New Date :- 14/11/24

Department of Physics

Scheme of Examination and Syllabus for
Under Graduate Programme
(University Teaching Departments)
Under Multiple Entry and Exit, Internship and
CBCS-LOCF as per NEP-2020
w.e.f. session 2024-25 (in phased manner)

Subject: Physics

Guru Jambheshwar University of Science &Technology
Hisar-125001, Haryana

(A+ NAAC Accredited State Govt. University)

09/11/24
Chairperson
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001

Guru Jambheshwar University of Science and Technology
Hisar-125001, Haryana
('A+' NAAC Accredited State Govt. University)

Scheme of Examination for UTD for the session 2024-25
As per Scheme-A for UTD
Name of the Programme: Integrated B.Sc. (Physical Sciences)-M.Sc. Physics
According to National Education Policy-2020

FIRST YEAR

SEMESTER-I

Type of Course	Course Code	Nomenclature of Paper/Course	Credits	Contact Hours	Internal Marks	External Marks	Total Marks	Duration of Exam (Hrs)
Discipline Specific Course	24CHE0101T	Chemistry-I	3	3	20	50	70	2.5
	24CHE0101P	Chemistry-I Lab	1	2	10	20	30	3
	24PHY0101T	Mechanics	3	3	20	50	70	2.5
	24PHY0101P	Mechanics Lab	1	2	10	20	30	3
	24MAT0101T	Basic Algebra and Number Theory	4	4	30	70	100	3
Minor Course/ Vocational Course		To be opted from the Pool of MIC	2	2	15	35	50	2
Multidisciplinary Course		To be opted from the Pool of MDC	3	3	25	50	75	2.5
		OR						
		To be opted from the Pool of MDC	2	2	15	35	50	2
			1	2	10	15	25	3
Ability Enhancement Course	24AEC0101T	English for Effective Communication-I	2	2	15	35	50	2
Skill Enhancement Course	24SEC0112P	Basic Instrumentation-I Lab	3	6	25	50	75	4.5
Value Added Course	24VAC0101T	Environmental Studies-I	2	2	15	35	50	2
			24				600	

SEMESTER-II

Type of Course	Course Code	Nomenclature of Paper/Course	Credits	Contact Hours	Internal Marks	External Marks	Total Marks	Duration of Exam (Hrs)
Discipline Specific Course	24CHE0201T	Chemistry-II	3	3	20	50	70	2.5
	24CHE0201P	Chemistry-II Lab	1	2	10	20	30	3
	24PHY0201T	Heat and Thermodynamics	3	3	20	50	70	2.5
	24PHY0201P	Heat and Thermodynamics Lab	1	2	10	20	30	3
	24MAT0201T	Calculus	4	4	30	70	100	3
Minor Course/ Vocational Course		To be opted from the Pool of MIC	2	2	15	35	50	2
Multidisciplinary Course		To be opted from the Pool of MDC	3	3	25	50	75	2.5
		OR						
		To be opted from the Pool of MDC	2	2	15	35	50	2
			1	2	10	15	25	3
Ability Enhancement Course	24AEC0102T	हिंदी भाषा का व्याकरणिक ज्ञान	2	2	15	35	50	2
Skill Enhancement Course	24SEC0212P	Basic Instrumentation-II Lab	3	6	25	50	75	4.5
Value Added Course	24VAC.....	To be opted from the Pool of VAC	2	2	15	35	50	2
			24				600	

Chairperson
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001

Guru Jambheshwar University of Science and Technology

Hisar-125001, Haryana

('A+' NAAC Accredited State Govt. University)

Scheme and Syllabus of courses offered by Physics for B. Sc. Physical Science Programme w.e.f. session 2024-25
(For University Teaching Departments according to National Education Policy-2020)

Subject-Physics

SEMESTER – I

Type of Course	Course Code	Nomenclature	Credits	Hours/ Week	Marks			Exam hours
					External	Internal	Total	
Discipline Specific Course (DSC-A1)	24PHY0101T	Mechanics	3	3	50	20	70	2.5
	24PHY0101P	Mechanics lab	1	2	20	10	30	3
Minor Course (MIC1)	24MIC0128T	Fundamental of Electronics-I	2	2	35	15	50	2
Multidisciplinary Course (MDC1)	24MDC0111T	Programming with FORTRAN	2	2	35	15	50	2
	24MDC0111P	Programming with FORTRAN Lab	1	2	15	10	25	3
Skill Enhancement Course (SEC1)	24SEC0112P	Basic Instrumentation-I Lab	3	6	50	25	75	4.5
Value Added Course (VAC1)	24VAC0122T	Physics in Everyday Life	2	2	35	15	50	2

