

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

Paper Code: PT03CESC01	Total Credit: 4
Title Of Paper: Geophysics	

Unit	Description in Detail	Weightage (%)
I	The dynamic Earth -Gravity, the figure of the Earth and geodynamics -The Earth's rotation, Gravity anomalies and its Interpretation. Earth's age, thermal and electrical properties- Geochronology, Geoelectricity Geomagnetism and paleomagnetism - The physics of magnetism, Rock magnetism, Geomagnetism, Magnetic surveying, Paleomagnetism, Geomagnetic polarity.	25%
II	Plate Tectonics and Geodynamics- Seismology and the internal structure of the Earth - Elasticity theory, Seismic waves , The seismograph , Earthquake seismology, Seismic wave propagation , Internal structure of the Earth, Vine-Mathews hypothesis, Marine magnetic anomalies, sea floor spreading, mid-oceanic ridges and geodynamics, Plate boundaries and seismicity, Heat flow mechanisms, Core-Mantle convection and Mantle plumes.	25%
III	Earth's upper atmosphere, ionosphere, plasmasphere, Geomagnetic field, magnetosphere and its implications, Van Allen radiation belts. Vertical structure of ionosphere, number density and processes of atomic-molecular constituents, properties of ionosphere, day-night differences. Earth-Sun interactions - Space phenomena, solar corona, solar wind and flares, coronal mass ejections, interactions with magnetosphere, geomagnetic storms. Auroral phenomena, ionospheric currents, Radio wave propagation and communications, space radiation protection, Heating of neutral atmosphere, solar and other radiation effects on stratosphere	25%
IV	Depth of penetration of electromagnetic fields, Detection of electromagnetic fields, Tilt-angle methods, Tilt-angle methods employing local transmitters, The VLF method, The AFMAG method, Phase measuring systems, Time-domain electromagnetic surveying, Non-contacting conductivity measurement, Airborne electromagnetic surveying, Fixed separation systems, Quadrature systems, Interpretation of electromagnetic data, Limitations of the electromagnetic method, Telluric and magnetotelluric field methods- Surveying with telluric currents, Magnetotelluric surveying, Ground-penetrating radar, Applications of electromagnetic surveying.	25%

Basic Text & Reference Books:-

- Fundamentals of Geophysics, William Lowrie, Cambridge University Press, 2nd Ed.
- Space Physics, V. Bothmer and I. Dagliz, Springer
- An Introduction to Geophysical Exploration, Philip Kearey, Michael Brooks and Ian Hill, Wiley-Blackwell; 3rd Ed.
- Outlines of Geophysical Prospecting - A manual for Geologists, Ramachandra Rao, M.B. Prasaranga, University of Mysore.
- An Introduction to Geophysical Prospecting, M.B. Oobrin, and C.H. Savit, McGraw-Hill Inc., US, 4th Ed.



- Applied Geophysics, W. M. Telford, L. P. Geldart, R. E. Sheriff, Cambridge University Press, 2nd Ed.
- The Solar-Terrestrial Environment - An Introduction to Geospace, J. K. Hargreaves, Cambridge University press.
- Introduction to Space Physics, M. G. Kivelson, C. G. Russell, Cambridge University press
- Sun, Earth and Sky, Kenneth R. Lang, Springer-Verlag Berlin Heidelberg GmbH

