Belmont, CA94002-3098 USA.
3. Physics For You, Fifth Edition, by Keith Johnson, OUP Oxford; 5th edition (23 June2016).
4. B.Sc Practical Physics, C. L. Arora, R Chand & Co. New Delhi
5. B.Sc Practical Physics, Harnam Singh and Dr. P.S. Hemne, S Chand & Company Ltd.

Practical

External Practical Marks: 15
Internal Assessment Marks: 10
Time allowed: 2 Hrs

Course Outcomes:

CO1: Learn to present observations, results, analysis and different concepts related to experiments of Physics Fundamentals.

Practical

1. To measure the diameter of a small spherical / cylindrical body Vernier caliper
2. To measure the length, width and height of the given rectangularblock.
3. Use of screw gauge:(i) to measure diameter of a given wire and (ii) to measure thickness of a given sheet.
4. To determine radius of curvature of a given spherical surface by a spherometer.
5. To find the weight of a given body using parallelogram law of vectors.
6. Verification of Archimedes principle.
7. Verification of Work-energy theorem.
8. Acceleration due to gravity (g) by bar pendulum.
9. To determine the moment of Inertia of a fly-wheel.
10. Study of law of conservation of linear momentum and Kinetic Energy.

Instructions for External Practical Paper Setter/Examiner:

Student will perform at least four experiments in complete semester. Practical group consists of 15 students for B.Sc 1st & 20 students for B.Sc. II, III, IV, V.

The examiner will allot three practical at the time of end term examination. Out of four students should perform one experiment allotted by examiner.

Electricity, Magnetism and EM Theory
B-PHY-201

Total Credits: 4
L - T - P
3 - 0 - 2

External Theory Marks: 50
Internal Assessment Marks: 20
Time allowed: 3 Hrs

Course outcomes:

CO1: Explain and differentiate the vector and scalar formalisms of electrostatics. Also be able to apply Gauss's Divergence & Stokes theorem to solve various problems in electrostatics

CO2: Describe the magnetic materials & important properties of magnetic field. Understand the properties and theories of dia-, para- & ferromagnetic materials.

CO3: Derive Maxwell equations and their physical significance and familiar about the propagation of electromagneticwaves i.e. boundary conditions at the interface between different media. The students will also be able to have basic idea about the propagation of electromagnetic waves in free space and in medium.

CO4: Understand D.C. and A.C. circuits, able to apply and analyse using networks. Analyze DC/AC circuits consisting of parallel and/or series combinations of voltage sources and resistors and to describe the graphical relationship of resistance, capacitor and inductor.

Unit – I

Vector Background and Electric Field : Gradient of a scalar and its physical significance, Line, Surface and Volume integrals of a vector and their physical significance, Flux of a vector field, Divergence and curl of a vector and their physical significance, Gauss's divergence theorem, Stoke's theorem. Conservative nature of Electrostatic Field, Electrostatic Potential, Potential as line integral of field, potential difference Derivation of electric field E from potential as gradient. Derivation of Laplace and Poisson equations. Electric flux, Gauss's Law, Differential form of Gauss's law and applications of Gauss's law. Mechanical forceof charged surface, Energy per unit volume.

Unit – II

Magnetic Field: Biot-Savart law and its simple applications: straight wire and circular loop, Current Loop as a Magnetic Dipole and its Dipole Moment, Ampere's Circuital Law and its applications to (1) Solenoid and
(2) Toroid, properties of B: curl and divergence,

Magnetic Properties of Matter: Force on a dipole in an external field, Electric currents in Atoms, Electron spin and Magnetic moment, types of magnetic materials, Magnetization vector (M), Magnetic Intensity (H), Magnetic Susceptibility and permeability, Relation between B, H and M, Electronic theory of dia and paramagnetism, Domain theory of ferromagnetism (Langevin's theory), Cycle of Magnetization- B-H curve and hysteresis loop: Energy dissipation, Hysteresis loss and importance of Hysteresis Curve.

Unit – III

Time varying electromagnetic fields: Electromagnetic induction, Faraday'slaws of induction and Lenz's Law, Self-inductance, Mutual inductance, Energy stored in a Magnetic field, Derivation of Maxwell's equations, Displacement current, Maxwell's equations in differential and integral form and their physical significance.

Electromagnetic Waves: Electromagnetic waves, Transverse nature of electromagnetic wave, energy transported by electromagnetic waves, Poynting vector, Poynting's theorem. Propagation of Plane electromagnetic waves in free space & Dielectrics.

Unit – IV

DC current Circuits: Electric current and current density, Electrical conductivity and Ohm's law (Review), Kirchhoff's laws for D.C. networks, Network theorems: Thevenin's theorem, Norton theorem, Superposition theorem.

Alternating Current Circuits: A resonance circuit, Phasor, Complex Reactance and Impedance, Analysis for RL, RC and LC Circuits, Series LCR Circuit: (1) Resonance, (2) Power Dissipation (3) Quality Factor and
(4) Band Width, Parallel LCR Circuit.

Instructions for External Theory Paper Setter/Examiner :

Nine questions will be set in total. Question no. 1 will be compulsory and based on the conceptual aspects of the entire syllabus. This question may have 4 parts and the answer should be in brief but not in Yes/No. Four more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts. All questions will carry equal marks.20% numerical problems are to be set. Use of scientific (non-programmable) calculator is allowed.

Recommended Readings:

1. Mechanics "Berkeley Physics Course Vol. I", Charles Kittel, Tata McGraw-Hill
2. Mechanics, D.S. Mathur, S. Chand and Company Limited, 2000
3. Elements of Properties of Matter, D.S. Mathur, S .Chand & Com. Pt. Ltd., New Delhi
4. Physics, Resnick, Halliday & Walker, Wiley
5. An introduction to mechanics, D. Kleppner, R.J. Kolenkow, 1973, McGraw-Hill.
6. Properties of Matter, R. Murgeshan, S. Chand & Com. Pt. Ltd., New Delhi
7. Classical Mechanics, J.C. Upadhyaya, Himalaya Publishing House.
8. B.Sc. Practical Physics, C.L. Arora, S. Chand Publisher, New Delhi
9. Advanced Level Practical Physics, M. Nelkon and Ogborn, Henemann Education Books Ltd., New Delhi
10. Practical Physics, S.S. Srivastava and M.K. Gupta, Atma Ram & Sons, Delhi
11. Practical Physics, S.L. Gupta and V. Kumar, Pragati Prakashan Meerut
12. Modern Approach to Practical Physics, R.K. Singla, Modern Publishers, Jalandhar

Practical

External Practical Marks: 20
Internal Assessment Marks: 10
Time allowed: 3 Hrs

Course Outcomes:

CO1: Learn to present observations, results, analysis and different concepts related to experiments of Electricity and Magnetism.

Practical

1. Use of Multimeter for measuring Resistance, A.C. and D.C. Voltageand Current, checking of electrical fuses.
2. Low resistance by Carey Foster's bridge with calibration.
3. Determination of Impedance of an A.C. circuit and its verification.
4. Frequency of A.C. mains using an electromagnet.
5. Frequency of A.C. mains Electrical vibrator.

6. High resistance by substitution method.
7. To study the Characteristics of a Series RC Circuit.
8. To study a series LCR circuit and determine its (a) Resonantfrequency, (b) Quality factor.
9. To study a parallel LCR circuit and determine its (a) Anti-resonantfrequency and (b) Quality factor.
10. To verify the Thevenin and Norton theorems.
11. To verify the Superposition and Maximum Power Transfer Theorems.
12. Self-inductance by Anderson's bridge.
13. Verification of laws of electromagnetic induction.
14. Study of B-H curves of various materials using C.R.O, anddetermination of various parameters.
15. To find the capacitance of capacitor using flashing and quenching of Neon Lamp

Instructions for External Practical Paper Setter/Examiner:
Student will perform at least six experiments in complete semester. Practical group consists of 15 students for B.Sc 1st & 20 students for B.Sc. II, III, IV, V.
The examiner will allot four practical at the time of end term examination. Out of four students should perform one experiment allotted by examiner.

Elementary Electricity, Magnetism & EM Theory
B-PHY-202

Total Credits: 2
L - T - P
2- 0- 0

External Theory Marks: 35
Internal Assessment Marks : 15
Time allowed : 1.5 Hrs

Course outcomes:

CO1: Explain and differentiate the vector and scalar formalisms of electrostatics. Also be able to apply Gauss's Divergence & Stokes theorem to solve various problems in electrostatics..

CO2: Describe the magnetic materials & important properties of magnetic field. Understand the properties and theories of dia-, para- & ferromagnetic materials.

Unit – I

Vector background and electric field: Gradient of a scalar and its physical significance, Line, Surface and Volume integrals of a vector and their physical significance, Flux of a vector field, Divergence and curl of a vector and their physical significance, Gauss's divergence theorem, Stoke's theorem.

Unit – II

Magnetic field and magnetic properties : Magnetic induction, Magneticflux, Solenoidal nature of vector field of induction, properties of B (i)$\nabla.B = 0$ (ii) $\nabla \times B = \mu_o J$, Magnetic Materials, types, Hysteresis curve andimportance of Hysteresis Curve.

Instructions for External Theory Paper Setter/Examiner :

The examiner will set 5 questions asking two questions 12 marks from each unit and one compulsory question of 11 marks by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 3 questions, selecting one question from each unit and the compulsory question. 20% numerical problems are to be set. Use of scientific (non-programmable) calculator is allowed.

Recommended Readings:

1. Electricity and Magnetism (Berkley, Phys. Course 2), Edward M. Purcell, 1986 McGraw-Hill Education
2. Electricity and Magnetism: A.S. Mahajan & A.A. Rangwala (Tata- McGraw Hill), 1988.
3. Electricity, Magnetism & Electromagnetic Theory, S. Mahajan and Choudhury, 2012, TataMcGraw
4. Introduction to Electrodynamics, D.J. Griffiths, 3rd Edn., 1998, Benjamin Cummings.
5. Feynman Lectures Vol.2, R.P. Feynman, R.B. Leighton, M. Sands, 2008, PearsonEducation
6. Elements of Electromagnetics, M.N.O. Sadiku, 2010, Oxford University Press.
7. Electricity and Magnetism, J.H.Fewkes & J.Yarwood. Vol. I, 1991, Oxford Univ. Press.

