

ii. Viva-Voce=10Mark

B.Sc. (Semester-II)

Syllabus for the examinations to be held in May 2017, 2018, 2019

Subject: Physics (Theory)

Course Code/No.: UPHTC201

Title of the Course: Vector Calculus, Electrostatics and Electromagnetic Waves

No. of Credits: 04

Internal Assessment Test: 20 marks

Duration: 3 hours

End Semester University Examination: 80 marks (External)

Total Marks-100

The question paper shall be of 80 marks. There shall be 10 questions in the paper with two from each unit. Each question shall be of 16 marks. The students have to attempt 5 questions selecting one from each unit.

Unit-I

VECTOR CALCULUS

Review of vector algebra, Scalar and vector fields, Gradient of a scalar field and its physical interpretation, Line, surface and volume integrals, Divergence of a vector field and its physical significance, Solenoidal field with examples, Gauss's divergence theorem.

Curl of a vector field and its physical significance, Stokes' theorem, Irrotational vector field, Vector identities.

Unit- II

ELECTROSTATICS

Gauss's law in integral and differential forms, Line integral of electrostatic field, Conservative nature of electrostatic field, Electric field as the negative gradient of potential, Poisson's and Laplace's equations.

Electric quadrupole, Electric field and potential due to quadrupole, Energy of electrostatic field.

Dielectrics, Polar and non-polar molecules, Polarisation of dielectric, Polarisation vector \vec{P} , Displacement vector \vec{D} , Relation $\vec{D} = \epsilon_0 \vec{E} + \vec{P}$, Atomic polarizability, Electric susceptibility, Relation $K = 1 + \chi_e$, Gauss's law in a dielectric medium (differential and

integral forms), Energy in the dielectric system, boundary conditions satisfied by \vec{E} and \vec{D} at the interface between two homogeneous dielectrics.

Unit-III

ELECTRIC CURRENT AND MAGNETOSTATICS

Current and current density, Equation of continuity, Electrical conductivity, Microscopic form of Ohm's law, Failure of Ohm's law

Biot Savart's law, Ampere's circuit law (integral and differential forms) and its limitations, Modified form of Ampere's Circuit Law, Displacement current, Divergence of magnetic field, Magnetic scalar and vector potentials, Divergence of vector potential, Derivation of Biot-Savart's law from vector potential.

Current loop as a magnetic dipole, Relation between magnetic dipole moment and angular momentum, magnetization vector \vec{M} , Magnetisation current, Free and bound currents,

Relation between \vec{B} , \vec{H} and \vec{M} , Magnetic susceptibility and permeability, Boundary conditions satisfied by \vec{B} and \vec{H} at the interface between two media

UNIT- IV

TIME VARYING FIELDS

Integral and differential forms of Faraday's laws of electromagnetic induction, Self inductance of a solenoid, Mutual inductance of two solenoids, Self inductance and mutual inductance of current loops, Reciprocity theorem of mutual inductance, Relation between self and mutual inductances, Coefficient of coupling.

Energy stored in a magnetic field, Maxwell's equations (differential and integral forms) and their interpretation, Poynting vector, Poynting theorem and its differential form.

UNIT-V

ELECTROMAGNETIC WAVES

Electromagnetic waves in vacuum: The wave equations for \vec{E} and \vec{B} , Monochromatic plane electromagnetic waves and their transverse nature, Characteristic impedance.

Electromagnetic waves in dielectric medium: Propagation in linear media, Reflection and transmission at normal and oblique incidence, Derivation of laws of reflection and refraction.

Electromagnetic waves in conductors: Modified wave equations, Skin Depth, and Characteristic impedance.

Scheme for Internal Assessment Test

Upto 50% (after 45days) completion of the syllabus there shall be an internal assessment test of 20 Marks. It will carry two long answer type questions of 10 marks each and 8 short answer type questions out of which atleast two should be numerical problems. The students shall be asked to attempt one long answer and five short answer type questions.

Note for examiners/paper setters

There will be two questions from each unit. The students have to attempt one question. Each question comprise part A (Short answer type questions of 04 marks each) and B (Long answer type question of 12 marks each). Part A can be short answer type/numerical and part B would be long answer type. There should be atleast two numerical in part-A of the question paper.

Text and Reference Books:

1. Vectors by Speigal
2. Electromagnetics by B.B. Laud
3. Electricity and Magnetism by K.K. Tiwari
4. Electricity, Magnetism and E. M. waves by K.K. Sharma
5. Introduction to Electrodynamics by David J. Griffiths
6. Electricity and Magnetism by A. E. Kip
7. Electricity and Magnetism by D. C. Tayal
8. Electricity and Magnetism by Reitz and Millford
9. Electricity and Magnetism by AK. Sikri

B.Sc. (Semester-II)

Syllabus for the examinations to be held in May 2017, 2018, 2019

Subject: Physics (Practical)

Course Code/No.: UPHPC202

No. of Credits: 04

Internal Assessment: 50 marks

Final Practical Examination: 50 Marks

Total Marks-100

List of the Practical's

1. To find Capacity of a Capacitor by Electrical vibrator.
2. To find the Impedance of series LCR circuit.
3. To find low resistance by Carey Foster Bridge (Calibrating Bridgewire).
4. Compare the capacitance by De-Surety's Method.
5. Find Horizontal component of Earth's magnetic field by using vibration and deflection magnetometer.
6. To find the rigidity of wire by Maxwell's needle.
7. Bifilar Pendulum.
8. To find the frequency by Sonometer.

Reference Books

1. B. Sc Practical Physics by C. L. Arora.
2. Practical Physics by G L Squires Cambridge University Press
3. Advanced Practical Physics for Students by Worsnop and Flint
4. Practical Physics by R K Shukla
5. B.Sc Practical Physics by Harnam Singh

Note: The candidates are required to complete at least 5 practicals.

Instructions for Internal/External Assessment

a) Internal Assessment:-

Total Marks=50

- iv. Attendance (20% weightage)=10Marks
- v. Internal Test and day to day performance(60% weightage)=10(test)+20=30Marks
- vi. Viva Voice(20% weightage)=10Marks

b) External Practical Examination

- iii. External Practical Paper=40Marks
- iv. Viva-Voce=10Mark