

SAURASHTRA UNIVERSITY



Accredited by NAAC With 'A' Grade

[3rd Cycle]

Faculty of Science
Syllabus

for

B.Sc. / M.Sc. (Applied Physics) Integrated
Semester – III

Revised syllabus

Effective From

June 2020 onwards

Under

Department of Nano science

&

Advanced Materials

Saurashtra University,
University Road, University Campus

Rajkot– 360005

Gujarat, India

SEMESTER III: PAPER IX –Non- Conventional Energy Resources (Revised)

Unit - 1

Human energy requirement, Energy use pattern in different parts of the world and its impact on the environment; Energy use pattern in India;

Wind Energy: Wind power, Harnessing of wind energy, Power generation – wind mills, wind characteristics, environmental considerations; Wind energy potential in India

Unit – 2

Solar Energy Sun as source of energy: Solar radiation – absorption, reflection, scattering and diffusion in the atmosphere, Harnessing of solar energy, Solar collectors and concentrators, Solar thermal energy, Solar electricity generation, Solar heaters, dryers and cookers; Photovoltaic

Unit – 3

Biomass Energy Biomass composition and types; Conversion processes – pyrolysis, charcoal production; Energy plantation; Biogas – production and uses, anaerobic digestion; Environmental constrains; Energy from solid wastes – Sources and types

Energy from water: Principles of generation of hydroelectric power, environmental impacts, Energy from oceans- OTEC, Tidal energy.

Unit – 4

Geothermal energy: Sources – Earth’s Crust, high temperature aquifers,; Harnessing of geothermal energy and its problems; Geothermal energy prospect in India.

Nuclear energy: Fission and fusion energy, Nuclear fuels, Nuclear reactors and radioactive waste; Fuel cells, Future perspectives.

References:

1. Remote Sensing and GIS - M. Anji Reddy.
2. Environmental Remote Sensing - F. Mark Danson.
3. Principles of GIS for Land - Burrough P.A. Resources Assessment.
4. Renewable Energy Environment and Development, Maheswar Dayal Konark Publishers pvt. Ltd.
5. Renewable Energy Programmes in India : some recent developments , Sinha P.C., Natural Resource Forum, 18(3), 1994.
6. Renewable Energy Resources: Basic Principles and Applications Tiwari, G.N., Narosa Publishing House.
7. Conventional and Non-Conventional Energy Sources G. D Rai.
8. Andrew R.W., Jackson & Julie M. Jackson, “Environmental Science – The Natural Environment and Human Impact”, Addison Wesley Longman Limited, 1996.
9. S.C. Santra, “Environmental Science”, 2nd Edition, New Central Book Agency (P) Ltd, Kolkata, India, 2005.
10. Fowler, John M., “Energy and the Environment”, 2nd Edition, McGraw Hill, New York, 1984.
11. Carless, Jennifer, “Renewable Energy: A Concise Guide to Green Alternative”, Walker, New York, 1993.

SEMESTER III: PAPER X - APPLIED ELECTRONICS

(Revised)

Unit I: Field Effect Transistors

FET: Construction and characteristics of JFETs, transfer characteristics, Types of MOSFETs: Depletion type & Enhancement type, Introduction to VMOS and CMOS
FET biasing: Fixed biased configuration, self-bias, voltage divider bias,

Book: Electronic Devices and circuit theory - By: Robert L. Boylestad – Louis N

PHI publication

Unit II: Application based devices

Two terminal devices:

Schottky barrier (hot carrier diodes), Varactor diodes, Power diodes, Tunnel diodes, Photodiodes, Photoconductive cells, IR emitters, LCD, Solar cells, Thermistors

Book: Electronic Devices and circuit theory -By: Robert L. Boylestad – Louis N.

Unit III: Special Purpose Devices :

Introduction, Uni Junction Transistor (UJT), Silicon Controlled Rectifier

(SCR), DIAC, TRIAC– Construction, working, Characteristics and applications

Book: Electronic Devices and circuit theory -By: Robert L. Boylestad – Louis N.