Physics Fundamentals -II
B-PHY-203

Total Credits: 3
L - T - P
2 - 0 - 2

External Theory Marks: 35
Internal Assessment Marks: 15
Time allowed: 2 Hrs

Course outcomes:

CO1: Have basic knowledge about nature of light, the associated phenomena and their importance in daily life

CO2: Understand and describe the working of important optical instruments through the learning of image formation by mirrors and lenses.

CO3: Have basic knowledge about electric current, electric circuit, electric components, and practical utility of heating and magnetic effects of electric current

Unit – I

Light and optics-Nature and properties of light, its speed, frequency and wavelength; Reflection of light-types of reflection and their importance in daily life, laws of reflection, multiple reflection by mirrors and their applications.

Refraction of light- laws of refraction, refractive index, refraction of light through prism (dispersion of light), formation Rainbow, twinkling of stars, advance Sunrise and delayed Sunset; Scattering of light and blue colour of the sky; apparent depth, total internal reflection and its important applications.

Unit – II

Image formation through reflection-images formed by plane mirrors, multiple images formed by two flat mirrors and optical illusions; images formed by parabolic mirrors and spherical mirrors- Concave and convex mirrors, ray diagrams, mirror equation and magnification; applications of plane and curved mirrors in daily life.

Image formation through refraction- images by convex and concave lenses, ray diagrams and lens equation.

Optical instruments- Camera, eye, telescope and microscope.

Unit – III

Electricity- electric charge, types of charges, unit of charge, frictional electricity, electricity by conduction and electric current, units of electric current, measurement of current, conductors and insulators; resistance, resistivity and Ohm's law, electric potential and potential difference, emf; Electric circuit- resistor, capacitor, battery, ammeter and voltmeter; Series and parallel combinations of resistors, electrical wiring in houses and electrical safety (fuse, hot wire, neutral, ground and short circuit), electric power and electric power transmission; Heating effect of current and its practical applications. Magnetic effect of electric current- Magnetic field and field lines, bar magnet, magnetic field and direction of field due to a current- through straight conductor and through a circular loop; solenoid, electromagnet.

Instructions for External Theory Paper Setter/Examiner:

The examiner will set 7 questions asking two questions 09 marks from each unit and one compulsory question of 08 marks by taking course learning outcomes (COs) into consideration. The compulsory question (Question No. 1) will contain 04 parts covering entire syllabus. The examinee will be required to attempt 4 questions, selecting one question from each unit and the compulsory question. 20% numerical problems are to be set. Use of scientific (non-programmable) calculator is allowed.

Recommended Readings:

1. Essential University Physics, Vol.-1 &2 by Richard Wolfson, Pearson Education, Patparganj, Delhi, India.
2. Concept of Physics by H.C. Verma, Bharti Bhawan, Ansari Road, Daryaganj, New Delhi,India.
3. Modern Physics (2nd edition), by S.L. Kakani and Shubhra Kakani, Viva Books, New Delhi.
4. Physics for Scientists and Engineers with Modern Physics, 7th edition, by Raymond A. Serway and John W. Jewett, Jr., Thomson Higher Education 10 Davis Drive Belmont, CA 94002-3098 USA.
5. Physics For You (Fifth Edition) by Keith Johnson.
6. B.Sc Practical Physics, C. L. Arora, R Chand & Co. New Delhi

Practical

External Practical Marks: 15
Internal Assessment Marks: 10
Time allowed: 2 Hrs

Course Outcomes:

CO1: Learn to present observations, results, analysis and different concepts related to experiments of experiments of light & optics.

Practicals

1. To find the focal length of a convex mirror using a convex lens.
2. To find the value of v for different values of u in the case of a concavemirror and to find the focal length
3. To find the focal length of a concave lens using a convex lens.
4. To determine the refractive index of a glass slab
5. To find the refractive index of a liquid using a convex lens and planemirror
6. To determine the resistivity of different wires by plotting a graph forpotential difference versus current.
7. To verify Ohm's law for metallic conductor and to determine itsresistance.
8. To find the frequency of AC mains with a sonometer.
9. Use of Multimeter for measuring Resistance, A.C. and D.C. Voltageand Current, checking of electrical fuses.
10. Use of Multimeter to check the working condition of diode, an LED, aresistor and a capacitor.

Instructions for External Practical Paper Setter/Examiner:

Student will perform at least four experiments in complete semester. Practical group consists of 15 students for B.Sc 1st & 20 students for B.Sc. II, III, IV, V.

The examiner will allot three practical at the time of end term examination. Out of four students should perform one experiment allotted by examiner.

Bhagat Phool Singh Mahila Vishwavidyalaya Khanpur Kalan

Scheme and Syllabus of Chemistry Subject for 4 Year UG Programme
Common for Bachelor of Life Science and Bachelor of Physical Science
w.e.f. Academic session 2024-25

Scheme of Examination for 1st Semester

First Year: 1st Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-CHE-101	DSC	Chemistry-I	3	2	0	4	20	10	50	20	100
2	B-CHE-102	MIC	Minor Chemistry - I	2	0	0	2	15	0	35	0	50
3	B-CHE-103	MDC	Introductory Chemistry-I	2	2	0	3	15	10	35	15	75

Scheme of Examination for 2nd Semester

First Year: 2nd Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-CHE-201	DSC	Chemistry-II	3	2	0	4	20	10	50	20	100
2	B-CHE-202	MIC	Minor Chemistry - II	2	0	0	2	15	0	35	0	50
3	B-CHE-203	MDC	Introductory Chemistry-II	2	2	0	3	15	10	35	15	75

Scheme of Examination for 3rd Semester

Second Year: 3rd Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-CHE-301	DSC	Chemistry-III	3	2	0	4	20	10	50	20	100
2	B-CHE-302	MIC	Minor Chemistry – III	3	2	0	4	20	10	50	20	100
3	B-CHE-303	MDC	Introductory Chemistry-III	2	2	0	3	15	10	35	15	75

Scheme of Examination for 4th Semester

Second Year: 4th Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-CHE-401	DSC	Chemistry-IV	3	2	0	4	20	10	50	20	100
2	B-CHE-402	MIC (VOC)	Chemistry of Fertilizers and Pesticides	3	2	0	4	20	10	50	20	100

Scheme of Examination for 5th Semester

Third Year: 5th Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-CHE-501	DSC	Chemistry-V	3	2	0	4	20	10	50	20	100
2	B-CHE-502	MIC (VOC)	Green Chemistry	3	2	0	4	20	10	50	20	100

Scheme of Examination for 6th Semester

Third Year: 6th Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-CHE-601	DSC	Chemistry-VI	3	2	0	4	20	10	50	20	100
2	B-CHE-602	MIC	Minor Chemistry-IV	3	2	0	4	20	10	50	20	100
3	B-CHE-603	VOC	Chemistry of Cosmetics and Perfumes	3	2	0	4	20	10	50	20	100

Scheme of Examination for 7th semester

Fourth Year: 7th Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-CHE-701	DSC-C1	Organic Chemistry-I	3	2	0	4	20	10	50	20	100
2	B-CHE-702	DSC-C2	Organic Chemistry-II	3	2	0	4	20	10	50	20	100
3	B-CHE-703	DSC-C3	Physical Chemistry-I	3	2	0	4	20	10	50	20	100
4	B-CHE-704	DSC-C4	Physical Chemistry-II	3	2	0	4	20	10	50	20	100
5	B-CHE-705	DSC-C5	Inorganic Chemistry-I	3	2	0	4	20	10	50	20	100
6	B-CHE-706	MIC	Inorganic Chemistry-II	3	2	0	4	20	10	50	20	100

Scheme of Examination for 8th Semester(4 year UG Hon.)

Fourth Year: 8th Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-CHE -801	DSC-C6	Advanced Chemistry-I	3	2	0	4	20	10	50	20	100
2	B-CHE -802	DSC-C7	Advanced Chemistry-II	3	2	0	4	20	10	50	20	100
3	B-CHE-803	DSC-C8	Organic Chemistry-III	3	2	0	4	20	10	50	20	100
4	B-CHE-804	DSC-C9	Physical Chemistry-III	3	2	0	4	20	10	50	20	100
5	B-CHE-805	DSC-C10	Inorganic Chemistry-III	3	2	0	4	20	10	50	20	100
6	B-CHE-806	MIC	Biochemistry	3	2	0	4	20	10	50	20	100

Scheme of Examination for 8th semester (4 years UG Hon. with Research)

Fourth Year: 8th Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-CHE -801	DSC-C6	Advanced Chemistry-I	3	2	0	4	20	10	50	20	100
2	B-CHE -802	DSC-C7	Advanced Chemistry-II	3	2	0	4	20	10	50	20	100
3	B-CHE-803	MIC	Research Methodology	4	0	0	4	30	0	70	0	100
4	B-CHE-804	Dissertation	Research Project/ Dissertation				12					300

Chemistry-I
B-CHE-101

Total Credits: 4
L - T - P
3 - 0 - 2

External Theory Marks: 50
Internal Assessment Marks: 20
Time allowed: 3 hrs

Course outcomes:

After completing this course, the learner will be able to:

CO1 Enable to understand the basis of quantum mechanics and structural idea and relevance in describing shapes of s, p and d orbitals.

CO2 To learn about role of temperature and pressure to establish the state of gases and describe the concept of critical constants of real gases.

CO3 Get knowledge about the electrophile/nucleophile and its role in mechanism of preparation of organic compounds.

CO4 To know the physical properties, morphology and crystalline study of liquid and different type of solids.

Unit – I

Atomic Structure: Dual behaviour of matter and radiation, de Broglie's relation, Heinsenberg's uncertainty principle, concept of atomic orbitals, significance of quantum numbers, radial and angular wave functions, normal and orthogonal wave functions, significance of Ψ and Ψ^2, shapes of s, p, d, f orbitals, Rules for filling electrons in various orbitals, effective nuclear charge, Slater's rules.

Periodic table and atomic properties: Classification of periodic table, definition of atomic and ionic radii, ionisation energy, electron affinity and electronegativity, trend in periodic table (in s and p-block elements), Pauling, Mulliken, Allred Rachow and Mulliken Jaffe's electronegativity scale, Sanderson's electron density ratio.