SEMESTER – II

Type of Course	Course Code	Nomenclature	Credits	Hours/Week	Marks			Exam hours
					External	Internal	Total	
Discipline Specific Course (DSC-A2)	24PHY0201T	Heat and Thermodynamics	3	3	50	20	70	2.5
	24PHY0201P	Heat and Thermodynamics Lab	1	2	20	10	30	3
Minor Course (MIC2)	24MIC0228T	Fundamental of Electronics-II	2	2	35	15	50	2
Multidisciplinary Course (MDC2)	24MDC0211T	Computational Methods	2	2	35	15	50	2
	24MDC0211P	Computational Methods Lab	1	2	15	10	25	3
Skill Enhancement Course (SEC2)	24SEC0212P	Basic Instrumentation-II Lab	3	6	50	25	75	4.5
Value Added Course (VAC2)	24VAC0122T	Physics in Everyday Life	2	2	35	15	50	2

Chairperson
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001

Pool of Minor Courses (MIC)

Semester	Course Code	Nomenclature	Credits	Hours/Week	Marks		
					External	Internal	Total
Semester - I	24MIC0128T	Fundamental of Electronics - I	2	2	35	15	50
Semester - II	24MIC0228T	Fundamental of Electronics - II	2	2	35	15	50

Pool of Multidisciplinary Courses (MDC)

Semester	Course Code	Nomenclature	Credits	Hours/Week	Marks		
					External	Internal	Total
Semester - I	24MDC0111T	Programming with FORTRAN	2	2	35	15	50
	24MDC0111P	Programming with FORTRAN Lab	1	2	15	10	25
Semester - II	24MDC0211T	Computational Methods	2	2	35	15	50
	24MDC0211P	Computational Methods Lab	1	2	15	10	25

Pool of Skill Enhancement Courses (SEC)

Semester	Course Code	Nomenclature	Credits	Hours/Week	Marks		
					Internal	External	Total
Semester - I	24SEC0112P	Basic Instrumentation-I Lab	3	6	25	50	75
Semester - II	24SEC0212P	Basic Instrumentation-II Lab	3	6	25	50	75

Pool of Value-Added Courses (VAC)

Semester	Course Code	Nomenclature	Credits	Hours/Week	Marks		
					External	Internal	Total
Semester – I/II	24VAC0122T	Physics in Everyday Life	2	2	35	15	50

Chairperson
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001

Physics
Discipline Specific Course (DSC)
Mechanics (Semester I)

Paper Code: 24PHY0101T
45 Hrs (3Hrs /week)
Credits: 3
Time: 2.5 Hrs

External Marks: 50
Internal Marks: 20
Total Marks: 70

Note: The examiner is required to set seven questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 2.5 marks each. In addition to this, six more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt four questions in all selecting one from each unit in addition to the compulsory Question No.1. All questions carry equal marks. 20% numerical problems are to be set and use of scientific calculator (nonprogrammable) is allowed.

Unit-I

Fundamentals of Dynamics: Reference frames, Inertial and non-inertial frames of references, Conservative and non-conservative forces, Fictitious forces, Concept of potential energy, Energy diagram. Stable and unstable equilibrium, Elastic potential energy, Force as gradient of potential energy, Work & Potential energy, Impulse, Centre of Mass for a system of particles, Motion of centre of mass (discrete and continuous), Expression for kinetic energy, Linear momentum and angular momentum for a system of particles in terms of centre of mass values.
Collisions: Elastic and inelastic collisions between particles, Centre of Mass and Laboratory frames.

Unit-II

Rotational Dynamics: Equation of motion of a rigid body, Rotational motion of a rigid body in general and that of plane lamina, Rotation of angular momentum vector about a fixed axis, Angular momentum and kinetic energy of a rigid body about principal axis, Torque, Principle of conservation of angular momentum, Moment of Inertia (discrete and continuous), Calculation of moment of inertia for rectangular, cylindrical and spherical bodies, Kinetic energy of rotation, Motion involving both translation and rotation, elementary Gyroscope.

