

**परिशिष्ट-दो,
“पाठ्यक्रम”**

भाग-1 :: सामान्य ज्ञान ::

1. भारत का इतिहास एवं भारत का स्वतंत्रता आंदोलन।
2. छत्तीसगढ़ का इतिहास एवं स्वतंत्रता आंदोलन में छ.ग. का योगदान।
3. भारत का भौतिक, सामाजिक एवं आर्थिक भूगोल। (छत्तीसगढ़ के विशेष संदर्भ में)
4. भारत का संविधान एवं राजव्यवस्था, छ.ग. का प्रशासनिक ढांचा, स्थानीय शासन एवं पंचायती राज।
5. भारत की अर्थव्यवस्था, वाणिज्य, उद्योग, वन, कृषि एवं हाथकरघा उद्योग। (छत्तीसगढ़ के विशेष संदर्भ में)
6. छ.ग. की जनजातियाँ, बोली, तीज, त्यौहार, नृत्य, पुरातात्विक एवं पर्यटन केंद्र
7. समसामायिक घटनाएं एवं खेल (भारत एवं छ.ग. के संदर्भ में)
8. पर्यावरण।

PART-1 :: GENERAL KNOWLEDGE ::

1. History of India and Indian national movement.
2. History of Chhattisgarh and Contribution of Chhattisgarh in national movement.
3. Physical, Social and Economic geography of India. (With special reference to Chhattisgarh)
4. Constitution of India and Polity. Administrative structure of Chhattisgarh, Local Government of Chhattisgarh and Panchayati Raj.
5. Economy, Commerce, Industry, Forest, Agriculture and Handloom Industry of India. (With special reference to Chhattisgarh)
6. Tribes, Special tradition, Teej and festival, Dance, archaeological and tourist centres of Chhattisgarh.
7. Current affair and sports (With reference to India and Chhattisgarh)
8. Environment.

PART-2 (A) :: GEOLOGY (For Assistant Geologist) ::

1. STRUCTURAL GEOLOGY:-

1. Mechanics of folding and buckling. Fold development and distribution of strain in folds. Superimposed folding and interference patterns.
2. Fractures and joints, their nomenclature, age relationship, origin and significance.
3. Causes and dynamics of faulting. strike-slip faults, normal faults, over thrust and nape.
4. Planar and linear fabrics in deformed rocks. their origin and significance.
5. Concept of Petrofabrics and tectonics axes.
6. Types of fabric, fabric elements, and interpretation of fabric data on microscopic and macroscopic scale.

2. GEOMORPHOLOGY & REMOTE SENSING :-

1. Dynamics of geomorphology and geomorphic processes.
2. Study of fluvial, arid, karts and glacial landforms.
3. Study of volcanic, structural and coastal landforms.
4. Morphometric analysis. Geomorphologic mapping based on genesis of landforms.
5. Geomorphic regions of India. Principles of remote sensing.
6. Electromagnetic Spectrum and principles of remote sensing.
7. Satellite remote sensing. Global and Indian space missions, Satellite exploration programmes and their characteristics- LANDSTA, METEOSAT, SEASET SPOT, and IRS.
8. Aerial photography, aerial photographs and their geometry.
9. photogrammetry.

10. Recent advances in aerial photography. Application of aerial photography in rock type identification.
11. Image interpretation and digital processing techniques.
12. Image Characters and their relations with ground objects.
13. Interpretation of topographic and tectonic features.
14. Application of remote sensing in groundwater evaluation.
15. Application of remote sensing in terrain evaluation.
16. Terrain evaluation for strategic purposes.

3. MINERALOGY:-

1. Morphology of crystals, crystal zones, and zone symbols.
2. Classification of crystals in 32 classes. Crystal Projections.
3. Crystal aggregates, twinning and irregularities in crystals.
4. Crystal optics, pleochroism, interference and birefringence in minerals.
5. Refractometry and its determination. Uniaxial and biaxial indicatrices and optical characters of uniaxial and biaxial minerals.
6. Dispersion in minerals, optic orientation, optical anomalies. Universal stage and its use.
7. Classification of silicate structure, systematic mineralogy of nesosilicates olivine, Garnet and Al_2SiO_5 groups.
8. Systematic mineralogy of sorosilicates - Epidote group; and zircon, topaz, staurolite, and sphene.
9. Systematic mineralogy of Cyclosilicates-Cordierite, Tourmaline and Bery l.
11. Systematic mineralogy of Ionosilicates- Pyroxene and Amphibole groups.
12. Systematic mineralogy of tectosilicates - Silica, Feldspar, Felspathoid, and zeolite groups.
13. Systematic mineralogy of phyllosilicates - Mica, Chlorite, Serpentine groups and Clay minerals, kaolinite and talc.
14. Systematic mineralogy of carbonates, oxides and hydroxides.
15. Mineral assemblages, Gem and Semiprecious stones.