Unit – II

Gaseous State: Kinetic theory of gases, Maxwell's distribution of velocities and energies (derivation excluded) Calculation of root mean square velocity, average velocity, and most probable velocity. Collision diameter, collision number, collision frequency and mean free path (Derivations excluded), Deviation of Real gases from ideal behaviour, Derivation of Vander Waal's Equation of State, its application in the calculation of Boyle's temperature (compression factor)

Critical Phenomenon: Concept of Critical temperature, critical pressure, critical volume, relationship between critical constants and Van der Waal's constants (Derivation excluded).

Unit – III

Structure and Bonding: Localized and delocalized chemical bond, Van der Waals interactions. Concept of resonance and its applications, hyperconjugation , inductive effect, Electromeric effect and their comparison.

Mechanism of Organic Reactions: Curved arrow notation, homolytic and heterolytic bond fission. Types of reagents: electrophiles and nucleophiles. Types of organic reactions: Substitution, Addition, Condensation, Elimination, Rearrangement, Isomerization and Pericyclic reactions. Reactive intermediates: Carbocations, carbanions, free radicals, carbenes (structure & stability).

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Unit - IV

Liquid State: Structure of liquids, Properties of liquids – surface tension, refractive index, viscosity, vapour pressure and optical rotation.
Solid State: Classification of solids, Law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry and symmetry elements, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of Laue method, rotating crystal method and powder pattern method.

Instructions for External Theory Paper Setter/Examiner:
The examiner will set 9 questions asking two questions from each unitand one compulsory question by taking course outcomes (COs) into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question.

Recommended Books/e-resources/LMS:

1. Lee, J.D.; (2010), Concise Inorganic Chemistry, Wiley India.
2. Kapoor, K.L. (2015), A Textbook of Physical Chemistry, Vol 1, 6th Edition, McGraw HillEducation.
3. Clayden, J.; Greeves, N.; Warren, S. (2012), Organic Chemistry, Oxford.
4. Morrison, R. N.; Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

Practical

External Practical Marks: 20
Internal Assessment Marks: 10
Time allowed: 2hrs

Course Outcomes:
CO1: Hand on practice in preparation of solutions, compounds
CO2: Estimation and determination of physical properties of some compounds.

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1. Acid/Base titration: Determination of strength of NaOH using oxalic acid.
2. Redox titrations: Determination of Fe^{2+} ions using $KMnO_4$.
3. To determine the surface tension of given liquid using Stalagmometer by drop no. methods.
4. Preparation of *m*-Dinitrobenzne from Nitrobenzene (use 1:2 conc. HNO_3-H_2SO_4 mixture if fuming HNO_3 is not available).
5. Preparation of p-Bromoacetanilide from Acetanilide

Instructions for External Practical Paper Setter/Examiner:
The examiner will set 2 Experiments at the time of practical examination by taking course outcomes (CO) into consideration. Equal weightage will be given to both the Experiments. The evaluation will be done on the basis of practical record, viva-voce, write up and experimental results.

Minor Chemistry – I
B-CHE-102

Total Credits: 2
L - T - P
2 - 0 - 0

External Theory Marks: 35
Internal Assessment Marks: 15
Time allowed: 1:30 hrs

Course Outcomes:

After completing this course, the learner will be able to:

CO1 To understand the basics of Covalent bonding in simple molecules and to get the basics of rates of chemical reactions and factors affecting it.

CO2 To learn about the nomenclature, classification and methods of preparation of alkenes and conductors, semiconductors and insulator.

Unit - I

Covalent Bond: Valence bond theory approach, shapes of simple inorganic molecules and ions based on valence shell electron pair repulsion (VSEPR) theory and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonalbipyramidal and octahedral arrangements. Molecular orbital theory of homonuclear (N_2, O_2) and heteronuclear (CO and NO) diatomic molecules, dipole moment and percentage ionic character in covalent bond.

Chemical Kinetics: Concept of reaction rates, rate equation, factors influencing the rate of reaction, Order and molecularity of a reaction, integrated rate expression for zero, first, second order reactions (for equal conc. of reactants), Half-life period of a reaction

Unit - II

Alkanes (upto 5 carbon atoms): Alkanes, nomenclature, classification of carbon atoms in alkanes. Isomerism in alkanes, sources, methods of formation: Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids, physical properties. Mechanism of free radical halogenation of alkanes: reactivity and selectivity.

Metallic Bond and semiconductors: Metallic bond – Qualitative idea of valence bond and Band theories of metallic bond (conductors, semiconductors, insulators). Semiconductors – Introduction, types, and applications.

Instructions for External Theory Paper Setter/Examiner:

The examiner will set 5 questions asking two questions of 12 marks from each unit and one compulsory question by taking course outcomes (CO) into consideration. The compulsory question (Question No. 1) will contain 5 parts of 11 marks covering entire syllabus. The examinee will be required to attempt 3 questions, selecting one question from each unit and the compulsory question.

Recommended Readings:

1. DhawanS.N.,Organic Chemistry, Vol 1 Pardeep Publication.
2. J.D. Lee, Concise Inorganic Chemistry (4th Edition), Chapman and hall Publications.

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Introductory Chemistry-I
B-CHE-103

Total Credits: 3
L - T - P
2 - 0 - 2

External Theory Marks: 35
Internal Assessment Marks: 15
Time allowed: 2 hrs

Course Outcomes:
After completing this course, the learner will be able to:

CO1 To get knowledge about structure and bonding.
CO2 To learn about hydrocarbons and their applications.
CO3 To get aware about different polymers and preservative.

UNIT-I

Atomic Structure and Bonding: Introduction, Elementary introduction of atomic structure and chemical bonding, Representation of elements/ atoms, Lewis structure, electronic configurations.

UNIT-II

Carbon and Its Compounds: Introduction, Tetravalency of Carbon, allotropes of carbon and their properties, hydrocarbons, nomenclature (linear compounds), Applications of hydrocarbons.

UNIT-III

Polymers: Introduction, elementary idea of synthetic and natural polymers, Homo polymers and copolymers, uses and properties (Natural rubber, Vulcanized rubber, Polyethene, PVC, Styrene, Teflon, PAN, Nylon-66).
Food Preservatives: Elementary idea of natural and synthetic food preservatives, rancidity, uses and properties, different food preservation processes (pickle, Jam), artificial sweeteners, uses and properties.

Instructions for External Theory Paper Setter/Examiner:
The examiner will set 7 questions asking two questions from each unit and one compulsory question by taking course outcomes (COs) into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 4 questions, selecting one question from each unit and the compulsory question.

Recommended Books/e-resources/LMS:

1. Lee, J.D.; (2010), Concise Inorganic Chemistry, Wiley India.
2. Morrison, R. N.; Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. B. Sivasankar, Food processing and preservation, Prentici Hall India learning private limited.
4. ManasChanda, 2013, Introduction to Polymer Science and Chemistry 2nd Edition, Making Rayon Fiber - Artificial silk, chemical experiment.
5. Neelam Seedher, Basic Concepts: Physical Chemistry Experiments, Kindley Edition

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Practical

External Practical Marks: 15
Internal Assessment Marks: 10
Time allowed: 2 hrs

Course Outcomes:

CO1: To get knowledge about experiments related to daily life.

1. Identify the pH of the given samples through pH strip.
2. Experiments related to persevering food items.
3. Preparation of Artificail Silk.
4. To senthesize some polymers asper available resources.

Instructions for External Practical Paper Setter/Examiner:

The examiner will set 2 Experiments at the time of practical examination by taking course outcomes (CO) into consideration. Equal weightage will be given to both the Experiments. The evaluation will be done on the basis of practical record, viva-voce, write up and experimental results

Chemistry-II
B-CHE-201

Total Credits: 4	**External Theory Marks: 50**
L - T - P	**Internal Assessment Marks: 20**
3 - 0 - 2	**Time allowed: 3 hrs**

Course Outcomes:

CO1 Able to understand the theories which governs the shape, structure and ionic behavior, polarizability, ionic structures and concept of Lattice energy of crystals of molecules.

CO2 To know the basics of rates of chemical reactions ,the laws and solubility behavior of solutes in different compositions of solvents

CO3 To know about alkanes, alkene, cycloalkanes and their chemical reactions.

CO4 To understand about weak interactions and bonding in metals.

UNIT-I

Ionic Solids: Ionic structures (NaCl, CsCl, ZnS (Zinc blende), CaF_2) size effects, radius ratio rule and its limitations, Concept of Lattice energy, Born- Haber cycle, Solvation energy and its relationship with solubility of Ionic solids, Polarizing power and Polarisability of ions, Fajan's rule.

UNIT-II

ChemicalKinetics: Concept of reaction rates, rate equation, factors influencing the rate of reaction,Order and molecularity of a reaction, integrated rate expression for zero, first, Half-life period of a reaction, Arrhenius equation.

Distribution Law: Nernst distribution law – its thermodynamic derivation, Nernst distribution law after association and dissociation of solute in one of the phases, of distribution law: (i) Determination of degreeof hydrolysis and hydrolysis constant of aniline hydrochloride

UNIT-III

Alkanes and Cycloalkanes: Nomenclature, classification of carbon atoms in alkanes and its structure. Isomerism in alkanes, sources. Methods of formation: Wurtz reaction, Kolbe reaction, Corey- House reaction and decarboxylation of carboxylic acids, physical properties. Mechanism of free radical halogenation of alkanes: reactivity and selectivity: Nomenclature of Cycloalkanes, Baeyer's strain theory and its limitations, theory of strainless rings.

Alkenes: Nomenclature of alkenes and its structure. Methods of formation: dehydration of alcohols, dehydrohalogenation of alkyl halide, Hofmann elimination and their mechanism. The Saytzeff rule and relative stabilities of alkenes. Chemical reactions: electrophilic and free radical additions, addition of halogens, halogen acids, hydroboration–oxidation, oxymercuration-reduction, ozonolysis and hydration, Markownikoff's rule of addition.

UNIT-IV

Hydrogen Bonding and Van der Waals forces Hydrogen Bonding – Definition, types, effects of hydrogen bonding on properties of substances, application and Brief discussion of various types of Van der Waals forces.