Unit-III

Inverse Square Law Force: Central forces, Law of gravitation, Gravitational potential energy, Inertial and gravitational mass, Potential energy and force between a point mass and spherical shell, two body problem and concept of reduced mass, Motion of a body under central force, Equation of orbit in inverse-square force field, satellite in Circular orbit & Geosynchronous orbits

Special Theory of Relativity: Special Theory of Relativity: Michelson-Morley Experiment and its outcome, Galilean transformation (velocity) and its inadequacy, Postulates of Special Theory of Relativity, Lorentz Transformations, Lorentz contraction, Time dilation, Variation of mass with velocity, Massless Particles, Mass-energy Equivalence

Mechanics Lab

Paper Code: 24PHY0101P
30 Hrs (2 Hrs /week)
Credit: 1
Time: 3 Hrs

External Marks: 20
Internal Marks: 10
Total Marks: 30

Practical

1. To study the random error in observations.
2. To measure the length, width and height of the given rectangular block using vernier calipers.
3. To measure the internal diameter and depth of a given beaker/calorimeter and hence find its volume.
4. Use of screw gauge to measure diameter of a given wire.
5. Use of screw gauge to measure thickness of a given sheet.
6. Diameter of thin wire using Screw gauge
7. To determine the value of 'g' by using Bar pendulum.
8. To study the area of a window using a Sextant.

Chairperson 27/11/24
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001

Note: The list of experiments may vary. Student will perform at least six experiments. The examiner will allot one practical at the time of end term examination. Students are required to get minimum pass marks separately as per university rules in theory and practical components of the course.

Course Outcomes (CO)

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

CO1. Understand the concept of reference frames, potential energy, work, impulse, centre of mass and collision types used in analyzing motion.

CO2. Know about the basic concepts of fundamental of dynamics and rotational dynamics

CO3. Understand postulates of Special theory of relativity and its consequences such as length contraction, time dilation, relativistic mass and mass-energy equivalence.

CO4. Comprehend the general characteristics of central forces and the application of Kepler's laws to describe the motion of planets and satellite in circular orbit through the study of law of Gravitation.

CO5. Perform experiments on use of basic instruments such as screw gauge, vernier caliper etc. in various types of measurements, and compare the experimental values with the standard values

Reference Books:

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. B.Sc. Practical Physics, C.L. Arora, S. Chand Publisher, New Delhi

Chairperson
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001

Physics
Minor Course (MIC)
Fundamental of Electronics- I (Semester I)

Paper Code: 24MIC0128T
30 Hrs (2 Hrs /week)
Credits: 2
Time: 2 Hrs

External Marks: 35
Internal Marks: 15
Total Marks: 50

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all selecting one from each unit in consisting of 10 marks in addition to the compulsory Question No.1.

Unit-I

Energy bands in solids: Charge particles, field intensity, potential, energy and its unit, nature of atom, atomic energy levels, electronic structure of the elements, energy band theory of crystals, Insulators, semiconductors, and metals.
Transport phenomena in semiconductors: mobility and conductivity, Intrinsic and extrinsic semiconductors, charge density in a semiconductor, Electrical properties of Ge and Si, Hall effect, Generation and recombination of charges, Diffusion, and continuity equation.

Unit-II

p-n junction: open circuited p-n junction, current component of p-n diode, VI characteristics and its temperature dependence behavior, p-n junction as rectifier, space charge and transition capacitance, diffusion capacitance, Breakdown diodes, Zener diode and its characteristics. Applications of diode; Diode as a rectifier, LED, Solar cell, tunnel diodes.

Course Outcomes (CO)

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

CO1. Understand the types of materials such as Insulators, semiconductors, and metals.
CO2. Know about the mobility and conductivity, Intrinsic and extrinsic semiconductors, charge density in a semiconductor, Electrical properties of Ge and Si and Hall effect
CO3. Understand the V-I characteristics of p-n junction, Zener diode and applications of diode as LED and solar cell.

Reference Books:

1. Physics of Semiconductor Devices, S. M. Sze, Willey Publisher.
2. Integrated Electronics, Jacob Millman and C C Halkias, TATA McGraw-Hill Edition.
3. A text book in Electrical Technology- B L Theraja – S Chand & Co.
4. Basic Electronics and Linear Circuits, N N Bhargava, McGraw-Hill Edition

Chairperson
Department of Physics
Guru Jambheshwar University
Hisar-125001

Physics
Multidisciplinary Course (MDC)
Programming with FORTRAN (Semester I)

Paper Code: 24MDC0111T
30 Hrs (2 Hrs /week)
Credits: 2
Time: 2 Hrs

External Marks: 35
Internal Marks: 15
Total Marks: 50

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all selecting one from each unit in consisting of 10 marks in addition to the compulsory Question No.1.

