SAURASHTRA UNIVERSITY

RAJKOT

Accredited Grade "A" by NAAC

(CGPA 3.05)

FACULTY OF SCIENCE

SYLLABUS FOR

B.Sc.

PHYSICS

(Semester- 3 & 4)

According to Choice Based Credit System

Effective from June – 2017

B.Sc. (Physics)

Semester -3

Paper: Physics-301

(Electricity, Magnetism, & Semiconductor Electronics)

Course duration:

Theory: 60 hours, 6 hours a week, Credit: 4

External Marks: 70, Internal Marks: 30, Total: 100

Practical: 60 hours, 6 hours a week, Credit: 3

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

PAPER STYLE For Semester -3

1. B. Sc. Physics Syllabus for Semester 3 consists of 5 units:
2. All units carry 14 marks
3. Total 5 questions one question from each unit.
4. Each question of 14 mark
5. Time duration:2.5 Hours

Question:1 from Unit 1 : Mark 14

Question:2 from Unit 2 : Mark 14

Question:3 from Unit 3 : Mark 14

Question:4 from Unit 4 : Mark 14

Question:5 from Unit 5: Mark 14

Each Question divide in a,b,c and d sub question as shown below

(a) Shorts questions 4 [4 Marks]

(One word, one line, explanation, definition, true or false, fill up the blanks, etc.)

(b) Answer any 1 numerical out of 2 [2 Marks]

(c) Answer any1 out of 2 [3Marks], one question should be numerical.

(d) Answer any1 out of 2 [5 Marks]

Paper: Physics-301

(Electricity, Magnetism, & Semiconductor Electronics)

UNIT 1: (12 hours: 14 Mark)

Vector Analysis: Review of vector algebra, scalar and vector product, Triple product , How vectors transform, Gradient , The operator Del (∇), The Divergence, The Curl and their significance, Product rules, Integral Calculus – Fundamental theory for Gradient, Fundamental theorem for Divergences- Gauss's theorem, Fundamental theorem for Curls- Stokes theorem, Relations between fundamental theorems, Numerical Examples.

UNIT 2: (12 hour: 14 Mark)

Electrostatics: Introduction , Coulomb's law, Electric field, Continuous charge distributions, Field Lines and Gauss's law, Divergence and Curl of Electrostatic field, Application of Gauss theorem - electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor, Electric potential, Poisson's and Laplace equation, Potential of a charged distribution, Summary: Electrostatic Boundary Conditions, Work done in moving charge, The energy of point charge distribution, The energy of continuous charge distribution, Numerical Examples.

UNIT 3: (12 hour: 14 Mark)

Magnetostatics: Magnetic fields, Magnetic forces: Cyclotron and Cycloid motion, Current , Biot-Savart's law: Steady currents and the magnetic field of steady current, Straight line current, The divergence of B, The Curl of B, Ampere's law with examples , Comparison of Electrostatics and Magnetostatics, The Vector Potential , Summary: Magnetostatic Boundary Conditions, Numerical Examples.

UNIT 4: (12 hour: 14 Mark)

Electrostatic and Magnetostatics fields inside matter:

Dielectrics, Induced dipoles with examples, Alignment of Polar molecules, Polarization, The field of Polarized object: Bound charges, Physical interpretation of bound charges with examples, Field inside the dielectrics, The Electric displacement: Gauss's law in the presence of dielectrics, Susceptibility, Permittivity, and Dielectric Constant.

Magnetization: Diamagnets, Paramagnets, Ferromagnets, Torques and Forces on magnetic dipoles, Effect of magnetic field on atomic orbits, Magnetization, The field of magnetized objects: Bound currents, Physical interpretation of bound currents, The magnetic field inside matter, Ampere's law in magnetized materials, Magnetic Susceptibility & Permeability, Numerical Examples.

Basic Reference books for unit 1 to 4:

1) Introduction to electrodynamics By David J Griffiths, Publisher: PHI.

