Maharshi Dayanand Saraswati University
Ajmer

Three-year bachelor's degree with three major disciplines (B.Sc.)

Syllabus

(PHYSICS)

Scheme of Assessment (Pass course)

The assessment will include *in term continuous assessment* (30% marks) and *an end-of-term examination* (70 % marks). The total marks for assessment of a theory course will be 100 and that of a practical course will be 50.

1. The Theory question paper of end of semester Exam for the discipline-specific core courses (DSC), Discipline-specific elective (DSE), Ability Enhancement Course (AEC), Value Added Course (VAC), and Skill Enhancement Course (SEC) will be of 70 marks and it will be divided in two parts i.e., Part A and Part-B.

   Part-A will consist of 10 compulsory questions. There will be at least three questions from each unit and answer to each question shall be limited up to 50 words. Each question will carry two marks. *(Total 20 Marks)*

   Part B will consist of 10 questions. At least three questions from each unit be set and students will have to answer five questions, selecting at least one question from each unit. The answer to each question shall be limited to 400 words. Each question carries 10 Marks. *(Total 50 Marks)*

2. Continuous internal assessment for a theory coursewill be of 30 marks andshall be basedon allotted assignments/class tests and attendance. The distribution of marks shall be as follows:

   Class Tests/ Assignments -20 marks and attendance -10 marks.

3. The end-semester practical examination shall be of 35 Marks. There will be a panel of examiners consisting of one external and one internal examiner. Following will be the distribution of marks in End-semester Practical Examination:

   One Experiment-25 marks, Viva voce- 10 marks.

4. Continuous internal assessment for a practical course will of 15 marks. Distribution of marks for Internal Assessment will be:

   Record – 10 marks, Attendance-5 Marks.

5. The compulsory subjects like Ability Enhancement Course (AEC) in all under graduate semester course examinations will be held as per the below mentioned semesters.

   1- First compulsory "Life and Philosophy of Gandhi" in Semester First.

   2- Second compulsory "General English" in Semester Second.

   3- Third Compulsory “General Hindi" in Semester Second.

   4- Fourth compulsory "Environmental Studies" in Semester Third."

Semester	Course Type	Course Code	Course Nomenclature	Credits (L+T+P)	Teaching Hours per week	Maximum Marks			Duration of Examination (Hrs.)
						Internal Assessment	End-semester Examination	Total	
1st	Core	PHY5101T-C	Mechanics	4+0+0	4	30	70	100	3
		PHY5102P-C	Physics Practical-I	0+0+2	4	15	35	50	3
2nd	Core	PHY5201T-C	Electromagnetism and Optics	4+0+0	4	30	70	100	3
		PHY5202P-C	Physics Practical-II	0+0+2	4	15	35	50	3

Semester-I
Physics
(Course Type- Core Course, Course Code: PHY5101T-C)
Nomenclature: Mechanics
No. of credits: 4
Teaching Hours - per week4hrs., Total 60 hrs.

Max. Marks: 100
End-semester Examination: 70
Internal Assessment: 30

UNIT-I

Inertial frames, Galilean transformation, non-inertial frames, fictitious forces, Displacement, velocity, and acceleration in rotating coordinate systems. centrifugal acceleration, Coriolisforce and its applications, Foucault pendulum, Invariance of the velocity of light, postulates of the special theory of relativity, Lorentz transformations, relativistic addition of velocities, Length contraction, time dilation, Variation of mass with velocity, mass-energy relation.Concept of reduced mass, single stage, and multistage rocket, concepts of elastic and inelastic collisions, Analysis of collision in the centre of mass frame,

UNIT-II

Angular momentum of a system of particles, equation of motion of a rotating body, inertial coefficients, case of J not parallel tow, kinetic energy of rotation and idea of principles axes, Euler's Equations, Precessional motion of the Spinning top.Elasticity, Smalldeformations. Young's modulus, Bulk modulus, and Modulus of rigidity for an isotropic solid, Poisson ratio,

relation between elastic constants. Theory of bending of beams and Cantilever, Torsion of a cylinder.

UNIT-III

Simple and compound pendulum.Damped harmonic oscillators, Power dissipation, Quality factor. Driven harmonic oscillator, Transient and steady state, Power absorption, Motion of two coupled oscillators, normal modes and motion in mixed mode, the effect of coupling in mechanical systems. N coupled oscillators.

Text and Reference Books:

1. Berkeley Physics Course Vol-1, Mechanics (Mc Graw-Hill)
2. The Feynman Lectures in Physics, Vol-1, R.P. Feynman, R.B.Lighton and M. Sands.
3. R. S. Gambhir-Mechanics, (CBS Publishers and Distributors, New Delhi.)
4. D. P. Khandelwal - Oscillation and waves (Himalaya Publishing House, (Mumbai).
5. R.K. Ghose-The Mathematics of waves and vibrations.
6. I.G. Main - Vibrations and waves (Cambridge Univ Press).

Semester-I (Physics)

(Course Type- Core Course, Course Code: PHY5102P-C)
Nomenclature: Physics Practical-I
No. of credits: 2
Teaching/Contact Hours - per week 4 hrs, Total 60 hrs.