4. GEOCHEMISTRY:-

1. Origin and abundance of elements in the solar system and in the earth.
2. Atomic structure and properties of elements in the periodic table. Special properties of transition and Rare earth elements.
3. Geochemical classification of elements.
4. Radiogenic isotopes. Radioactive decay Schemes U-Pb, Sm-Nd, Rb-Sr, K-Ar, and growth of daughter isotopes. Radiometric dating of single minerals and whole minerals.
5. Stable isotopes : nature, abundance and fractionation.
6. Law of thermodynamics: concept of free energy, activity, fugacity and equilibrium constant. Thermodynamics of ideal, nonideal and dilute solutions. Principles of ionic substitution in minerals.
7. Element partitioning in mineral/rock formation and concept of simple distribution coefficients and exchange reaction distribution coefficients.
8. Element partitioning in mineral assemblages and its use in P-T estimation.
9. Principles and geological application of atomic absorption spectrometry, inductively coupled plasma-atomic emission spectrometry.
10. Scanning and transmission electron microscopy, electron-probe microanalysis, XRF: Principles and application in geology.

5. STRATIGRAPHY/TECTONICS:-

1. Concept of stratigraphy and its significance. Stratigraphic scales, dual classification.
2. Lithostratigraphy, correlation and serigraphic code.
3. Rules of Stratigraphic nomenclature: Sequence stratigraphy. Geochronology and Chronostratigraphy.