Metallic Bond and semiconductors: Metallic bond – Qualitative idea of valence bond and Band theories of metallic bond (conductors, semiconductors, insulators), Semiconductors – Introduction, types, and applications.

Instructions for External Theory Paper Setter/Examiner:

The examiner will set 9 questions asking two questions from each unitand one compulsory question by taking course outcomes (COs) into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question.

RecommendedBooks/e-resources/LMS:

1. Lee,J.D.;(2010),Concise Inorganic Chemistry,Wiley India.
2. Kapoor, K.L. (2015),A textbook of Physical Chemistry, Vol1, 6th Edition, McGraw Hill Education.
3. Clayden,J.;Greeves,N.;Warren,S.(2012), OrganicChemistry, Oxford.
4. Morrison,R.N.;Boyd,R.N.Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education)
5. Khosla, B.D. ;Garg,V.C.;Gulati,A.(2015), Senior Practical Physical Chemistry ,R. Chand & Co, New Delhi.
6. Jeffery,G.H.;Bassett,J.;Mendham,J.;Denney,R.C.(1989),Vogel'sTextbook of Quantitative Chemical Analysis, John Wiley and Sons.

Practical

External Practical Marks: 20
Internal Assessment Marks:10
Time allowed: 2 hrs

Course Outcomes:

CO1: Hand on practice for estimation and determination of viscosity, specific refractivity properties of some compounds.

1. Complexometric titrations: Determination of Mg^{2+} by EDTA.
2. Paper Chromatography: Qualitative Analysis of any one of the following Inorganic cations and anions by paper chromatography (Pb^{2+}, Cu^{2+}, Ni^{2+}, Cl^{-}, Br- , and PO_4^{3-} and NO^{3-}).
3. To determine the viscosity of given liquid using Ostwald's Viscometer.
4. To determine the specific refractivity of at least two liquids by Refractometer.
5. Separation of mixture of two Organic Compounds by TLC.

Instructions for External Practical Paper Setter/Examiner:

The examiner will set 2 Experiments at the time of practical examination by taking course outcomes (CO) into consideration. Equal weightage will be given to both the Experiments. The evaluation will be done on the basis of practical record, viva-voce, write up and experimental results

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Minor Chemistry II
B-CHE-202

Total Credits: 2	**External Theory Marks: 35**
L - T - P	**Internal Assessment Marks: 15**
2 - 0 - 0	**Time allowed: 1:30 hrs**

Course Outcomes:

After completing this course, the learner will be able to:

CO1 To know the basics of periodic properties, hybridization and Ionic Solids.

CO2 Get the knowledge of metallic bonds and stereochemistry of simple organic molecules.

UNIT – I

Periodictable and atomic properties

Atomic properties: atomic and ionic radii, ionisation energy, electron affinity and electronegativity definition, methods of determination or evaluation, trend in periodic table, effective nuclear charge, Slater's rules. Directional characteristics of covalent bond, various type of hybridisation and shapes of simple inorganic moleculesand ions (BeF_2, BF_3, CH_4, PF_5, SF_6, IF_7, SO_4^{-2}, CO_3^{-2}, NO_3^{-1}

Ionic Solids: Stoichiometric and Non-stoichiometric defects in crystals, Lattice energy and Born- Haber cycle, Solvation energy and its relationship with solubility of Ionic solids, Polarizing power and Polarisability of ions, Fajan's rule. Metallic bond – Qualitative idea of valence bond and Band theories of metallic bond (conductors, semiconductors, insulators)

UNIT – II

Metallic Bond

Localized and delocalized chemic al bond, Van der Waal's interactions, resonance: conditions, resonance effect and its applications, hyperconjugation, inductive effect, Electromeric effect & their comparison.

Stereochemistry of OrganicCompounds

Concept of isomerism.Types of isomerism. Optical isomerism, element s of symmetry, enantiomers, stereogenic centre,optical activity, properties of enantiomers, chiral and achiral molecules (upto two stereo genic centres), diastereomers, threo and erythro-diastereomers, meso compounds Relative and absolute configuration, sequence rules, R & S systems of nomenclature, Geometrical isomerism.Determination of configuration of geometric isomers.

Instructions for External Theory Paper Setter/Examiner:

The examiner will set 5 questions asking two questions of 12 marks from each unit and one compulsory question by taking course outcomes (CO) into consideration. The compulsory question (Question No. 1) will contain 5 parts of 11 marks covering entire syllabus. The examinee will be required to attempt 3 questions, selecting one question from each unit and the compulsory question.

Recommended Readings:

1. Huheey,J.E.;Keiter,E.A.;Keiter;R.L.;Medhi,O.K.(2009),Inorganic Chemistry-Principles of Structure and Reactivity,Pearson education.
2. Atkins, P.W.; Paula, J.de.(2014), Atkin's Physical Chemistry Ed., 10th Edition,Oxford University Press.
3. Kapoor,K.L.(2015),A Textbook of Physical Chemistry ,Vol1, 6thEdition,McGraw Hill Education.
4. Nasipuri,D.(2018),Stereochemistry of Organic Compounds: Principles and Applications, 3 rd Edition, New Age International.
5. Gunstone,F.D.(1975),GuidebooktoStereochemistry,PrenticeHallPress.

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Introductory Chemistry-II
B-CHE-203

Total Credits: 3
L - T - P
2 - 0 - 2

External Theory Marks: 35
Internal Assessment Marks: 15
Time allowed: 2 hrs

Course Outcomes:

After completing this course, the learner will be able to:

CO1 To learn about role of Indian scientists in the upliftment of research
CO2 To learn about classification of elements with their properties
CO3 To learn about three states of matte and role of fertilizers in fertility of soil

UNIT-I

Renowned Indian Scientists

Brief Biography of Renowned Indian Scientists (Hargobind Khurana, Dr. P.C. Ray, Sir C.V. Raman, Dr. A.P.J. Abdul Kalam, C. N. R. Rao, Dr. Vikram Sara Bhai, Dr. Homi Jahangir Bhabha, Dr. J.C. Bose, Dr. S. N. Bose)

UNIT-II

MetalandNon-Metals

Periodic table, classification of elements, physical andchemical aspects of metals and non-metals, Ore and Minerals of Iron, Copper, Aluminium, alloys

UNIT-III

Physical Properties of Matter

Classification of matter, properties, uses, ideal gas equation, real gas equation, some important compounds (baking soda, washing soda, plaster of Paris, gypsum, glass)

Soil and fertilizers

Green revolution, soil: types of soil and their components for fertility, grow condition, pH, irrigation, bio-fertilizers, chemical fertilizers and their uses, acid rain.

Instructions for External Theory Paper Setter/Examiner:

The examiner will set 9 questions asking two questions of 7 marks from each unit and one compulsory question by taking course outcomes (COs) into consideration. The compulsory question (Question No. 1) will beof 7 marks covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question.

Recommended Readings:

1. Chemistry In Daily Life:Third Edition by Kirpal Singh, PHI Learning
2. General Chemistry: Principles, Patterns ,and Applications, Bruce Averill, Strategic Energy Security Solution, Patricia Eldredge, R.H. Hand, LLC, Copyright Year: 2011
3. The Great Indian Scientists Paperback-1 January2017, Cengage Learning India

Practical

External Practical Marks: 15
Internal Assessment Marks: 10
Time allowed: 2 hrs

Course Outcomes:
CO1: To learn about acid- base reaction in daily life

1. To prepare Plaster of Paris
2. To prepare Potash Alum
3. To study the effect of acid on Baking and washing soda
4. To perform the action of water on quick lime and identify the nature of reaction (Exo/Endothermic)

Instructions for External Practical Paper Setter/Examiner:
The examiner will set 2 Experiments at the time of practical examination by taking course outcomes (CO) into consideration. Equal weightage will be given to both the Experiments. The evaluation will be done on the basis of practical record, viva-voce, write up and experimental results

Bhagat Phool Singh Mahila Vishwavidyalaya Khanpur Kalan

Scheme and Syllabus of Computer Sciences Subject for 4 Year UG Programme
Bachelor of Physical Sciences
w.e.f. Academic session- 2024-25

First Year: First Semester

Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1.	B-CSC-101	DSC	Computer Fundamental and Programming Methodology	3	2	0	3+1=4	20	10	50	20	100
2.	B-CSC-102	MIC	Basics of Computer	2	0	0	2	15	0	35	0	50
3.	B-CSC-103	MDC	Fundamentals of Computer Science	2	2	0	2+1=3	15	10	35	15	75

First Year: Second Semester

Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1.	B-CSC - 201	DSC	Programming with C	3	2	0	3+1=4	20	10	50	20	100
2.	B-CSC - 202	MIC	Basic of IT Tools	2	0	0	2	15	0	35	0	50
3.	B-CSC-203	MDC	Web Designing with HTML	2	2	0	2+1=3	15	10	35	15	75

Second Year: Third Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1.	B-CSC-301	DSC	Data and File Structure Using C	3	2	0	3+1=4	20	10	50	20	100
2.	B-CSC-302	MIC	Logical Organization of Computer	4	0	0	4	30	0	70	0	100
3.	B-CSC-303	MDC	Advance IT Skills	2	2	0	2+1=3	15	10	35	15	75

Second Year: Fourth Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1.	B-CSC-401	DSC	Object Oriented Programming with C++	3	2	0	3+1=4	20	10	50	20	100
2.	B-CSC-402	MIC	Advanced Data and File Structure	4	0	0	4	30	0	70	0	100

Third Year: Fifth Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1.	B-CSC-501	DSC	Data Base Management System	3	2	0	3+1=4	20	10	50	20	100
2.	B-CSC-502	MIC	Operating System	4	0	0	4	30	0	70	0	100

Third Year: Six Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1.	B-CSC-601	DSC	Programing in Python	3	2	0	3+1=4	20	10	50	20	100
2.	B-CSC-602	MIC	Software Engineering	4	0	0	4	30	0	70	0	100
3.	B-CSC-603	MIC(VOC)	E-Commerce	4	0	0	4	30	0	70	0	100

