

SARDAR PATEL UNIVERSITY
Programme & Subject: M.Sc (Physics)
Semester: IV
Syllabus with Effect from: June - 2014

Paper Code: PS04EPHY08	Total Credit: 4
Title Of Paper: Nuclear Energy & Energy Strategies	

Unit	Description in detail	Weightage (%)
I	Introduction to the nuclear energy, Historical background status and prospects-nuclear energy application compared with coal, Fuels for nuclear fission reactor, Terms and definitions-nuclear fuel cycle-storage transportations. Nuclear fission and chain reaction, Moderators – energy from nuclear fission reactions, Uranium enrichment process – Nuclear reactor power plant, Fast breeder reactors, Boiling water reactor, pressurized heavy water reactor, and pressurized light water reactor Gas cooled reactor, Liquid metal fast breeder reactor, Nuclear waste management, Introduction to the nuclear fusion, Nuclear fusion reactions, Problems with nuclear fusion, Plasma confinement.	25%
II	Toroidal magnetic confinement of plasma-magnetic mirror confinement, Laser inertial confinement reactors, Fusion-fission hybrid, Environmental and safety with nuclear fusion, Compact toroids, Introduction to the environmental aspects of energy and pollution control, terms and definitions. Pollution from use of energy, Combustion products of fossil fuels, Particulate matter, Electro-static precipitator (ESP), Fabric filter and bag house, Carbon dioxide, Green house effect and global warming, Emission of carbon monoxide, Pollution by sulphur dioxide and hydrogen sulphide, Emission of nitrogen oxides, Acid rains, Acid snow, Acidic fog and dry acidic deposit, FGD and SCR systems for cleaning flue gases.	25%
III	Introduction to the hydrogen and methanol fuels, Applications of hydrogen, Productions of hydrogen, Storage and transportation of hydrogen, Methanol, Energy strategies, Energy management and energy conservation measures (Over view), Efficiency of the energy converters, Primary resources of energy, National energy strategy of India, Essential steps in energy planning, Energy planning in India.	25%
IV	Growth of energy sector of India/world, issues on global warming and climate change, Planning in electrical power sector and the objectives in energy planning, Growth of India's energy sector, Petroleum sector in India, Planning of coal in India, Energy conservation Opportunities (ECOs) and Energy Conservation measures (ECMs), ECOs in electrical power supply sector, ECOs in transportation, ECOs in residential and commercial sectors, ECOs in industry sector, Energy management activities, Economic benefits, Non-conventional renewable sources of energy, Energy audit.	25%

Basic Text & Reference Books:-

- Energy Technology (Non conventional, Renewable and conventional) By S. Rao and P. S. Perulkar
- Solar Energy conversion, An introductory course, By A. E. Dikon and J. D. Leslie
- Photoelectrochemical Solar Cells By Suresh Chandra
- Principles of Energy Conversion By Archie W. Cupl. Jr