UNIT – I

Introduction to Fortran: Computer architecture and organization, memory and input/output devices, Binary, decimal arithmetic and their conversion, Fortran character set, Data types and integer constant, variables, Arithmetic expression, Assignment statement, Format statement, Read/write statement, Unformatted input/output statements, Algorithm, Flowcharts.

UNIT – II

Fortran statement & subprograms: GOTO, Computed GOTO, Arithmetic If, logical If, If Then Else, Nested If Then Else, DO loops, Continue statement, Nested do loop. Data statement, Double precision, Logical data, Complex data, While structure, Arrays and subscripted variables, Subprograms.
Errors: Round off error, Truncation error, Machine error, Random error, Propagation of errors. Loss of Significance: Significant Digits, Computer caused loss of significance, Avoiding loss of significance in subtraction.

Programming with FORTRAN Lab

Paper Code: 24MDC0111P
30 Hrs (2 Hrs /week)
Credit: 1
Time: 3 Hrs

External Marks: 15
Internal Marks: 10
Total Marks: 25

Practical

1. Finding the roots of a quadratic equations
2. motion of a projectile.
3. summing a series of numbers.
4. finding factorial of given number.
5. motion in a central force field.
6. addition and multiplication of two matrices.
7. Study of motion of a pendulum.

Note: The list of experiments may vary. Student will perform at least six experiments. The examiner will allot one practical at the time of end term examination. Students are required to get minimum pass marks separately as per university rules in theory and practical components of the course.

Course Outcomes (CO)

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

CO1. Understand the basics of computer, memory units, number systems; and their conversion.
CO2. Know about the Fortran statements and their sub program.
CO3. Familiar with the Fortran programming used in various field of science.

Chairperson
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001

Reference Books:

1. Fortran 77 and Numerical Methods, C.Xavier, New Age International 1994.
2. William E. Mayo and Martin Cwiakala, Programming with Fortran 77, Schaum's outline serios, McGraw Hill, Inc.
3. Fortran 77, Programming and applications by RC Verma et al. Allied Publishers, New Delhi.
4. R C Desai, Fortran Programming and Numerical methods, Tata McGraw Hill, New Delhi.

Chairperson 8/11/
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001

Physics
Skill Enhancement Course (SEC)
Basic Instrumentation-I Lab (Semester I)

Paper Code: 24SEC0112P
90 Hrs (6 Hrs /week)
Credits: 3
Time: 4.5 Hrs

External Marks: 50
Internal Marks: 25
Total Marks: 75

Note: The list of experiments may vary. The examiner will allot one practical at the time of end term examination.

Practical

1. Young's Modulus by Bending of Beam.
2. Modulus of rigidity of material of wire by Maxwell's Needle.
3. Elastic constants by Searle's method.
4. To compare Moment of Inertia of a solid Sphere, Hollow Sphere, and solid Disc of same mass with the help of Torsion Pendulum.
5. Moment of Inertia of Fly Wheel.
6. To determine the bending moment of a cantilever beam with uniformly distributed load, uniformly varying load and point load.
7. Moment of Inertia of irregular body using a Torsion pendulum.

Course Outcomes (CO)

After completing this course, the students will be able to:
CO1. Understand the error involved in measurements and different techniques used in elastic constant measurements.
CO2. Know about the functioning of various elastic bodies and its use.
CO3. Perform experiments related elastic constant measurement; calculation of moment of inertia in various experiments.

Reference Books:

1. Mechanics "Berkeley Physics Course Vol. I", Charles Kittel, Tata McGraw-Hill
2. Physics, Resnick, Halliday & Walker, Wiley
3. An introduction to mechanics, D. Kleppner, R.J. Kolenkow, 1973, McGraw-Hill.
4. B.Sc. Practical Physics, C.L. Arora, S. Chand Publisher, New Delhi

Chairperson
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001

Physics
Value Added Course (VAC)
Physics in Everyday Life (Semester I/Semester II)

Paper Code: 24VAC0122T
30 Hrs (2 Hrs /week)
Credits: 2
Time: 2 Hrs

External Marks: 35
Internal Marks: 15
Total Marks: 50

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all selecting one from each unit in consisting of 10 marks in addition to the compulsory Question No.1.