Fourth Year: Seventh Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1.	B-CSC-701	DSC-C1	Computer Networks	3	2	0	3+1=4	20	10	50	20	100
2.	B-CSC-702	DSC-C2	Artificial Intelligence	4	0	0	4	30	0	70	0	100
3.	B-CSC-703	DSC-C3	Cloud Computing	4	0	0	4	30	0	70	0	100
4.	B-CSC-704	DSC-C4	Cyber Security	3	2	0	3+1=4	20	10	50	20	100
5.	B-CSC-705	DSC-C5	Data Mining & Warehousing	4	0	0	4	30	0	70	0	100
6.	B-CSC-706	MIC	Emerging Trends in Information Security	3	2	0	3+1=4	20	10	50	20	100

Fourth Year: Eighth Semester(4 Year UG Hon.)												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1.	B-CSC-801	DSC-C6	Visual Basic Programming	3	2	0	3+1=4	20	10	50	20	100
2.	B-CSC-802	DSC-C7	Programming in JAVA	3	2	0	3+1=4	20	10	50	20	100
3.	B-CSC-803	DSC-C8	Digital Marketing	4	0	0	04	30	0	70	0	100
4.	B-CSC-804	DSC-C9	Big Data	4	0	0	4	30	0	70	0	100
5.	B-CSC-805	DSC-C10	Internet of Things	3	2	0	3+1=4	20	10	50	20	100
6.	B-CSC-806	MIC	Principles of Design and Analysis of algorithms	4	0	0	4	30	0	70	0	100

Fourth Year: Eighth Semester(4 Year UG Hon. With Research)												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1.	B-CSC-801	DSC-C6	Visual Basic Programming	3	2	0	3+1=4	20	10	50	20	100
2.	B-CSC-802	DSC-C7	Programming in JAVA	3	2	0	3+1=4	20	10	50	20	100
3.	B-CSC-806	MIC	Principles of Design and Analysis of algorithms	4	0	0	4	30	0	70	0	100
4.	B-CSC-807	SEC	Research Project/ Dissertation	12	0	0	12					300

Computer Fundamental and Programming Methodology
B-CSC-101

Total Credits: 4
L - T - P
3 - 0 - 2

External Theory Marks: 50
Internal Assessment Marks: 20
Time allowed: 3hrs

Course outcomes: After completing this course, the learner will be able to:
CO1. Understand the basics of computer
CO2. Learn about I/O devices and operating systems
CO3. Understand memory and email.
CO4. Learn about the threats and security concepts on computers

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Unit – I

Computer Fundamentals: Evolution of Computers through generations, Characteristics of Computers, Strengths and Limitations of Computers, Classification of Computers, Functional Components of a Computer System, Applications of computers in Various Fields. Types of Software: System software, Application software, Utility Software, Shareware, Freeware, Firmware, Free Software.

Unit – II

I/O Devices: I/O Ports of a Desk Top Computer, Device Controller, Device Driver. Input Devices: classification and use, keyboard, pointing devices - mouse, touch pad and track ball, joystick, magnetic stripes, scanner, digital camera, and microphone Output Devices: speaker, monitor, printers: classification, laser, ink jet, dot-matrix. Plotter.

Introduction to Operating System: Definition, Functions, Features of Operating System, Icon, Folder, File, Start Button, Task Bar, Status Buttons, Folders, Shortcuts, Recycle Bin, Desktop, My Computer, My Documents, Windows Explorer, Control Panel.

Unit – III

Memory Systems: Concept of bit, byte, word, nibble, storage locations and addresses, measuring units of storage capacity, access time, concept of memory hierarchy. Primary Memory - RAM, ROM, PROM, EPROM. Secondary Memory - Types of storage devices, Magnetic Tape, Hard Disk, Optical Disk, Flash Memory.

Electronic Mail: Introduction, advantages and disadvantages, User Ids, Passwords, e-mail addresses, message components, message composition, mailer features. Browsers and search engines.

Unit – IV

Planning the Computer Program: Concept of problem solving, concept of programming, , program design, Debugging, Types of error, Techniques of problem solving: algorithms and flowcharting, pseudo code, decision table, concept of structured programming Programming methodologies-Top-Down and bottom up programming. Computer languages: Machine, assembly, high level language, compiler, interpreter, assembler.

Recommended Readings:

1.Sinha, P.K. & Sinha, Priti, Computer Fundamentals, BPB.
2.Dromey, R.G., How to Solve it By Computer, PHI.
3.Norton, Peter, Introduction to Computer, McGraw-Hill.
4.Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World.
5.Rajaraman, V., Fundamentals of Computers, PHI.
6.Gill,NasibS.:EssentialsofComputerandNetworkTechnology,KhannaBookPublishingCo.,New Delhi.
7.Gill Nasib Singh: Computing Fundamentals and Programming in C, Khanna Books Publishing Co.,New Delhi.

Note: Latest and additional good books may be suggested and added from time to time, covering the syllabus.

1200 -

Instructions for External Theory Paper Setter/Examiner:
The examiner will set 9 questions asking two questions from each unitand onecompulsoryquestion by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) willcontain 5 parts covering entire syllabus.The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question.

Practical

External Practical Marks: 20
Internal Assessment Marks: 10
Time allowed: 2hrs

Course Outcomes:
The following activities be carried out/ discussed in the lab during the initial period of the semester.

Laboratory:
Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

Computer Basics:
Identify the various computer hardware
Understanding the working of computer
Understanding various types of software

Operating System:
Starting with basics of Operating Systems and its functionalities

Internet and E-mail:
Using Internet for various tasks
Creating and using e-mail.

MS-Word, MS-PowerPoint

Basics of Computer
B-CSC-102

Total Credits: 2
L - T - P
2 - 0 - 0

External Theory Marks: 35
Internal Assessment Marks: 15
Time allowed: 1:30hrs

Course Outcomes:

CO1: To introduce to the students, the basic understanding of the working of a computer system and familiar with the basic internet technology and concepts.

CO2: To familiarize the students with the various types of software.

UNIT-I

Introduction to Computers: Definition of Computers, History and Generations of Computers, Characteristics of computer, Classification of Computers. Fundamental Block diagram of Computer: CPU, Input & Output Unit. Networking: Concept, Basic Elements of a Communication System, Data Transmission Media, LAN, MAN, WAN.
Introduction of Internet and WWW, Basic working of a Web Browser, Introduction to popular web browsers

UNIT-II

Software: Definition of Software, Types of Software-System software, Application software and Utility software. Types of Computer Languages, Assemblers, Interpreters, Compiler.
Introduction to OperatingSystems: Types of Operating System, Functions of Operating System.

Recommended Readings:

1. Fundamentals of Computers, V. Rajaraman 6th edition PHI Learning Private Limited 2014.
2. Peter Norton: Computing Fundamentals. 6th Edition, McGraw Hill-Osborne,2007
3. Alexis Leon and Marthews Leon: Introduction to Computers, Leon Vikas,1999.
4. Internet Basics. E.DouglasCommer PHI.

Note: Latest and additional good books may be suggested and added from time to time, covering the syllabus.

Instructions for External Theory Paper Setter/Examiner:
The examiner will set 5 questions asking two questions of 12 marks from each unit and one compulsory question by taking course outcomes (CO) into consideration. The compulsory question (Question No. 1) will contain 5 parts of 11 marks covering entire syllabus. The examinee will be required to attempt 3 questions, selecting one question from each unit and the compulsory question.

— 1202

Fundamental of Computer Science
B-CSC- 103

Total Credits: 3
L - T - P
2 - 0 - 2

External Theory Marks: 35
Internal Assessment Marks: 15
Time allowed: 2 hrs

Course Outcomes: A successful completion of this course, the students will be able to:
CO1. Understand the basic concepts of computer systems
CO2. Understand the basic concepts of memory and I/O.
CO3. Understand the basic concepts of Operating System.

Unit –I

Computer Fundamentals: Evolution of Computers through generations, Characteristics of Computers, Strengths and Limitations of Computers, Classification of Computers, Functional Components of a Computer System, Applications of computers in Various Fields. Types of Software: System software, Application software, Utility Software.

Unit-II

Memory Systems: Concept of bit, byte, word, nibble, storage locations and addresses, measuring units of storage capacity, access time, concept of memory hierarchy. Primary Memory - RAM, ROM, PROM, EPROM. Secondary Memory - Types of storage devices, Magnetic Tape, Hard Disk, Optical Disk, Flash Memory.

I/O Devices: I/O Ports of a Desk Top Computer, Device Controller, Device Driver. Input Devices: classification and use, keyboard, pointing devices - mouse, touch pad and track ball, joystick, magnetic stripes, scanner, digital camera, and microphone Output Devices: speaker, monitor, printers: classification, laser, ink jet, dot-matrix. Plotter.

Unit-III

Introduction to Operating System: Definition, Functions, Features of Operating System, Icon, Folder, File, Start Button, Task Bar, Status Buttons, Folders, Shortcuts, Recycle Bin, Desktop, My Computer, My Documents, Windows Explorer, Control Panel.

Recommended Readings:

1. Sinha, P.K. & Sinha, Priti, Computer Fundamentals, BPB.
2. Dromey, R.G., How to Solve it By Computer, PHI.
3. Norton, Peter, Introduction to Computer, McGraw-Hill.
4. Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World.
5. Rajaraman, V., Fundamentals of Computers, PHI.

Note: Latest and additional good books may be suggested and added from time to time, covering the syllabus.

Instructions for External Theory Paper Setter/Examiner:
The examiner will set 7 questions asking two questions from each unit and one compulsory question by taking course outcomes (COs) into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 4 questions, selecting one question from each unit and the compulsory question

Practical

External Practical Marks: 15
Internal Assessment Marks: 10
Time allowed: 2hrs

Course Outcomes:
The following activities be carried out/ discussed in the lab during the initial period of the semester.

Laboratory:
Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

Computer Basics:
Identify the various computer hardware
Understanding the working of computer
Understanding various types of software

Operating System:
Starting with basics of Operating Systems and its functionalities

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Instructions for External Practical Paper Setter/Examiner:

1. The examiner will set two questions at the time of practical examination by taking course learning outcomes into consideration.
2. Equal weightage will be given to both the questions.
3. The evaluation will be done on the bases of practical record, viva-voce, write up and execution of the practical work done in the class and at the time of the examination.

