TRIPURA UNIVERSITY

(A Central University)
Suryamaninagar-799022

Syllabus

OF

Physics
(General & Major)

Semester - IV

2014

Utkal University
Physics (general) Syllabus

Fourth Semester Syllabus
Paper PH-401 (T)
Full marks: 50 (Internal Assessment: 10, Semester Exam: 40)
Total Lecture 40, (Each lecture period = 1 hr.)

Unit I

ELECTRONICS: Total Lecture Period: 20
(Total: 25 marks, Internal Assessment: 05, Semester Exam: 20)
UNIT-VI:

Diode Rectifier: Calculation of average current and voltage, r.m.s. current and voltage, ripple factor and efficiency of half wave and full wave rectifier, removal of ripples : Γ and π filters.

Zener break down, zener voltage, zener diode and its use as a voltage regulator.

Transistor characteristics in CE mode, load line analysis, Q-point. Working of CE transistor amplifier and calculation of voltage gain (Preliminary method)

Field effect transistor (FET) and its differences from bipolar transistor, n and p channel FET. FET operations, static and dynamic characteristics, FET parameters and their relation, use of FET as a voltage amplifier.

Operational amplifier (ideal), concept of virtual ground, basic equation of an ideal OP-AMP, use of OP AMP as inverter, phase shifter, adder, differentiator and integrator.

Network theorems: Thevenin, Norton, Superposition and Maximum power transfer.

Unit II

Relativity and Nuclear Physics: Total Lecture Period: 20
(Total: 25 marks, Internal Assessment: 05, Semester Exam: 20)

Gallilean invariance, inertial and non-inertial frames, pseudo force, apparent weight in accelerated frame. Concept of space, time and mass according to Newtonian Mechanics. Michelson-Morley experiment- its difficulties. Postulates of special theory of relativity, simple derivation of Lorentz transformation formula, length contraction, time dilation, addition of velocities (velocity along the same line), variation of mass with velocity (deduction on the basis of head-on-collision), equivalence of mass and energy.

Radioactivity: radioactivity, disintegration, [illegible]

[illegible] charged particles, Geiger-Nuttal rule.

β-ray spectrum and its natures, neutrino hypothesis (qualitative idea only), internal conversion, γ-rays, qualitative discussion on γ-ray absorption in matte electron-positron annihilation, [illegible]

Cosmic rays, primary and secondary cosmic rays, mesons, Van Allen belt.

Properties of nuclei: nuclear mass, charge, size, packing fraction, atomic mass unit, isobars, isotopes, isotones, binding energy, binding energy curve and its significance.

Nuclear reaction: Nuclear reaction, conservation principles in nuclear reactions, Q-value and thresholds, exoergic and endoergic reactions, artificial radioactivity.

PHYSICS

TDC (ELECTIVE) SYLLABUS FOR PART-III

Full marks : 50 (Internal assessment :10, Semester Examination:40)

Total Practical Period: 60 Hours

Experiment No.	**Name of the experiments**

1. To draw the characteristic curves of PN- junction diode for both forward and reverse bias and hence to determine the AC and DC resistance of the diode.
2. To draw static characteristic curves (only mutual characteristics) of a triode and to find μ, r_p and g_m.
3. Study of the characteristic response curve of a photodiode cell (or determination of plank's constant).
4. Zener diode reverse characteristics, reverse impendence and break down voltage.
5. Input characteristics of common emitter (CE) transistor.
6. Output characteristics of common emitter (CE) transistor.
7. Drawing characteristics of FET & to determine FET parameters.
8. To construct 2- input OR & AND gates using diodes and to verify the truth table.

Theory paper H4-A (96 marks)
Total Theory Marks = 72
(48 + 12 internal)
Two units : each unit has (24 + 6 marks internal)

Fourth Semester: Theory Paper = H4-A

UNIT-I
Mechanics – II and Relativity: (24 + 6 internal)

Mechanics – II

Rigid body, angular momentum of a rigid body, moment and product of inertia, kinetic energy of rotation of a rigid body, ellipsoid of inertia, inertia tensor, principal axes, principal planes and principal moment of inertia, setting up of principal axes in simple symmetric cases, Euler's angles.

Generalized coordinate, constraints, forces of constraints, degrees of freedom, application of generalized coordinate and concept of constraints in different cases, generalized velocity, generalized potential, generalized force

Lagrangian formulation and its superiority over Newtonian approach, Principle of virtual work, D'Alemberts principle. Lagrange's equation for a conservative system from D'Alembert's principle and its application to different cases (see appendix), cyclic coordinates and its applications.

Hamiltonian formulation and its superiority, Calculation of Hamiltonian in simple cases (see appendix).

Relativistic mechanics: Gallilean transformation and invariance, Michelson-Morley experiment: its outcomes and difficulties. Postulates of the special theory of relativity, simple derivation of Lorentz transformation formula, relativity of simultaneity, length contraction, time dilation, addition of velocities (velocities along same line), variation of mass with velocity (head-on and oblique collision), Equivalence of mass and energy.

Fourth Semester: Theory Paper = H4-A

UNIT-II
Electromagnetism and Electromagnetic Theory: (24 + 6 internal)

Applications of Biot-Savart law and Ampere's circuital law (see appendix), Lorentz force and concept of magnetic induction, non-existence of magnetic monopole, $\nabla.B=0$; magnetic vector potential, calculation of vector potential and magnetic induction in simple cases.

Displacement current, Maxwell's electromagnetic equations (using Divergence and Stokes theorem), propagation of plane electromagnetic waves in free space, transverse character and polarized electromagnetic wave, Poynting vector and Poynting theorem, energy density in electromagnetic field,, Hertz's experiment.

Reflection and refraction of plane wave at the boundary of two dielectrics (law in generalized case and calculation of intensity only for normal incidence), waves in conducting media – skin effect and skin depth.

Normal and anomalous dispersion, Cauchy and Sellemier equation and Lorentz modification.

Fourth Semester: Practical Paper = H4-B
(Total marks: 40)

Marks division:

10 marks = One flow chart (questions to be supplied by the Head Examiner)

10 marks = First program (questions to be supplied by the Head Examiner)

10 marks = Second program (questions to be supplied by the Head Examiner)

05 marks = Viva Voce

05 marks = Laboratory Note Book

Computer Programming in Basic / Fortran