SAURASHTRA UNIVERSITY

Accredited by NAAC With ‘A’ Grade

[3\textsuperscript{rd} 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:

2. Environmental Remote Sensing - F. Mark Danson.
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. Aruldhas, P. Rajagopal, PHI, New Delhi

Unit II: Radioactivity and Radioactive 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. Aruldhas & 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. Murugeshan, S. Chand Publications
SEMESTER III: PAPER XII - MODERN PHYSICS II

(Revised)


Page Nos 101-127 : Concepts of Modern Physics
By Arthur Beiser, Shobit Mahajan & S.Rai Choudhuri


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


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