Programing with C
B-CSC-201

Total Credits: 4
L - T - P
3 - 0 - 2

External Theory Marks: 50
Internal Assessment Marks: 20
Time allowed: 3 hrs

Course Outcomes:

CO1: Understand the concepts of structure of C program and the basics of C programming along with various I/O functions
CO2: Understand various operators
CO3: Understand various loops and branching statements in C
CO4: Understand function defining, functions call and arrays in C

UNIT-I

Overview of C: History, Importance, Structure of C Program, Character Set, Constants and Variables, Identifiers and Keywords, Data Types, Assignment Statement, Symbolic Constant. Input/output: Unformatted & Formatted I/O Function, Input Functions viz. scanf(), getch(), getche(), getchar(), gets(), output functions viz. printf(), putch(), putchar(), puts().

UNIT-II

Operators & Expression: Arithmetic, Relational, Logical, Bitwise, Unary, Assignment, Conditional Operators and Special Operators Operator Hierarchy & Associativity. Arithmetic Expressions, Evaluation of Arithmetic Expression, Type Casting and Conversion

UNIT-III

Decision making with if statement, if-else statement, nested if statement, else-if ladder, switch and break statement, goto statement. Looping: for, while, and do-while loop, jumps in loops.

UNIT-IV

Functions: definition, prototype, function call, passing arguments to a function: call by value, call by reference, recursive functions.Arrays: Definition, types, Initialization, multidimensional arrays, Processing on Arrays.

Recommended Readings:

1. Gottfried, Byron S., Programming with C, Tata McGraw Hill.
2. Balagurusamy, E., Programming in ANSI C, Tata McGraw-Hill.
3.Jeri R. Hanly& Elliot P. Koffman, Problem Solving and Program Design in C, Addison Wesley.
4. YashwantKanetker, Let us C, BPB.
5. Rajaraman, V., Computer Programming in C, PHI.
6. YashwantKanetker, Working with C, BPB
7. Gill Nasib Singh: Computing Fundamentals and Programming in C, KhannaBooksPublishing Co.,New Delhi.

Note: Latest and additional good books may be suggested and added from time to time, covering the syllabus.

Instructions for External Theory Paper Setter/Examiner:

The examiner will set 9 questions asking two questions from each unit and one compulsoryquestionbytakingcourselearningoutcomes(CLOs)intoconsideration.Thecompulsoryquestion (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will berequired toattempt5 questions, selecting onequestion from each unitand the compulsoryquestion.

- 1905

Practical

External Practical Marks: 20
Internal Assessment Marks: 10
Time allowed: 2hrs

Course Outcomes:
The following activities be carried out/discussed in the lab during the initial period of the semester.

Programming Lab:

- Write a C Program to read three numbers and find the sum.
- Write a C Program to read length and breadth and find area and perimeter of a rectangle.
- Write a C Program to read three numbers and find the biggest of three
- Write a C Program to demonstrate library functions in math.h (at least 5)
- Write a C Program to read a number, find the sum of the digits, reverse the number and check it for palindrome
- Write a C Program to find the simple interest.
- Write a C Program to read percentage of marks and to display appropriate grade (using switch case)
- Program to find whether a year is leap or not.
- Write a C Program to find the roots of quadratic equation (if else ladder)
- Write a C program to print triangle of star.
- Write a C Program to check a number for even or odd.
- Program to perform addition and subtraction of Matrices
- Write a C Program to print first 10 natural numbers using for loop.
- Write a C Program to find the sum of two numbers using function.
- Write a C Program to print the Fibonacci series.

Basic of IT Tools
B-CSC-202

Total Credits: 2
L - T - P
2 - 0 - 0

External Theory Marks: 35
Internal Assessment Marks: 15
Time allowed: 1:30 hrs

Course Outcomes:

CO1: Identify the basic components of computers and computer networks, browser.

CO2:.Understand and use of email and social networking.

UNIT – I

Introduction to Computer: Computer and Latest IT gadgets, Evolution of Computers & its applications, Basics of Hardware and Software, Application Software, Systems Software, Utility Software. Central Processing Unit, Input devices, Output devices, Computer Memory & storage, Mobile App
Introduction to Internet and World Wide Web, Basic of Computer Networks, Local Area Network (LAN), Wide Area Network (WAN), Network Topology, Internet, Applications of Internet, Website Address and URL, Popular Web Browsers (Internet Explorer/Edge, Chrome, Mozilla Firefox, Opera etc.), Popular Search Engines, Searching on the Internet.

UNIT-II

E-mail: Using E-mails, Opening Email account, Mailbox: Inbox and Outbox, Creating and Sending a new E-mail, replying to an E-mail message, forwarding an E-mail message, searching emails, and Attaching files with email, Email Signature. Social Networking: Facebook, Twitter, LinkedIn, Instagram, Instant Messaging (WhatsApp, Facebook Messenger, Telegram), Introduction to Blogs, Digital Locker.

Recommended Readings:

1. Sinha, P.K. & Sinha, Priti, Computer Fundamentals, BPB
2. Dromey, R.G., How to Solve it By Computer, PHI
3. Norton, Peter, Introduction to Computer, McGraw-Hill
4. Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World
5. Rajaraman, V., Fundamentals of Computers, PHI
6. Ram, B., Computer Fundamentals, Architecture & Organization, New Age International (P)Ltd.

Note: Latest and additional good books may be suggested and added from time to time, covering the syllabus.

Instructions for External Theory Paper Setter/Examiner:

The examiner will set 5 questions asking two questions of 12 marks from each unit and one compulsory question by taking course outcomes (CO) into consideration. The compulsory question (Question No. 1) will contain 5 parts of 11 marks covering entire syllabus. The examinee will be required to attempt 3 questions, selecting one question from each unit and the compulsory question.

Web Designing with HTML
B-CSC- 203

Total Credits: 3
L - T - P
2 - 0 - 2

External Theory Marks: 35
Internal Assessment Marks: 15
Time allowed: 2 hrs

Course Outcomes: A successful completion of this course, the students will be able to:
CO1: Understand the fundamental concepts of web development
CO2: Understand the image and hyperlink.
CO3: Understand the basic tags of HTML

Unit –I

Web Programming Introduction: Architecture of a website, Different technologies in making the website; Introduction to HTML: History of HTML, Basic structure of an HTML document, Introduction to Static and Dynamic Websites.

Unit-II

HTML Tag vs Element, HTML Attributes; HTML-Basic Formatting Tags; Grouping Using Div and Span, HTML-Lists: Unordered Lists, Ordered Lists, Definition list; Image and Image Mapping, Hyperlink.

Unit-III

HTML-Table: < table >, <th>, <tr>, < td >, < caption >, <thead>, <tbody>, <tfoot>, <colgroup>, <col>; Colspan & Rowspan
HTML-Iframe: Iframe attributes, Using Iframe as the Target; HTML-Form: Form attributes, Form elements: < input >, <textarea>. <button>, < select >, < label >, <fieldset>, <legend>etc.

Recommended Readings:

1. Deitel H.M., Deitel P.J., Internet & World Wide Web: How to program, Pearson Education.
2. Jackson, Web Technologies, Pearson Education

Instructions for External Theory Paper Setter/Examiner:
The examiner will set 7 questions asking two questions from each unit and one compulsory question by taking course outcomes (COs) into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 4 questions, selecting one question from each unit and the compulsory question

1208

Practical

External Practical Marks: 15
Internal Assessment Marks: 10
Time allowed: 2hrs

Course Outcomes:
The following activities be carried out/ discussed in the lab during the initial period of the semester.

Laboratory:
Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

Web Designing:
Starting with introduction to WWW

HTML:

- Write a HTML document to print "Hello World" in bold and Italic Format.
- Design a page having suitable background colour and text colour with title "My First Web Page" using all the attributes of the Font tag.
- Write HTML code to design a page containing some text in a paragraph by giving suitable heading style.
- Write HTML code to display three images at LEFT, RIGHT and CENTER respectively in web browser.
- Write HTML code which contains Hyperlinks.
- Program based on HTML form and frames
- Design a HTML table with the use of colspan and rowspan

Bhagat Phool Singh Mahila Vishwavidyalaya Khanpur Kalan

Scheme and Syllabus of Mathematics Subject for 4 Year UG Programme
Common for Bachelor of Arts and Bachelor of Physical Science
w.e.f. Academic session- 2024-25

Scheme of Examination for 1st semester

First Year: 1st Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-MAT-101	DSC	Calculus	3	2	0	4	20	10	50	20	100
2	B-MAT-102	MIC	Basic Algebra	2	0	0	2	15	0	35	0	50
3	B-MAT-103	MDC	Introductory Mathematics	3	0	0	3	25	0	50	0	75

Scheme of Examination for 2nd Semester

First Year: 2nd Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-MAT-201	DSC	Algebra and Number Theory	3	2	0	4	20	10	50	20	100
2	B-MAT-202	MIC	Vector Calculus	2	0	0	2	15	0	35	0	50
3	B-MAT-203	MDC	Mathematics for commerce and Social Sciences	3	0	0	3	25	0	50	0	75

Scheme of Examination for 3rd semester

Second Year: Third Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-MAT-301	DSC	Analytical Geometry & Vector Calculus	3	2	0	4	20	10	50	20	100
2	B-MAT-302	MIC	Business Mathematics	4	0	0	4	30	0	70	0	100
3	B-MAT-303	MDC	Mathematics for All	3	0	0	3	25	0	50	0	75

Scheme of Examination for 4th semester

Second Year: Fourth Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-MAT-401	DSC	Differential Equations	3	2	0	4	20	10	50	20	100
2	B-MAT-402	MIC (VOC)	Mathematical Computing using Python	3	2	0	4	20	10	50	20	100

Scheme of Examination for 5th semester

Third Year: Fifth Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-MAT-501	DSC	Advanced Calculus	3	2	0	4	20	10	50	20	100
2	B-MAT-502	MIC (VOC)	Data Structure using C	3	2	0	4	20	10	50	20	100

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Scheme of Examination for 6th semester

Third Year: Sixth Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-MAT-601	DSC	Sequences and Series	3	2	-0	4	20	10	50	20	100
2	B-MAT-602	MIC	Probability Theory and Statistics	4	0	-0	4	30	0	70	0	100
3.	B-MAT-603	MIC (VOC)	Linear Programming	4	0	-0	4	30	0	70	0	100

Scheme of Examination for 7th semester

Fourth Year: Seventh Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-MAT-701	DSC-M1	Groups and Rings	4	0	-0	4	30	0	70	0	100
2	B-MAT-702	DSC-M2	Real Analysis-I	4	0	-0	4	30	0	70	0	100
3	B-MAT-703	DSC-M3	Complex Analysis	4	0	-0	4	30	0	70	0	100
4	B-MAT-704	DSC-M4	Special functions and integral transforms	4	0	-0	4	30	0	70	0	100
5	B-MAT-705	DSC-M5	Discrete Mathematics	4	0	-0	4	30	0	70	0	100
6	B-MAT-706	MIC	Programming in C and Numerical Methods	3	2	-0	4	20	10	50	20	100

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Scheme of Examination for 8th semester (4 years UG Hon.)

