MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

Ph.D ADMISSION TEST (MR-PAT)

Ph.D. in CAWTM

Module 1: Basics of geology, Planetary Surface Process and Indian Stratigraphy

1.1 Basic geology- Rock, Minerals and Crystals, Geological Time scale, Fossil and its formation, Concept of solar system and its planets, History of Archean records and Geodynamic process of early earth Formation of Early Earth and its model, Evolution of continental crust, division of Indian Stratigraphy , location and significance, Sequence stratigraphy

Module 2: Igneous, Metamorphic and Sedimentary petrology

2.1 Igneous and Metamorphic rocks and its characteristic, Classification scheme Silicate system & classification Crustal composition, evolution and their properties, Introduction to sedimentary basin, Basin analysis, Depositional environment, Plate tectonics and sedimentation.

Module 3: Structure & Tectonics

3.1 Rock Deformation & their mechanism Rock deformation & their effects on rock structures Fault geometry and their implication in rock deformation Fold classification & their relationship, Plate tectonic in different basin settings Subduction & rise in different basin settings

Module 4: Environmental Geology

4.1 Net Zero concept, SDG initiatives, Climate change and its impact on hydrosphere, Natural hazards, Disaster Management and its assessment, Land pollution and its effects, urbanization and industrialization impacts on geology,

Module 5: Geostatistics

5.1 Geographical Data, mean, median, variance, standard deviation, skewness and kurtosis, Concept of probability and Bivariate analysis in geo-science, : Inferential statistics and Time series analysis and Principal component analysis in geo-science

Module 6: Hydrogeology

6.1 Water Cycle, Introduction to Hydrogeology, Hydrogeological properties and drainage basin concept, Concept of aquifer and hydraulic properties, Concept of water table and its recharge system, Types of wells and its construction methods and design, Role of remote sensing in ground water exploration. Hydro geomorphic and lineament mapping, Groundwater regulation in India

Module 7: Geophysics

7.1 Surface and subsurface geophysical and geological methods of ground water exploration. Surface geophysical methods: resistivity, seismic, gravity and magnetic methods. Well logging for delineation of aquifers and estimation of water quality, electrical resistivity and SP, radiation logging, Gamma, Neutron Caliper and temperature logging

Module 8: Computer Applications in Geology

8.1 Concepts of Computer programmes, operating system, Database - structure, and types; Geological database. Elementary concepts on Knowledge Based Expert System, Decision Support System, Neural Network, Fuzzy Logic and Genetic Algorithm, GPS and GIS and its application, Rockworks

Module 9: Water Resources Management

9.1 Water use efficiency, Reuse-Reduce-Recycle of water, Greywater treatment process Use of treated water and its economics, Zero discharge policy, National Water Policy, Government schemes for water use and conservations, Surface water resources and its distribution,

Module 10: Agri-water and societal benefits

10.1 Concepts of IEC , irrigation water management, impact of water on Crop Yield and Quality, impact on soil health, climate-smart agriculture

Suggested Readings:

1. Duff, P. M. D., & Duff, D. (Eds.). (1993). Holmes' principles of physical geology. Taylor & Francis.
2. Deer W. A., Howie.R. A. and Zussman, J.,(1992) An introduction to the rock forming minerals
3. Prothero, D. R.,& Schwab, F. (2004).Sedimentary geology. Macmillan
4. Nichols,G. (2009) Sedimentology and Stratigraphy, Second Edition. Wiley Blackwell
5. Billings, M. P. (1987). Structural Geology, 4th edition, Prentice-Hall. Park,
6. R. G. (2004). Foundations of Structural Geology. Chapman & Hall.
7. Mason, B (1986). Principles of Geochemistry. 3 rd Edition,
8. Winter, J. D. (2014). Principles of igneous and metamorphic petrology. Pearson
9. Krishnan, M. S. (1982) Geology of India and Burma, CBS Publishers, Delhi
10. Ramakrishnan, M. & Vaidyanadhan, R. (2008) Geology of India Volumes 1 & 2, Geological Society of India, Bangalore

Weblinks

- https://epgp.inflibnet.ac.in/ahl.php?csrno=448
- http://www.earthpolicy.org/images/uploads/book_files/pb4book.pdf)