2) Electricity and Magnetisam By D.C. Tayal, Publisher: Himaliya publishing House.

UNIT 5: (12 hour : 14 Mark)

Transistor Biasing & Stabilization of operating point:

Review of transistor connection, Load line analysis, Operating point, Transistor amplifier performance, Cutoff and Saturation regions, Power rating of transistor , Transistor lead identification and testing , Faithful Amplification , Transistor Biasing, Inherent variation of the transistor parameters, stabilization , Stability factors, Methods of transistor biasing- base resistor method, Emitter Bias Method, feedback resistor method, voltage divider biasing, Low power transistor biasing circuit designing, Numerical Examples.

Single Stage Transistor amplifier circuit:

Introduction to the single stage transistor amplifier, How Transistor amplifies?, Graphical Explanation, Practical circuit of transistor amplifier, Phase reversal, voltage gain, Load line analysis, Classification of Amplifiers, Frequency response and bandwidth of CE amplifier, Numerical Examples.

Basic Reference books for unit-5:

1) Principles of electronics By V.K.Mehta & Rohit Mehta, Publisher: S.Chand

2) Basic Electronics By B.L.Thereja, Publisher : S.Chand.

Other Reference books for semester 3 :

1) Electromagnetics by B. B. Laud, Publisher: Willey Eastern Limited.

2) Electricity and Magnetism By Edward M. Purcell, Publisher: McGraw-Hill

3) Electricity and Magnetism By J.H. Fewkes & J.Yarwood, Publisher: Oxford University Press

4) University Physics By Ronald Lane Reese, Publisher: Thomson Brooks

5) Concept of physics By H C Verma part 1, Publisher: Bharati Bhawan

6) University Physics with modern physics By Sears ,Zemansky & H D Young, Publisher: PEARSON

7) Basic electronics and linear circuits By N N BhargavA, D C Kushreshtha, S C Gupta, Publisher: Technical Teachers Training Institute Chandigarh.

8) Elements of Electronics By Bagde & Singh, Publisher: S.chand

9) Electronic Device And Circuits By Allen Mottershead, Publisher: PHI

LIST OF EXPERIMENTS for B.Sc. (Physics) semester -3

1. To determine the Young's modulus (Y) of material by Cantilever method
2. To determine the Young's modulus (Y) of material by bending of beam.
3. To determine the viscosity of liquid by Searl's co-axial cylinder.
4. To determine the Moment of Inertia of a Fly wheel.
5. To determine resolving power of prism.
6. To determine resolving power of telescope.
7. To determine refractive index of liquid by using liquid lens method.
8. To determine radius of curvature of a given lens and refractive index of glass using optical lever method.
9. Study of Zener Diode as voltage regulating characteristics.
10. To study the Characteristics of Photo Transistor and verify inverse square law.
11. To determine Q point and Load line for BJT.
12. To determine the figure of merit & volt sensitivity of ballistic galvanometer.
13. To study the Frequency response & Bandwidth of R.C.Coupled Amplifier.
14. To study the variation of magnetic field of Solenoid.
15. Experimental measurements by Multimeter, (Power Supply, Resistor, Transistor, Diode, Capacitor).
16. To determine e/m by Thomson's method.
17. To verify the Thevnin's theorem.
18. To verify the Maximum Power transfer theorem.
19. To determine the capacity 'C' of Capacitor. (verification of Series & Parallel connection of capacitor).
20. To determine the self inductance 'L' of inductor (verification of series & Parallel connection of inductor).

Reference Books for practicals:

1) B.Sc. Practical physics By C.L.Arora, Publisher: S.chand.
2) A text book of Practical Physics By Indu Prakash & Ramkrishna
   Publisher: Kitab Mahal, New Delhi.
3) Practical Physics By S.L.Gupta and V. Kumar
   Publisher: Pragati Prakashan, Meerut.
4) B.Saraf et aI-Physics through experiments Vol. I & II.
5) B.Sc. Practical physics By Harnam Singh, Dr P.S. Hemne
   Publisher: S.chand