Unit-I

Fundamental and derived quantities. Units and dimensions, dimensional analysis, order of magnitude, significant figures, errors.

Reflection, refraction, diffraction, interference, scattering (elementary ideas only) – examples from daily life – apparent depth, blue color of sky, twinkling of stars, Total internal reflection, mirage, sparkling of diamond, primary and secondary rainbow – optical fibres. Concave and convex mirrors, lenses – focal length, power of a lens, refractive index, prism, dispersion.

Unit-II

Velocity, acceleration, momentum, Idea of inertia, force - laws of motion. Newton's law of gravitation, acceleration due to gravity, mass and weight, apparent weight, weightlessness. Rotational motion, Moment of inertia, torque, centripetal and centrifugal acceleration examples- banking of curves, centrifugal pump, roller coasters.

Planets, – solar system, moon- faces of moon, lunar and solar eclipses, constellations, Different types of stars, Galaxies, black hole. Satellites, Artificial satellites, Global positioning system. Geo stationary satellite.

Course Outcomes (CO)
After completing this course, the student will be able to:

CO1. Understand the basics of measuring units and their application in daily life.
CO2. Know about the properties of light and various physical applications.
CO3. Understand the basics of velocity, acceleration, inertia and about the solar system.

Reference Books:

1. Fundamentals of Physics with Applications by Arthur Beiser, Willey Publisher.
2. Conceptual Physics by Paul G Hewitt
3. Fundamental of Physics by Resnick and Halliday.

Chairperson
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001

Physics
Discipline Specific Course (DSC)
Heat and Thermodynamics (Semester II)

Paper Code: 24PHY0201T
45 Hrs (3 Hrs /week)
Credits: 3
Time: 2.5 Hrs

External Marks: 50
Internal Marks: 20
Total Marks: 70

Note: The examiner is required to set seven questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 2.5 marks each. In addition to this, six more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt four questions in all selecting one from each unit in addition to the compulsory Question No.1. All questions carry equal marks. 20% numerical problems are to be set and use of scientific calculator (nonprogrammable) is allowed.

Unit-I

Zeroth and First Law of Thermodynamics: Extensive and intensive thermodynamic variables, Thermodynamic equilibrium, zeroth law and Concept of Temperature, Work and heat, State functions, First law of thermodynamics, Internal energy, Applications of first law, General relation between Cp and Cv, Work done during isothermal and adiabatic processes.
Second Law of Thermodynamics: Reversible and Irreversible process with examples, Conversion of Work into Heat and Heat into Work, Heat Engines, Carnot's Cycle, Carnot engine &its efficiency, Refrigerator & coefficient of performance, 2ndLaw of Thermodynamics: Kelvin-Planck and Clausius Statements and their equivalence, Carnot's Theorem.

Unit-II

Entropy and Third law of Thermodynamics: Concept of entropy, Clausius theorem, Clausius Inequality, Second Law of Thermodynamics in terms of Entropy, Entropy of a Perfect Gas and Universe, Entropy Changes in Reversible and Irreversible Processes, Principle of Increase of Entropy, Third Law of Thermodynamics, Unattainability of absolute zero, T-S Diagrams, Phase Change, Classification of Phase Changes.

Unit-III

Thermodynamic Potentials: Extensive and Intensive Thermodynamic Variables; Internal Energy; Definition, importance, properties and applications of Chemical Potential, Enthalpy, Gibbs function and Helmholtz function.
Maxwell's Thermodynamic Relations: Derivations of Maxwell's Relations

Real gases: Behavior of Real Gases, Deviations from the Ideal Gas Equation. The Virial Equation, Critical Constants. Continuity of Liquid and Gaseous State. Vapour and Gas, Boyle Temperature, Van-der Waal's Equation of State for Real Gases. Values of Critical Constants. Law of Corresponding States. Comparison with Experimental Curves, P-V Diagrams, Joule's Experiment, Free Adiabatic Expansion of a Perfect Gas.
Thermo-electricity: Seeback effect, Paltier effect, Thomson effect and their explanations.