Fourth Year: Eighth Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-MAT-801	DSC-M6	Linear Algebra	4	0	0	4	30	0	70	0	100
2	B-MAT-802	DSC-M7	Real Analysis-II	4	0	0	4	30	0	70	0	100
3	B-MAT-803	DSC-M8	Mechanics	4	0	0	4	30	0	70	0	100
4	B-MAT-804	DSC-M9	Topology	4	0	0	4	30	0	70	0	100
5	B-MAT-805	DSC-M10	Theory of Ordinary Differential Equations	4	0	0	4	30	0	70	0	100
6	B-MAT-806	MIC	Numerical Analysis	3	2	0	4	20	10	50	20	100

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Scheme of Examination for 8th semester (4 years UG Hon. with Research)

Fourth Year: Eighth Semester												
Sr. No.	Course Code	Course Type	Course Title	Workload			Credits	Division of Marks				
				L	P	T		Internal Marks		External Marks		Total Marks
								T	P	T	P	
1	B-MAT-801	DSC-M6	Linear Algebra	4	0	0	4	30	0	70	0	100
2	B-MAT-802	DSC-M7	Real Analysis-II	4	0	0	4	30	0	70	0	100
3	B-MAT-803	MIC	Research Methodology and Statistics	4	0	0	4	30	0	70	0	100
4	B-MAT-804	Dissertation	Research Project/ Dissertation				12					300

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Calculus
B-MAT-101

Total Credits: 4
L - T - P
3 - 0 - 2

External Theory Marks: 50
Internal Assessment Marks: 20
Time allowed: 3 Hrs

Course outcomes:

CO1: Gain knowledge of the concepts and theory of limit, continuity and differentiability of functions. Attain skills of calculating the limit of functions and examining the continuity and differentiability of different types of functions and perform successive differentiation of functions. To apply the procedural knowledge to obtain the series expansions of functions which find multidisciplinary applications.

CO2: Understand concepts of asymptotes and curvature, the geometrical meaning of these terms and to have procedural knowledge to solve related problems.

CO3: Determine singular points of a curve and classify them. Understand the concept of rectification of curves and derive the reduction formulae.

CO4: Have theoretical knowledge and practical skills to evaluate the area bounded by the curves and volume and surface area of solids formed by revolution of curves.

Unit – I

$\varepsilon - \delta$ definition of limit and continuity of a real valued function, basic properties of limits, types of discontinuities. Differentiability of functions. Application of L'Hospital rule to indeterminate forms. Successive differentiation, Leibnitz theorem, Taylor's and Maclaurin's series expansion with different forms of remainder.

Unit – II

Asymptotes: Horizontal, vertical and oblique asymptotes for algebraic curves, asymptotes for polar curves, Intersection of a curve and its asymptotes, Curvature and radius of curvature of curves (cartesian, parametric, polar & intrinsic forms), Newton's method, Centre of curvature and circle of curvature.

Unit – III

Multiple points, Node, Cusp, conjugate points. Tests for concavity and convexity, Points of inflection. Tracing of curves. Reduction formulae.

Unit – IV

Rectification, intrinsic equation of a curve, Quadrature, Area bounded by closed curves. Volumes and surfaces of solids of revolution.

Instructions for External Theory Paper Setter/Examiner:

The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course outcomes (COs) into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 5 questions selecting one question from each unit and the compulsory question.

Recommended Readings:

1. Howard Anton, I. Bivens & Stephan Davis (2021). Calculus (12th edition). J. Wiley & Sons.
2. Gabriel Klambauer (1986). Aspects of Calculus (4th edition). Springer.

- 1915.

3. Wie Jaw Krawcewicz & Bindhyachal Rai (2003). Calculus with Maple Labs. Alpha Science Int'l Ltd.

4. Gorakh Prasad (2016). Differential Calculus (19th edition). Pothishala Pvt. Ltd.

5. George B. Thomas Jr., Joel Hass, Christopher Heil & Maurice D. Weir (2018).(14th edition). Pearson Education.

6. Monty J. Strauss, Gerald L. Bradley & Karl J. Smith (2002). Calculus (3rd edition). Dorling Kindersley (India) Pvt. Ltd

Practical

External Practical Marks: 20
Internal Assessment Marks: 10
Time allowed: 3 Hrs

Course Outcomes:

CO1: Attain cognitive and technical skills required for solving different problems of calculus associated with tracing of curves, determination of curvature and rectification of curves, volume and surface area of solids of revolution.

CO_2: Have technical and practical skills of solving calculus problems related to differentiation and integration of functions by using MAXIMA software.

(A) **Problem Solving-** Questions related to the following problems will be solved and their record will be maintained in the Practical Notebook:

1. Problems of curve tracing when equation is given in Cartesian coordinates.
2. Problems of curve tracing when equation is given in Parametric form.
3. Problems of curve tracing when equation is given in Polar coordinates.
4. Problem of determination of length of a curve expressed in Cartesian coordinates.
5. Problem of determination of length of a curve expressed inPolar coordinates.
6. Problem of determination of radius of curvature expressed in Cartesian coordinates.
7. Problem of determination of radius of curvature expressed in Polar coordinates.
8. Problem of determination of radius of curvature expressed in Parametric form.
9. Problem of determination of volumes and surfaces of solidsof revolution for Cartesian curve.
10. Problem of determination of volumes and surfaces of solids of revolution for parametric curve.
11. Problem of determination of volumes and surfaces of solids of revolution for Polar curve.

(B)The **following practicals** will be done **using MAXIMA software and their record will be maintained in the practical** note book:

1. Learn to use basic operators and functions in Maxima software.
2. Simplify algebraic expressions and expressions containing radicals, logarithms, exponentials and trigonometric functions.
3. Expand algebraic, rational, trigonometric and logarithmicexpressions.
4. Find derivatives of algebraic, trigonometric, exponential andlogarithmic functions.
5. Find derivatives of functions involving above mentionedfunctions.
6. Problems of successive differentiation.

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Basic Algebra
B-MAT-102

Total Credits: 2	**External Theory Marks: 35**
L - T - P	**Internal Assessment Marks: 15**
2 - 0 - 0	**Time allowed: 1:30 Hrs**

Course Outcomes:

CO_1: Gain knowledge of the concepts of symmetric, skew-symmetric, Hermitian, skew-Hermitian, Orthogonal and Unitary matrices.

CO_2: Have knowledge of procedure and cognitive skills used in calculatingrank of a matrix, row rank and column rank of a matrix.

CO_3: Gain knowledge of the concepts of eigen values, characteristic equation, minimal polynomial of a matrix and technical skills used in solving problems based on Cayley- Hamilton theorem.

CO_4: Acquire knowledge of Applications of matrices to a system of linear (both homogeneous and non–homogeneous) equations and theorems on consistency of a system of linear equations.

UNIT-I

Symmetric, Skew symmetric, Hermitian and skew Hermitian matrices. Elementary Operations on matrices. Rank of a matrices. Inverse of a matrix. Linear dependence and independence of rows and columns of matrices. Row rank and column rank of a matrix.

UNIT-II

Eigenvalues, eigenvectors and the characteristic equation of a matrix. Minimal polynomial of a matrix. Cayley Hamilton theorem and its use in finding the inverse of a matrix. Applications of matrices to a system of linear (both homogeneous and non–homogeneous) equations. Theorems on consistency of a system of linear equations. Unitary and Orthogonal Matrices.

Instructions for External Theory Paper Setter/Examiner:

The examiner will set 5 questions asking two questions of 12 marks from each unit and one compulsory question by taking course outcomes (CO) into consideration. The compulsory question (Question No. 1) will contain 5 parts of 11 marks covering entire syllabus. The examinee will be required to attempt 3 questions, selecting one question from each unit and the compulsory question.

Recommended Readings:

1. H.S. Hall and S.R. Knight: Higher Algebra, H.M. Publications 1994.
2. Shanti Narayan: A Text Books of Matrices.
3 Chandrika Prasad: Text Book on Algebra and Theory of equations, Pothishala Private Ltd., Allahabad.
4. Khurosh: Higher Algebra (Mir Publication)

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Introductory Mathematics
B-MAT-103

Total Credits: 3
L - T - P
3 - 0 - 0

External Theory Marks: 50
Internal Assessment Marks: 25
Time allowed: 2 Hrs

Course Outcomes:

CO_1: Gain the knowledge of set theory, types of sets and operations on sets. Understand various concepts of matrices and determinants.

CO_2: Acquire the cognitive skills to apply different operations on matrices and determinants. Gain the knowledge of the concepts of Arithmetic progression, Geometric progression and Harmonic progression, and find A.M., G.M. and H.M. of givennumbers.

CO_3: Have the conceptual knowledge of straight lines and circles. Find out the slope of a line, angle between two lines, and know about various forms of a straight line and the standard form of a circle.

UNIT-I

Sets and their representations, Empty set, Finite and infinite sets, Subsets, Equal sets, Power sets, Universal set, Union and intersection of sets, Difference of two sets, Complement of a set, Venn diagram, De-Morgan's laws and their applications. An introduction to matrices and their types, Operations on matrices, Symmetric and skew-symmetric matrices, Minors, Co-factors. Determinant of a square matrix, Adjoint and inverse of a square matrix.

