

SARDAR PATEL UNIVERSITY**Programme: B.Sc (Physics)****Semester: VI****Syllabus with effect from: November/December-2013**

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| Paper Code: US06CPHY02 | Total Credit: 3 |
| Title Of Paper: Atomic-Molecular Physics, Energy Science and Earth Science | |

| Unit | Description in detail | Weighting (%) |
|-------------|---|----------------------|
| I | Atomic Physics Resume of atomic models, Spectrum of Hydrogen atom and spectral series, Observation of Hydrogen spectrum, Failure of electromagnetic theory, Bohr's theory and spectrum of Hydrogen atom, Franck-Hertz Experiment, Stern-Gerlach Experiment, Fine structure of Hydrogen lines, Positronium, Different series in Alkali spectra, Ritz combination principle, explanation of salient features of Alkali spectra, Alkali-like spectra, atoms of Alkaline elements, spectra of Alkaline earths, Related Numericals | |
| II | Molecular Physics Separation of Electronic and Nuclear Motion: The Born-Oppenheimer approximation, Types of molecular energy states and associated spectra, Types of spectra, Pure rotational spectra: Salient features of rotational spectra, The molecule as a rigid rotator: Explanation of rotational spectra, Diatomic molecule as a Non-rigid rotator, Validity of the theory: Determination of the inter-nuclear distance(Bond length) and moment of inertia, Isotope effect in rotational spectra, Rotational spectra of polyatomic molecules, Raman effect and its salient features, Observation of Raman spectra, Related Numericals | |
| III | Energy Science Solar Thermal energy Conversion Systems: Solar Thermal energy Conversion Subsystems, Solar Thermal Collectors, Characteristics features of a collectors, Important aspects of solar thermal Collectors, Collector Efficiency, Simple Flat plate Collectors, Installation of Flat Plate Collectors, Guidelines for Installation, Shadow Effect, Cosine loss factor and reflective Loss Factor Solar Photovoltaic Systems: Introduction to Photovoltaic systems, Merits and Limitations of Solar PV Systems, Principle of a Photovoltaic cell, V-I characteristics of Solar Cell, Interconnections of solar cells, Efficiency of a Solar Cell, Configuration of a Solar PV Panel Wind Energy: Introduction of Wind Energy, Wind power density, Power in a wind stream, Wind turbine Efficiency, Power of a wind Turbine for given incoming Wind Velocity, Types of wind turbine –Generator Units, Mono-Blade, Twin- Blade and Three-Blade Horizontal axis Wind turbine (HAWT) Fuel Cells: Introduction, Advantages of Fuel Cell Power Sources, Theory of Electro-Chemistry applied to fuel Cells, Principle and Operation of fuel Cells, H ₂ -O ₂ Acidic fuel Cell, Alkaline H ₂ -O ₂ fuel Cell, Classification and Types of Fuel Cells, Fuels for Fuel Cells, Performance Characteristics of Fuel Cells | |
| IV | Earth Science Internal structure of Earth: The Core, Influence, chemical compositions, pressure and temperature in the earth, The Mantle, Influence, chemical compositions, pressure and temperature in the earth, The Crust, Influence, | |



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| <p>chemical compositions, pressure and temperature in the earth, The Atmosphere and Influence of the Atmosphere, Influence of the Sun and Moon, Density of the Earth, Mass of the Earth and the Sun</p> <p>Plate Tectonics: Classification of plates, Oceanic and continental plates, Movement of plates, Plate boundaries</p> <p>Earth quakes: Seismology, Seismograph, Determination of epicenter and the focus, Modern applications of Seismology, Relative numerical</p> | |
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Basic Text & Reference Books :-

- Molecular structure and Spectroscopy
G Aruldas, Prentice-Hall of India Private Limited
- Elements of Spectroscopy, S L Gupta, V Kumar, R C Sharma, Pragati Prakashan
- Energy Technology Nonconventional, Renewable and Conventional
S Rao and Dr. B B Parulekar, Khanna Publishers
- Non Conventional energy Sources, G D Rai, Khanna Publishers Delhi
- Non-Conventional Energy systems, Principles, Progress and Prospects
K M Mital, Wheeler Publishing – New Delhi
- Basics of Earth Science, D K Pandey, Anmol publisher, New Delhi
- Elements of properties of matter
D S Mathur, S.Chand & company Ltd. New Delhi
- Seismology and Plate Tectonics
Gubbins Devid, Cambridge Uni. Press