Reference Books:

1. A Treatise on Heat: Meghnad Saha and B.N. Srivastava, Indian Press
2. Thermal Physics: S. Garg, R. Bansal and Ghosh, Tata McGraw-Hill
3. Concepts in Thermal Physics: S.J. Blundell and K.M. Blundell, Oxford University Press
4. Heat and Thermodynamics: An Intermediate Textbook by M. W. Zemansky and R. Dittman, McGraw-Hill.

Chairperson
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001

Heat and Thermodynamics Lab

Paper Code: 24PHY0201P
30 Hrs (2 Hrs /week)
Credit: 1
Time: 3 Hrs

External Marks: 20
Internal Marks: 10
Total Marks: 30

Practical

1. Conversion of Kinetic Energy to Internal Energy: Falling Weight
2. Determination of Specific Heat of Water.
3. Study of thermal conductivity of metals by ice cube cutting.
4. Demonstration of thermal conductivity of copper by using piece of paper.
5. Study of melting/freezing point of a mixture (using ice, water, and salt).
6. Study temperature of a gas affects its density.
7. Study of Electrochemical Equivalent of Hydrogen using Voltmeter
8. Study of Newton's Law of cooling.
9. Determination of specific heat of Solids

Note: The list of experiments may vary. Student will perform at least six experiments. The examiner will allot one practical at the time of end term examination. Students are required to get minimum pass marks separately as per university rules in theory and practical components of the course.

Course Outcomes (CO)

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

- CO1. Understand the laws of thermodynamics and their applications in different cases.
- CO2. Understand concept of entropy in reversible and irreversible process.
- CO3. Distinguish between the internal energy and Gibbs free energy; also understand about Maxwell's thermodynamics relation.
- CO4. Develop an understanding on the real and ideal gas behaviour.
- CO5. Understanding about Joule's experiments, thermoelectric effects such as Seebeck effect, Peltier effect and Thomson effect.
- CO6. Learn to present observations, results analysis and different concepts related to experiments of Heat and thermodynamics.

Reference Books

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. A Text Book of Practical Physics, I.Prakash& Ramakrishna, 11th Ed., 2011, KitabMahal
3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
4. A Laboratory Manual of Physics for undergraduate classes, D. P. Khandelwal,1985, Vani Pub.

Physics
Minor Course (MIC)
Fundamental of Electronics- II (Semester II)

Paper Code: 24MIC0228T
30 Hrs (2 Hrs /week)
Credits: 2
Time: 2 Hrs

External Marks: 35
Internal Marks: 15
Total Marks: 50

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all selecting one from each unit in consisting of 10 marks in addition to the compulsory Question No.1.

Unit-I

Transistors: The junction transistor, transistor current components, types of transistors (npn and pnp), and its configurations (CB, CE, CC) and characteristics, Working Regions of Transistors (cutoff, saturation, and active regions), Transistor as an amplifier, current gain of transistor, maximum voltage rating, Phototransistor.

Unit-II

Digital circuits: Difference between analog and digital circuits, Binary numbers, decimal to binary and binary to decimal conversion, AND, OR and NOT Gates, NAND and NOR Gate as Universal Gates, De Morgan's Theorem, Boolean's Laws.

Course Outcomes (CO)

After completing this course, the students will be able to:
CO1. Understand the types of transistors, biasing and working regions of transistors.
CO2. Know about the analog and digital circuits and about the number conversion such as binary to decimal etc.
CO3. Understand the working condition of various logic gates

Reference Books:

1. Physics of Semiconductor Devices, S. M. Sze, Willey Publisher.
2. Integrated Electronics, Jacob Millman and C C Halkias, TATA McGraw-Hill Edition.
3. A text book in Electrical Technology- B L Theraja – S Chand & Co.
4. Basic Electronics and Linear Circuits, N N Bhargava, McGraw-Hill Edition.
5. Modern Electronic Instrumentation & Measurement Tech., Helfrick & Cooper, 1990, PHI Learning.

Chairperson
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001

Physics
Multidisciplinary Course (MDC)
Computational Methods (Semester II)

Paper Code: 24MDC0211T
30 Hrs (2 Hrs /week)
Credits: 2
Time: 2 Hrs

External Marks: 35
Internal Marks: 15
Total Marks: 50

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all selecting one from each unit in consisting of 10 marks in addition to the compulsory Question No.1.