UNIT-II

Arithmetic progression, Geometric progression, Harmonic progression, Arithmetic mean (A.M.), Geometric mean (G.M.), Harmonic mean (H.M.), Relation between A.M., G.M. and H.M.

UNIT-III

Straight lines: Slope of a line and angle between two lines, Different forms of equation of a line: Parallel to co-ordinate axes, Point-slope form, Slope-intercept form, Two-point form, General form; Distanceof a point from a straight line. Standard form of a circle and its properties.

Instructions for External Theory Paper Setter/Examiner:

The examiner will set 7 questions asking two questions from each unit and one compulsory question by taking course outcomes (COs) into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 4 questions, selecting one question from each unit and the compulsory question.

Recommended Readings:

1. C. Y. Young (2021). Algebra and Trigonometry. Wiley.
2. S.L. Loney (2016). The Elements of Coordinate Geometry (Cartesian Coordinates) (2nd Edition). G.K. Publication Private Limited.
3. Seymour Lipschutz and Marc Lars Lipson (2013). Linear Algebra. (4th edition) Outline Series, McGraw-Hill.
4. C.C. Pinter (2014). A Book of Set Theory. Dover Publications.
5. J. V. Dyke, J. Rogers and H. Adams (2011). Fundamentals of Mathematics (10th edition), Brooks/Cole.
6. A. Tussy, R. Gustafson and D. Koenig (2010). Basic Mathematics for College Students (4th Edition). Brooks Cole.

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Algebra and Number Theory
B-MAT-201

Total Credits: 4	**External Theory Marks: 50**
L - T - P	**Internal Assessment Marks: 20**
3 - 0 -2	**Time allowed: 3 Hrs**

Course Outcomes:

CO_1: Have knowledge of the concepts used in solving problems based on relations between the roots and coefficients of general polynomial equation in one variable, solutions of polynomial equations having conditions on roots, common roots and multiple roots.

CO_2: Understand Descarte's rule of signs and learn cognitive and technical skills required in assessing nature of the roots of an equation and solving problems based on these.

CO_3: Have deeper and procedural knowledge required for solving cubic and biquadratic equations usedin Mathematics as well as many other learning fields of study. To understand the basic concepts of number theory and their applications in problem solving and life- long learning.

CO_4: Have knowledge of concepts, facts, principles and theories of Linear Congruences, Fermat's theorem, Euler's theorem, Wilson's theorem and its converse, Chinese Remainder theorem. Attain cognitive skills used in solving linear Diophantine equations in two variables.

UNIT-I

Relations between the roots and coefficients of general polynomial equation in one variable, Solutions of polynomial equations having conditions on roots, Common roots and multiple roots, Transformation of equations.

UNIT-II

Solution of cubic equations (Cardon's method). Biquadratic equations and their solutions. Nature of the roots of an equation, Descarte's Rule of signs.

UNIT-III

Divisibility, Greatest common divisor (gcd), Least common multiple (lcm), Prime numbers, Fundamental theorem of arithmetic.

UNIT-IV

Linear congruences, Fermat's theorem, Euler's theorem, Wilson's theorem and its converse, Chinese Remainder theorem, Linear Diophantine equations in two variables.

Instructions for External Theory Paper Setter/Examiner:

The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course outcomes (COs) into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question.

Recommended Readings:

1) Stephen H. Friedberg, Arnold J. Insel & Lawrence E. Spence (2022). Linear Algebra (5th edition). Prentice Hall of India Pvt. Ltd.
2) K. B. Dutta (2004). Matrix and Linear Algebra. Prentice Hall of India Pvt. Ltd.
3) Vivek Sahai & Vikas Bist (2013). Linear Algebra (2nd edition). Narosa Publishing House.

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4) Seymour Lipschutz and Marc Lars Lipson (2013). Linear Algebra(4thEdition)OutlineSeries, McGraw-Hill.
5) I. Niven (1991). An Introduction to the Theory of Numbers (5th edition). John Wiley &Sons.
6) H.S. Hall and S.R. Knight (2023). Higher Algebra (7th edition). Arihant Publications.
7) Leonard Eugene Dickson (2009). First Course in the Theory of Equations. The Project Gutenberg EBook (http://www.gutenberg.org/ebooks/29785).

Practical

External Practical Marks: 20
Internal Assessment Marks: 10
Time allowed: 3 Hrs

Course Outcomes:

CO_1: Attain cognitive and technical skills required to formulate and solve practical problems involving Cardon's method, Ferrari's method and Descarte's method.

CO_2: Have technical and practical skills required for solving algebraic equations by using built in functions of MAXIMA software.

A) Problem Solving: Questions related to the following problems will be worked out and record of those will be maintained in the Practical Notebook:

1. Problems of solving cubic equations by Cardon's method.
2. Problems of solving biquadratic equations by Descarte's method.
3. Problems of solving biquadratic equations by Ferrari's method.
4. Problems to find GCD and LCM of two integers.
5. Problems to find solution of linear congruence using Euler's theorem.
6. Problems to find solution of linear congruence using Wilson's theorem.
7. Problems to find common solution of congruences using Chinese remainder theorem.

B) The following practicals will be done using MAXIMA Software and their record will be maintained in the practicalnote Book:

1. To find roots of algebraic equations using MAXIMA.
2. To find multiple roots of algebraic equations using MAXIMA.
3. Problems of solving cubic equations by Cardon's method using MAXIMA.
4. Problems of solving biquadratic equations by Descarte's method using MAXIMA.
5. Problems to find GCD and LCM of two or more integers using MAXIMA.
6. Problems of solving biquadratic equations by Ferrari's method using MAXIMA.

Instructions for External Practical Paper Setter/Examiner:

The practical component of the course has two parts, Problem Solving and Practicals using MAXIMA software. The examiner will set 4 questions at the time of practical examination asking two questions from the part (A) and two questions from the part (B) by taking course learning outcomes (CLOs) into consideration. The examinee will be required to solve one problem from the part (A) and to execute one problem successfully from the part (B). Equal weightage will be given to both the parts. The evaluation will be done on the basis of practical record, viva-voce, write up and execution of the program.

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Vector Calculus
B-MAT-202

Total Credits: 2
L - T - P
2 - 0 - 0

External Theory Marks: 35
Internal Assessment Marks: 15
Time allowed: 1:30 Hrs

Course Outcomes:

CO_1: Gain the knowledge of Scalar and vector product of multiple vectors.
CO_2: Acquire the knowledge of vector differentiation and derivative along a curve.
CO_3: Gain the knowledge of the concepts of gradient of a scalar point function, divergence and curl of vector point function
CO_4: Have the conceptual knowledge of properties of gradient, divergence, curl and Laplacian operator.

UNIT – I

Scalar and vector product of three vectors, product of four vectors. Reciprocal vectors. Vector differentiation. Scalar Valued point functions, vector valued point functions, derivative along a curve, directional derivatives.

UNIT-II

Gradient of a scalar point function, geometrical interpretation of grad ϕ, character of gradient as a point function. Divergence and curl of vector point function, characters of Div. $\overline{f}$ and Curl $\overline{f}$ as point function, examples. Gradient, divergence and curl of sums and product and their related vector identities. Laplacian operator.

Instructions for External Theory Paper Setter/Examiner:
The examiner will set 5 questions asking two questions 12 marks from each unit and one compulsory question of 11 marks by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 3 questions, selecting one question from each unit and the compulsory question.

Recommended Readings:

1. J.E. Marsden and A. Tromba, Vector Calculus, W.H. Freeman & Co. Ltd., 6th Edition.
2. Murrary R. Spiegal, Vector Analysis, Schaum's outlines, McGraw Hill Education, NewYork.
3. N. Saran and S.N. Nigam, Introduction to Vector Analysis, Pothishala Pvt. Ltd., Allahabad.
4. Shanti Narayna , A Text Book of Vector Calculus. S. Chand & Co., New Delhi.

Mathematics for Commerce and Social Sciences
B-MAT-203

Total Credits: 3
L - T - P
3 - 0 - 0

External Theory Marks: 50
Internal Assessment Marks: 25
Time allowed: 2 Hrs

Course Outcomes:

CO_1: Understand and have the procedural knowledge of the concepts of differentiation. Gain the knowledge to find derivatives and integration of simple functions related to commerce and social sciences. Acquire skills to make use of derivatives and integration in realistic problems of the discipline.

CO_2: Have the conceptual knowledge of compound interest, annuity, loan, debenture and sinking funds and attain skills to use these concepts in problem solving.

CO_3: Gain the knowledge and understanding of the concepts of Linear programming and develop skills of formulating and solving linear programming problems based on real world problems.

UNIT-I

Differentiation, Derivatives of simple functions and other functions having applications in business and social studies,Maxima and minima of a function and their applications to Revenue, Cost, Demand, Production, Profit functions and other functions related to commercial and social Problems. Integration of simple functions and its applications in commercial and economic problems.

UNIT-II

Simple interest and compound interest. Annuities: Types of annuities, Present value and amount of an annuity (including the case of continuous compounding), Valuation of simple loans and debentures, Problems related to sinking funds.

UNIT-III

Linear Programming: Formulation of linear programming problems (LPP) and their solution by graphical and Simplex methods. Applications of linear programming in solving social science and business problems.

Instructions for External Theory Paper Setter/Examiner:

The examiner will set 7 questions asking two questions from each unit and one compulsory question by taking course outcomes (COs) into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 4 questions, selecting one question from each unit and the compulsory question.

Recommended Readings:

1. E.T. Dowling (2020). Schaum's outlines of Calculus for Business, Economics and theSocial Sciences. McGraw Hill.
2. S.C. Gupta and V.K. Kapoor (2014). Fundamentals of Mathematical Statistics. S. Chand & Sons, Delhi.
3. D.C. Sancheti and V.K. Kapoor (2011). Business Mathematics. Sultan Chand and Sons.
4. Holden (2010). Introductory Mathematics for Business and Economics. Ane/pal Exclusive.
5. E.T. Dowling (2009). Schaum outlines of Mathematical methods for Business and Economics. McGraw Hill.
6. E. Don and J. Lerner(2009). Schaum's outline of Basic Business Mathematics (2nd Edition). McGraw Hill.
7. L. N. Paul (2002). Linear Programming: an introductory analysis. Tata Mcgraw Hill. New Delhi.

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