Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
Syllabus Ph.D. Entrance Test 2024

Subject: GEOLOGY

Sr. No.	Name of The Unit	Detailing
Section –I : Research Methodology		
01	Research Methodology in Geology	Fundamental of Geological Mapping. Application of statistical concepts/ procedures: Data, Diagrammatic representation of data, Probability, Measures of central tendency, Measures of dispersion, Skewness and Kurtosis, Normal distribution, Simple correlation, multiple correlation, regression analysis and simple random sampling. Sampling methods. Windows operating system; Programming fundamentals; Editing, Compilation and running a programme, storing data; Elementary numerical methods. Plotting graph. Important software packages in Geology. ERDAS- for image processing; 21st Century GIS and ARC GIS. Literature Survey. Writing of Research report and paper. Research Ethics and Geoethics.
Section –II : Geology (Subject Specific)		
02	Mineralogy, Igneous And Metamorphic Petrology	Physical, chemical and opticsl properties of common rocks forming silicate mineral groups. Structural classification of silicates. Polymorphism. Solid solution and exsolution. Common minerals of igneous and metamorphic rocks. Minerals of the carbonate, phosphate, sulfide and halide groups. Extinction angles, pleochroism, birefringence of minerals and their relation with mineral composition. Forms, textures and structures of igneous rocks. Silicate melt equillibria, binary and ternary phase diagrams. Evolution of magmas, melting and differentiation. Petrology and petrogenesis of granites, basalts, andesites and alkaline rocks. Petrology of gabbros, kimberlites, anorthosites, lamprophyres and carbonatites. Origin of primary basic magmas. Large Igneous Provinces. Textures and structures of metamorphic rocks. Types of metamorphism. Metamorphic protoliths. Grade and facies of metamorphic rocks. Metasomatism and granitization. Anatexis and origin of migmatites. Tectonic controls of metamorphism. Metamorphic rocks and associated mineral deposits.
03	Sedimentology, Stratigraphy And Paleontology	Rock cycle. Textures of sedimentary rocks and their significance. Processes of sediment transport. Classification and composition of conglomerate, sandstones, shale and carbonate rocks. Biogenic and chemical sedimentary structures. Paleocurrent, heavy mineral study and provenance. Diagenesis-physical and chemical, processes and evidences of diagenesis in

		sandstones and carbonate rocks. Sedimentary environments and facies: Continental–alluvial, lacustrine, desert-aeolian and glacial; Transitional and Marine. Sedimentary basins of India- Precambrian-Proterozoic, Gondwana, postGondwana and Quaternary sedimentation. Seismic and Sequence stratigraphy. Nomenclature and the modern stratigraphic code. Radioisotopes and measurement of geological time. Geological time scale. Stratigraphic procedures of correlation of unfossiliferous rocks. Precambrian stratigaphy of India. Stratigraphy of the Palaeozoic, Mesozoic and Cenozoic formations of India. Gondwana System and Gondwana Land. Rise of the Himalaya and evolution of Siwalik basin. Geodynamic evolution of Deccan Volcanism. Quaternary Stratigraphy. Geology of Maharashtra. Rock record, palaeoclimates and palaeogeography. Fossil record and geological time-scale. Morphology and time-ranges of fossil groups. Evolutionary changes in mollusks, echinodermata, brachiopode, trilobites corals and mammals in geological time. Principles of evolution. Use of species and genera of foraminifera in biostratigraphic correlation. Siwalik vertebrate fauna and Gondwana flora. Evidences of life in Precambrian times. Paleobotany and its significance. Different microfossil groups and their applications in Earth Sciences and their distribution in India.
04	Structural Geology And Geotectonics	Principles of geological mapping and map reading. Projection diagrams. Stress strain relationships of elastic, plastic and viscous materials. Measurements of strain in deformed rocks under deformation conditions. Structural analysis of folds, cleavages, lineation, joints and faults. Superposed deformation. Mechanism of folding and faulting. Time-relationship between crystallization and deformation. Unconformities and basement-cover relations. Structural behavior of igneous rocks, diapirs and salt domes. Earth and the solar system. Meteorites and other extra-terrestrial materials. Planetary evolution of the earth and its internal structure. Heterogeneity of the earth's crust. Major tectonic features of the Oceanic and Continental crust. Continental drift – geological and geophysical evidences. Isostasy. Orogeny and epirogeny. Seismic belts of the earth and plate movements. Geodynamics of the Indian plate.
05	Economic Geology, Mineral Economics and Mineral Exploration	Ore deposits and ore minerals. Magmatic processes of mineralization. Porphyry, skarn and hydrothermal mineralization. Fluid inclusion studies. Mineralization associated with – (i) mafic and ultramifc rocks, (ii) greenstone belts, (iii) komatities, anorthosites and kimberlites, and (iv) submarine volcanism. Magma-related mineralization through geological time. Stratiform and

		stratabound ores. Ores and metamorphism. Occurrence and distribution of metalliferous deposits in India– base metals, iron, manganese aluminium, chromium, nickel, gold. Indian deposits of non-metals – mica, barite, gypsum and apatite. Phosphorite deposits. Placer deposits, rare earth minerals. Strategic, critical and essential minerals. India's status in mineral production. Changing patterns of mineral consumption. National Mineral Policy. Mineral concession Rules. Marine mineral resources and Law of Sea bed. UNFC classification. Methods of surface and subsurface exploration. Prospecting for economic minerals – drilling, sampling and assaying. Geophysical, geobotanical and geochemical methods of mineral exploration. Borehole logging.

Reference Books:

Unit 01: Title of Book: Ethics in Science Education, Research and Governance
Editors: Kambadur Muralidhar, Amit Ghosh and Ashok Kumar Singhvi
Publisher: Indian National Science Academy, New Delhi
Year: 2019; Price: Rs. 500/