Unit-I

Differentiation: Numerical methods, forward difference and central difference methods, Integration: Newton – cotes expression for integral, trapezoidal rule, Simpson's rule, Gauss quadrature method.

Roots of equations: Polynomial equations, graphical methods, bisectional method, Newton-Raphson method, false position method.

Unit-II

Solution of simultaneous equations: Elimination method for solving simultaneous linear equations, Gauss elimination method, pivotal condensation method, Gauss Seidal iteration method, Gauss Jordan method, matrix inversion method. Eigen values and Eigen vectors of matrix: Determinant of a matrix, characteristic equation of a matrix, eigen values and eigen vectors of a matrix, power method.

Computational Methods Lab

Paper Code: 24MDC0211P
30 Hrs (2 Hrs /week)
Credit: 1
Time: 3 Hrs

External Marks: 15
Internal Marks: 10
Total Marks: 25

Practical (FORTRAN Language)

1. Numerical integration using (a) Simpson 1/3 and 3/8.
2. Gauss quadrature methods for one and two dimensional integrals.
3. Least square fitting (Linear).
4. To find eigen values and eigen vectors of a square matrix using power method.
5. Solution of simultaneous linear algebraic equations by Gauss Jordan elimination method.
6. Find the roots of an equation using Bisection method.
7. Program for Gauss elimination method.

Note: The list of experiments may vary. Student will perform at least six experiments. The examiner will allot one practical at the time of end term examination. Students are required to get minimum pass marks separately as per university rules in theory and practical components of the course.

Chairperson
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001

Course Outcomes (CO)

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

CO1. Understand the numerical methods for differentiation and integration for various applications.

CO2. Know about the solution of differential equation and their applications in various fields, able to find the solution of a matrix and obtain the eigenvalues and eigenvectors of a matrix

CO3. Able to do the programing based on the computational methods in various field of science.

Reference Books:

1. Fortran 77 and Numerical Methods, C.Xavier, New Age International 1994.
2. William E. Mayo and Martin Cwiakala, Programming with Fortran 77, Schaum's outline serios, McGraw Hill, Inc.
3. Fortran 77, Programming and applications by RC Verma et al. Allied Publishers, New Delhi.
4. R C Desai, Fortran Programming and Numerical methods, Tata McGraw Hill, New Delhi.
5. Suresh Chandra, "Computer Applications in Physics", Narosa Publishing House, New Delhi.
6. Rubin H Landau & Manuel Jose Paez Mejia, "Computational Physics", John Wiley & Sons.

Chairperson
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001

Physics
Skill Enhancement Course (SEC)
Basic Instrumentation-II Lab (Semester II)

Paper Code: 24SEC0212P
90 Hrs (6 Hrs /week)
Credits: 3
Time: 4.5 Hrs

External Marks: 50
Internal Marks: 25
Total Marks: 75

Note: The list of experiments may vary. The examiner will allot one practical at the time of end term examination.

Practical

1. To determine Mechanical Equivalent of Heat,J. by Callender and Barne's constant flow method.
2. To determine the Coefficient of Thermal Conductivity of Cu by Searle's Apparatus.
3. To determine the Coefficient of Thermal Conductivity of Cu by Angstrom's Method.
4. To determine the Coefficient of Thermal Conductivity of a bad conductor by Leeand Charlton's disc method.
5. To determine the Temperature Coefficient of Resistance by Platinum Resistance Thermometer (PRT).
6. To study the variation of Thermo-Emf of a Thermocouple with Difference of Temperature of its Two Junctions.
7. To calibrate a thermocouple to measure temperature in a specified Range using (1) Null Method, (2) Direct measurement using Op-Amp difference amplifier and to determine Neutral Temperature.

Course Outcomes (CO)

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

CO1. Understand the knowledge of Heat and different measurement techniques in calorimetry.
CO2. Know about the specific heat capacity of solids and liquids.
CO3. Perform experiments related to heat and thermodynamics.

Reference Books

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. A Text Book of Practical Physics, I.Prakash& Ramakrishna, 11th Ed., 2011, Kitab Mahal
3. Advanced level Physics Practical, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
4. A Laboratory Manual of Physics for undergraduate classes, D. P. Khandelwal,1985, Vani Pub.
5. Heat and Thermodynamics, Zemansky, McGraw – Hill Book Co. Inc., New York.

Chairperson
Department of Physics
Guru Jambheshwar University
of Sc. & Tech., Hisar-125001