U.G. PROGRAM B. Sc. Physics (Hons.)

SEM-III-P-I

Electronics: Principles and Devices

SUBJECT CODE	Category	SUBJECT NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment *	End Sem University Exam	Teachers Assessment*				
BSPH302	DC	Electronics:Principles and Devices	60	20	20	30	20	3	1	4	6

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;
Q/A – Quiz/Assignment/Attendance, MST MidSem Test.
*Teacher Assessment shall be based on following components: Quiz/Assignment/ Project/Participation in class (Given that no component shall be exceed 10 Marks)

Course Objectives:-

1. To develop the comprehensive understanding of laws of physics related toElectronics: Principles and Devicesand ability to apply them for laying the foundation for research and development.
2. To work ethically as member as well as leader in a diverse team.

Course Outcomes:-

1. Student will be able to understand and solve the problems related toElectronics: Principles and Devices,
2. Student will be able to determine physical parameter experimentally with optimal usage of resources and complete the assignments in time.

BSPH 302- Electronics: Principles and Devices

Unit 1:-

Classical FE Model, Debye Model, Summer Field FE Model, Band Model, Kronig-Penney Model, Effective Mass, Formulation of Energy Bands, Gap in Solids, Motion of e^- in Metals. Density of States, Fermi Level, Fermi Velocity and Fermi Dirac Distribution of e^- Inside a Matter.

Unit-2

Semiconductors; Intrinsic-semiconductors, electrons and holes, Fermi Level, Temperature dependence of electron and hole concentrations Doping: impurity states, n and p type semiconductors, conductivity, mobility, Hall Effect, Hall Coefficient. Semiconductor devices: Metal-semiconductor junction, p-n junction, majority and minority carriers,

Unit-3

Zener and tunnel diodes, light emitting diode, solar cell Diode as a circuit element, load line concept, rectification, ripple & factor, Zener diode, voltage stabilization, IC voltage regulation. FETs: Field effect transistorsJEET, BJT, MOSFET, Transistors, Characteristics of a transistor in CB, CE and CC mode, h-parameters,

Unit-4

Amplifiers,Small signal amplifiers; General Principle of operation, classification, distortion, RC coupled amplifier, gain frequency response, input and output impedance, multistage amplifiers.Transformer coupled amplifiers, Equivalent circuits at low, medium and high frequencies, emitter follower, low frequency common source and common drain amplifier, Noise in electronic circuits.

Unit-5

Oscillators, Feedback in amplifiers, principle, its effects on amplifiers, characteristicsPrinciple of feedback amplifier,,Barkhausen criteria, Hartley, Colpitt and Wein bridge oscillators.Condition for oscillations and frequency derivation - Crystal oscillator - UJT Relaxation oscillator.Monostable, Bi-stable and Astablemultivibrators

References:

1. Introduction to Solid State Physics C. Kittel
2. Solid State Physics : R.L, Singhal
3. Micro Electronics J- Millman and A. Grabel
4. Electronic Devices and Circuits : MillmanHalkias
5. Electronic Devices Circuits and Applications : J.D. Ryder
6. Electronic Devices and Circuits: Robert Baylested and Louis Nashelsky

List of Experiments (Any Eight)

1. Find V-I characteristics of PN Junction Diode.
2. To Find V-I characteristics of Zener Diode
3. To Find V-I characteristics of Tunnel Diode
4. To Find V-I characteristics of Photo Diode
5. To find Input/output characteristics of common base PNP/NPN transistor.
6. To find Input/output characteristics of common emitter PNP/NPN transistor.
7. Determination of Energy band gap (E_g) using PN Junction Diode.
8. Study of regulated power supply.
9. Determination of Energy band gap 'E_g' of Ge using Four Probe method.
10. To Study Frequency of Hartley oscillator
11. To Study Frequency of Wein bridge oscillator
12. Study of RC coupled amplifiers

U.G. PROGRAM B. Sc. Physics (Hons.)

SEM-III-Paper-II

Nuclear and Particle Physics

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment	End Sem University Exam	Teachers Assessment				
BSPHPH303	DC	Nuclear and Particle Physics	60	20	20	0	0	4	0	0	4

Course Objectives:-

- To develop the comprehensive understanding of laws of Nuclear and Particle Physics and ability to apply them for laying the foundation for research and development.
- To work ethically as member as well as leader in a diverse team.

Course Outcomes:-

- Student will be able to understand and solve the problems related to Nuclear and Particle Physics.
- Student will be able to determine physical parameter experimentally with optimal usage of resources and complete the assignments in time.

BSPHPH303: Nuclear and Particle Physics

UNIT 1General Properties of Nuclei: Constituents of nucleus and their Intrinsic properties, quantitative facts about mass, radii, charge density (matter density), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A plot. angular momentum, parity, magnetic moment, electric moments, nuclear excites states.

UNIT 2Nuclear Models: Liquid drop model approach, semi empirical mass formula and significance of its various terms, condition of nuclear stability, two nucleon separation energies, Fermi gas model (degenerate fermion gas, nuclear symmetry potential in Fermi gas), evidence for nuclear shell structure, nuclear magic numbers, basic assumption of shell model, concept of mean field, residual interaction, concept of nuclear force.

UNIT 3 Radioactivity decay: (a) Alpha decay: basics of α-decay processes, theory of α- -decay: energyβemission, Gamow factor, Geiger Nuttall law, α-decay spectroscopy. (b) βdecay: energy kinematics for β decay, positron emission, electron capture, neutrino hypothesis. (c) β Kinematics for Gamma decay: Gamma rays emission & kinematics, internal conversion.

UNIT 4Nuclear Reactions: Types of Reactions, Conservation Laws, kinematics of reactions, Q-value, reaction rate, reaction cross section, Concept of compound and direct Reaction, resonance reaction, Coulomb scattering (Rutherford scattering), Linear accelerator, Cyclotron, Synchrotrons

UNIT 5Particle physics: Particle interactions; basic features, types of particles and its families. Symmetries and Conservation Laws: energy and momentum, angular momentum, parity, baryon number, Lepton number, Isospin, Strangeness and charm, concept of quark model, color quantum number and gluons.

Reference Books:

1. Introductory nuclear Physics by Kenneth S. Krane (Wiley India Pvt. Ltd., 2008).
2. Concepts of nuclear physics by Bernard L. Cohen. (Tata Mcgraw Hill, 1998).
3. Introduction to the physics of nuclei & particles, R.A. Dunlap. (Thomson Asia, 2004)
4. Introduction to High Energy Physics, D.H. Perkins, Cambridge Univ. Press.
5. Introduction to Elementary Particles, D. Griffith, John Wiley & Sons.
6. Basic ideas and concepts in Nuclear Physics - An Introductory Approach by Quarks and Leptons, F. Halzen and A.D. Martin, Wiley India, New Delhi.