SAURASHTRA UNIVERSITY
RAJKOT

Accredited Grade ‘A’ by NAAC

Syllabus for M.Sc. (Applied Physics) Integrated
Semester - II
(Based on UGC-CBCS-2015)

Under

Department of Nano science
&
Advanced Materials

Effective from June -2016

Saurashtra University
University Road, University Campus
Rajkot– 360005
Gujarat, India

www.saurashtrauniversity.edu
Semester - II

Paper V: Environmental Studies

Unit-I:
Environmental Studies: Multidisciplinary Approach
Definition, Scope & Importance
Public Awareness about environmental studies

Unit II:
Renewable & Nonrenewable resources
Forest Resources, Water Resources, Mineral Resources, Food Resources, Energy Resources and Land Resources

Unit III:
Ecosystems: Concept, Structure and Functions of Ecosystems
Energy flow in ecosystems: Types of Ecosystems: Forest, Grassland, Deserts, Aquatic

Unit IV:
Environmental Pollution: Air Pollution, Water Pollution, Soil Pollution, Marine Pollution, Noise Pollution, Thermal Pollution & Nuclear Hazards
Solid Waste Management
Disaster Management: Floods, Earthquakes, Cyclone and Landslides

Unit V:
Field Work
Visit to Local Areas to document environmental assets – river/ forest/ grasslands/ hill/ mountains
Visit to local polluted site – Urban/rural/industrial/agricultural
Study of Simple ecosystems → Pond, river, hill-slopes etc.

Book: Textbook for Environmental Studies (For Undergraduate Courses of all Branches of Higher Education) by Erach Bharucha, University Grants Commission (2004)
Semester - II
Paper VI: Applied Mathematics

**Unit-I: Linear differential equations of higher order**
Linear differential equations of higher order with constant coefficients. Operator D, Meaning of auxiliary equation, Roots of auxiliary equation and solution of auxiliary equation \( f(D)y = 0 \) for real roots and complex roots, Operator \( 1/D \). Solution of differential equations of the type \( f(D)y = X \). Meaning of complimentary function (C.F.) and Particular integral (P.I.). Methods to obtain Particular integral (P.I.) when 

\[
X = e^{ax}, \; X = \sin(ax+b), \; X = \cos(ax+b), \; X = x^m, \; X = e^{ax}V
\]

**Unit-II: Partial Derivatives**
Partial derivatives, total differential, Euler’s theorem for homogeneous functions, Maxima & Minima of functions of two variables, Lagrange’s method of undetermined multipliers, Jacobians, Partial derivatives of implicit functions.

**Unit-III: Partial Differential Equations**
Formation of PDE, Equations solvable by direct integration, Lagrange’s linear equation, Non-linear equations of first order, Homogeneous linear equations with constant coefficients, Method of separation of variables, Vibrations of a stretched string-Wave equation, One dimensional heat flow.

**Unit-IV: Differential Calculus & Integral Calculus**
Rolle’s Theorem, Lagrange’s Mean Value theorem, their geometrical interpretation, Cauchy Mean Value Theorem, Taylor’s theorem, Taylor’s series and Maclaurine’s series, Series expansion of \( \exp(x) \), \( \cos(x) \), \( \sin(x) \), \( \log(1+x) \), \( (1+x)_n \) etc.

Double integrals, evaluation of double integrals, Change of order of integration for two variables, Triple integrals, evaluation of triple integral, Jacobians and change of variables, Applications to areas and volumes.

**Reference Books: (for Sem-I & II)**

1. Theory of matrices by Shanti Narayan
2. A Course of Mathematical Analysis by Shanti Narayan
3. Mathematical Analysis by S.C. Malik
4. Differential Calculus by Shanti Narayan
5. Integral Calculus by Shanti Narayan
8. A Course of Mathematical Analysis by Shanti Narayan
Semester - II
Paper VII: Modern Physics I

Unit I:
1. Atomic Structure of Matter

Unit II:
1. Basics of Quantum Mechanics
   Space Quantization, Spinning Electron, Angular Momentum & magnetic momentum, orbital angular momentum, electron spin & Spin Quantum Number, magnetic quantum numbers, coupling schemes, selection rules, Pauli’s exclusion principle, Electron Configuration of Atoms

Unit III:
1. Origin of Quantum Theory
   Inadequacy of Classical mechanism, experimental basics of quantum mechanics – Electromagnetic Waves, Blackbody radiation, Photoelectric effect, Compton effect, bremsstrahlung & X-ray production, Raman Effect

Unit IV:
1. Atomic Structure and Atomic Spectra
   Bohr’s theory of hydrogen spectrum, Sommerfeld theory, Spatial (space) Quantization: Stern-Gerlach experiment, The Franck – Hertz experiment, Wave Particle duality, Davision & Germer experiment, uncertainty principle, inadequacy of Quantum theory

Unit 1 SEMICONDUCTOR PHYSICS


UNIT 2 SEMICONDUCTOR DIODES AND APPLICATIONS


UNIT 3 SPECIAL-PURPOSE DIODES AND TRANSISTORS

UNIT 4 TRANSISTORS BIASING AND AMPLIFIERS


Text Book:

1. Principles of Electronics by V.K. Mehta & Rohit Mehta, S. Chand Publications

Reference Books:

1. Electronic Devices by Thomas L. Floyd, PHI Publications
4. Basic Electronics by Thareja B.L., S. Chand Publications
5. Fundamentals of Microelectronics by Behzad Razavi