Max. Marks: 50
End-semester Examination: 35
Internal Assessment: 15

Total number of experiments to be performed by the student during the semester should be Seven. In examination. ONE experiment is to be performed.

1. Study of laws of parallel and perpendicular axes for the moment of inertia.
2. Study of conservation of momentum in two-dimensional oscillations.
3. Study of a compound pendulum.
4. Study of damping of a bar pendulum under various conditions.
5. Study of oscillations under a bifilar suspension.

6. Potential energy curves of a one-dimensional system and oscillations in it for various amplitudes.
7. Study of oscillations of a mass under different combinations of springs.
8. Study of bending of a cantilever or a beam.
9. Study of torsion of a wire (static and dynamic methods).
10. Study of the flow of liquids through capillaries.
11. Determination of surface tension of a liquid by different methods.
12. Study of viscosity of a fluid by different methods.
13. Conversion of galvanometer in to ammeter / voltmeter.

Reference Books

1. B.Sc. Practical Physics, C.L. Arora, S. Chand Publisher, New Delhi
2. Advanced Level Practical Physics, M.Nelkon and Ogborn, Heinemann Education Books Ltd., New Delhi
3. Practical Physics, S.S. Srivastava and M.K. Gupta, Atma Ram & Sons, Delhi
4. Practical Physics, S.L. Gupta and V. Kumar, Pragati Prakashan Meerut
5. Modern Approach to Practical Physics, R.K. Singla, Modern Publishers, Jalandhar
6. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, Asia Publishing House.

Semester-II
Physics
(Course Type- Core Course, Course Code: PHY5201T-C)
Nomenclature: Electromagnetism and Optics
No. of credits: 4
Teaching Hours - per week4hrs., Total 60 hrs.

Max. Marks: 100
End-semester Examination: 70
Internal Assessment: 30

UNIT- I

Gauss's Law and its integral and differential form. Potential and field of arbitrary charge distribution at rest. Concept of multi poles, dipole and quadruple, Work done on a charge in an electrostatic field expressed as a line integral, Screening of E held by a conductor.Electrostatic field-conductors in an electric field.Boundary conditions for potentialand field at dielectric surface. Uniqueness theorem, method of images and its applications for system of a point charge near a grounded conducting plane

UNIT-II

Poisson's and Laplace's equations in Cartesian, cylindrical and spherical polar coordinates (without derivation), solutions of Laplace's equations in Cartesian coordinates.Ampere circuital law (integral and differential form), divergence of the magnetic force on a current carrying wire and torque on a current loop in a magnetic field, magnetic dipole moment,Maxwell's equations (integral and differential form) and displacement current. working and application of CRO.

UNIT-III

Interference of light: thin films, Newton’s ring, Fringes of equal inclination, Michaelson interferometer and its application. Fresnel diffraction: Half period zones, circular aperture, circular disk, zone plate.Fraunhofer diffraction: single slit, double slit, N slit, plane diffraction grating, resolving power, Rayleigh criterion, resolving power ofgrating and prism. Polarization of light: polarization by reflection, Brewster law, polarization by refraction, law of Malus, the phenomenon of double refraction,

Text and Reference Books:

1. Berkeley Physics Course. Electricity and Magnetism. Ed. E.M. Procell (McGraw Hill)
2. Halliday and Resnik, Physics Vol. II
3. D.J. Griffiths "Introduction to electrodynamics". (Prentice Hall of India.)
4. V.V. Sarvate, 'Electromagnetic field and Waves', (Wiley Eastern Ltd., New, Delhi
5. Principles of Optics by BK Mathur

6. Optics by DP Khandelwal.
7. Introduction to modem optics by A K Ghatak (Tata McGraw Hill)

Semester-II
Physics
(Course Type- Core Course, Course Code: PHY5202P-C)
Nomenclature: Physics Practical-II
No. of credits: 2
Teaching/Contact Hours - per week 4 hrs., Total 60 hrs.

Max. Marks: 50
End-semester Examination: 35
Internal Assessment: 15

Total number of experiments to be performed by the student during the semester should be Seven. In the examination, ONE experiment is to be performed.

1. Characteristics of a ballistic galvanometer.
2. Setting up and using an electroscope or electrometer.
3. Use of a vibration magnetometer to study a magnetic field.
4. Study of the magnetic field due to a current.
5. Measurement of low resistance by Carey-foster bridge or otherwise.
6. Measurement of inductance using impedance at different frequencies.
7. Measurement of capacitance using impedance at different frequencies.
8. Study of decay of currents in LR and RC circuits.
9. Response curve for LCR circuits and resonance frequency and quality factor.
10. Sensitivity of CRO.
11. Characteristics of choke.
12. Measurement of inductance.
13. Study of Lorentz force.
14. Study of discrete and continuous LC transmission lines.

Reference Books

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

2. Advanced Level Practical Physics, M.Nelkon and Ogborn, Heinemann Education Books Ltd., New Delhi

3. Practical Physics, S.S. Srivastava and M.K. Gupta, Atma Ram & Sons, Delhi

4. Practical Physics, S.L. Gupta and V. Kumar, Pragati Prakashan Meerut

5. Modern Approach to Practical Physics, R.K. Singla, Modern Publishers, Jalandhar

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