Unit IV :Digital Electronics

Digital systems and binary numbers, Boolean algebra and logic gates, gate level minimization, combinational logic, synchronous sequential logic, registers and counters

Book: Digital Design By M. Morrismano - PHI Publication

SEMESTER III: PAPER XI - BASIC NUCLEAR PHYSICS

(Revised)

Unit I:Nucleus

Constituents of nuclei, Nuclear size, Binding Energy, Semi-empirical mass formula, Magic numbers, Nuclear shell model, Exercise

Books: Page Nos: 322-337

Modern Physics By G. Aruldas, P. Rajagopal, PHI, New Delhi

Unit II: Radioactivity and Radio Active decay

Discovery of Radioactivity, Rate of decay, Half-life, Mean life, Conservation law in radioactive decay, Radioactive equilibrium, Radioactive dating, Alpha decay, Theory of alpha decay, Beta decay, Electron Emission, Positron Emission, Electron Capture, Theory of Beta decay, Gamma decay, Exercise

Books: Page Nos: 344-361

Modern Physics By G. Aruldas & P. Rajagopal, PHI, New Delhi

Unit III: Nuclear Reactions

Kinds of Nuclear reactions, Conservation laws, Nuclear reaction kinematics, Q equation, Solution of Q equation, Introduction of Nuclear fission and fusion

Books: Page nos: 373-377, 524, 534

Nuclear Physics By D. C. Tayal, Himalaya publication House

Books: Page nos: 91-97

Nuclear Physics By S. B. Patel, New Age International Publishers

Unit IV: Nuclear Reactors

General aspects of a reactor design {Fuel, Moderators and reflectors, Reactor coolants, Control materials, Reactor shielding}, Classification of a reactor, Production reactors, Power reactors.

Books: Page nos: 564- 577

Nuclear Physics By D. C. Tayal, Himalaya publication House

Books: Page nos: 524-529

Modern Physics By R. Murugesan, S. Chand Publications

SEMESTER III: PAPER XII - MODERN PHYSICS II

(Revised)

Unit I: Basics of Quantum Mechanics: De Broglie Waves, Phase and Group velocity, Uncertainty Principle, Basic Postulates of Wave mechanics, Time Dependent and Time Independent Schrödinger's equations, Properties of Wave Function, Applications of Wave equation - particle in a box (infinite square well potential), potential step, Harmonic oscillator.

- Books: Page Nos 169-199 : Modern Physics (Revised Edition)
By R.Murugeshan & Er.Kiruthiga Sivaprashath, S.Chand
- Page Nos 101-127 : Concepts of Modern Physics
By Arthur Beiser, Shobit Mahajan & S.Rai Choudhuri
Mc Graw Hill Education (India) Pvt.Ltd pub.
- Page Nos 58-73 : Modern Physics By G.Aruldas & P.Rajagopal Phi Pub.

Unit II: Statistical Mechanics: Introduction, microscopic and macroscopic systems, Phase space, Maxwell – Boltzmann Distribution Law, Law of Equipartition of Energy, Quantum Statistics, Bose Einstein Statistics, Fermi Dirac Statistics, distribution functions

- Books: Page Nos 146-159 : Modern Physics By G.Aruldas & P.Rajagopal
PHI Learning Pvt.Ltd, Eastern Economy Edition
- Page Nos 339-352 : Concepts of Modern Physics
By Arthur Beiser, Shobit Mahajan & S.Rai Choudhuri
Mc Graw Hill Education (India) Pvt. Ltd publication

Unit III: LASER : Introduction, Absorption and Emission, Radiative and non radiative transitions, population inversion, pumping methods, Einstein's coefficient, Types of LASERs, Characteristics of LASER, Applications of LASER

- Books: Page Nos 280-303 : Modern Physics By G.Aruldas & P.Rajagopal PHI pub.

- Page Nos 303-308 : Modern Physics (Revised Edition) By R.Murugeshan & Er.Kiruthiga Sivaprashath, S.Chand Pub.

Unit IV: Fundamental Forces/ Interactions in nature, Mesons, Mediators of Interactions, Particles and Antiparticles, Classification of Elementary Particles, Conservation Laws

- Books: Page Nos 394-405 : Modern Physics
By G.Aruldas & P.Rajagopal, PHI Learning Pvt. Ltd,
- Page Nos 540-547 : Modern Physics (Revised Edition)
By R.Murugeshan & Er.Kiruthiga Sivaprashath, S.Chand