4. Plate tectonics. Dynamic evolution of continental and oceanic crust.
 5. Evolution of sedimentary basins. Tectonics and sedimentation.
 6. Tectonics of Precambrian orogenic belts of India.
 7. Formation of mountain roots. Anatomy of orogenic belts.
 8. Structure and origin of Alpine-Himalayan belt.
- 6. IGNEOUS PETROLOGY :-**
1. Physics of Magma generation in the mantle
 2. Evolution of Magma.
 3. Phase equilibrium of single, binary, ternary, and quaternary silicate systems. its relation of magma generation.
 4. Crystallization of granitic and basaltic magma in the light of modern experimental work.
 5. Forms, structures and textures of igneous rocks and their physico-chemical work.
 6. Criterion of classification of igneous rocks. norms_CIPW and niggli values, zavaritski number.
 7. Petrogenesis of major igneous rocks types with reference to Indian occurrence.
 8. Tholeiitic basalt and alkali olivine basalt.
 9. Andesite-rhyolite, Trachy-basalt, trachy-andesite and trachy-phonolite families.
 10. Granite and granodiorite.
 11. Peridotite, ultramafite, komatite, syenite, cobronatite and lamoprophyre.
 13. Rock suite, series: Petrographic provinces and association.
 14. Definition, agents and kind of metamorphism.
 15. Mineralogical phase rule of closed and open systems and its application in metamorphism.
- 7. METAMORPHIC PETROLOGY :-**
1. Classification of metamorphic rocks. Structures and facies series.
 2. Concept of depth zone and metamorphic zones and subfacies resulting from low to high- pressure metamorphism.
 3. Study of characteristic metamorphic zones and subfacies resulting from very low pressure metamorphism.
 4. Study of characteristic metamorphic zones and subfacies resulting from very high pressure metamorphism.
 5. Nature of metamorphic reactions and P-T condition of metamorphism. Isoreaction grad, Schreinemakers rule and construction of petrogenetic grids, crystalloblastic series.
 6. metamorphic differentiation. Anatexis and origin of migmatites in the light of experimental studies.
 7. Regional metamorphism and paired metamorphic belts in reference to plate tectonics. P-T time paths.
 8. Ultra high temperature, ultra-high pressure, and ocean floor metamorphism.
 9. Principle types and characters of metamorphism, grainitization.
 10. Petrogenesis of Charnockite, amphibolite, eclogite, gondite, greenschist, khondalite and granulites with special reference to Indian occurrences.
- 8. SEDIMENTOLOGY :-**
1. Earth surface system: Liberation and flux of sediments.
 2. Processes of transport and generation of sedimentary structures.
 3. Stromatolites and their significance.
 4. Textural analysis, Graphical representation and statistical treatment of grain size data and their significance.
 5. Classification of sandstone and carbonate rocks. Dolomite and Dolomitization.
 6. Sedimentary environments and facies.
 7. Continental : alluvial-fluvial facies, lacustrine, Desert-aeolian and glacial sedimentary environmental.
 8. Shallow coastal clastics and shallow water carbonates.
 9. Marine and continental evaporites.
 10. Deep-sea basins. Paleocurrents and basin analysis,
 11. Clastic petrofacies. Paleoclimate and paleo environment analysis.
12. Diagenesis and flood flow. Diagenesis of mudstones.
 13. Diagenesis of sandstone and carbonate rocks: Changes in mineralogy, Fabric and chemistry.
 14. Chemistry of natural waters. Mineral stability in Eh-pH Diagram.
 15. Rock Weathering and soil formation.
 16. Elemental mobility in surface environment.
 17. Concept of geochemical-biogeochemical cycling and global climate.
 18. Application of trace element, rare earth element and stable isotope geochemistry to sediment logical problems.
- 9. OREGEOLOGY :-**
1. Modern concepts of ore genesis. Spatial and temporal distribution of ore deposits-A global perspective. Comparison between earth's evolutionary history and evolutionary trends ore deposits
 2. Concept of ore bearing fluids, their origin and migration. Fluid inclusions in ores principles, assumptions, limitations and applications.
 3. Texture, paragenesis, and zoning of ores and their significance.
 4. Wall rock alteration, structural, physico-chemical and stratigraphic control of ore localization
 5. Chemical composition of important ores-Bulk chemistry, trace, elements, REE and stable and radiogenic isotopes. Organic matter in ores
 6. Orthomagmatic ores of mafic-ultramafic associations- Diamond in Kimberlites, REE in Carbonates, Ti-V Ores, Chromite and PGE, Ni Ores, Cyprus type Cu-Zn Ores.
 7. Ores of Silicic igneous rocks- Kiruna Type Fe-P, Pegmatoids, Greisen, Skarns.
 8. Porphyry associations, Kuroko Type Zn-Pb-Cu. Malanjhand type Cu-Mo.
 9. Ores of sedimentary affiliations-Chemical and clastic sediments, Stratiform and strata bound ore deposits (Fe,Mn,Nonferous,) Placers and paleoplacers.
 10. Ores of Metamorphic affiliation-Metamorphism of ores and Ni/ Au laterite ores, ores related to weathered surfaces- laterite, Bauxite and Ni/Au laterite
 11. Mineralogy. Genesis, uses and Indian distribution of ore minerals related to:
 - (a) Pb, Zn
 - (b) Fe, Mn, Cr
 - (c) W, Al
 - (d) U and Th
- 10. GEOCHEMICAL EXPLORATION :-**
1. Definition, scope and characteristic features of prospecting and exploration. Guides for mineral search, search, surface and subsurface indicators. Regional, stratigraphic, lithological, mineralogical structural and geobotanical guides.
 2. Sampling and its methods. Assay value and grade of ore. Ore reserves. Ore reserve categories, Estimation of ore reserves Persistence of ore in depth.
 3. Principles of geochemical prospecting. Geochemical and geobotanical surveys.
 4. Geochemical dispersion patterns and anomalies.
 5. Geological and Geochemical prospecting for copper, lead, zinc, nickel, oil and gas and atomic minerals.
- 11. GEOPHYSICAL EXPLORATION :-**
1. Variation of gravity over type surface of the earth. Principles of gravimeters. Gravity fields surveys. Various types of correction applied to gravity data. Preparation of gravity anomaly maps and their interpretation in terms of shape, size and depth
 2. Geomagnetic field of the earth. Magnetic properties of magnetic anomaly magnetometer. Field surveys and data reduction. Preparation of magnetic anomaly maps and their interpretation. Magnetic anomalies due to single pole and dipole Aeromagnetic survey.

3. Basic principles of resistivity methods. Various types of electrode configuration. Field procedure of profiling and sounding. Application of electrical methods in groundwater prospecting and civil engineering problems.
 4. Fundamental principles of wave propagation in seismic method. Refraction and reflection survey for single interface, horizontal and dipping cases. seismic velocity and interpretation of seismic data
 5. Brief outline of various well-logging techniques, Principles of electrical logging and its application in petroleum, ground water and mineral exploration, Basic principles and instrumentation of radioactive method of exploration.
- 12. MINING GEOLOGY :-**
1. Definition of various mining terms. Mining excavation. Filling for rock breaking and blast hole patterns.
 2. Ventilation and drainage in mining. Mining hazards.
 3. Alluvial and open pit mining methods – advantages and disadvantages.
 4. Underground and mining methods – gophing, Shrinkage, stoping, caving, slicing methods.
 5. Coal mining and ocean bottom mining methods.
- 13. ENVIRONMENT GEOLOGY :-**
1. Concept of ecosystem/ecology.
 2. Impact of man on environment.
 3. Problems pertaining to mining and utilization of energy resources.
 4. Problems pertaining to urbanization.
 5. Problems pertaining to wasteland and wet lands.
 6. Characterization of volcanoes.
 7. Impact of volcanoes on weather and climate.
 8. Earthquake-severity, distribution and occurrence.
 9. Natural and human induces causes of earthquakes.
 10. Land use planning in earthquake prone areas.
 11. Landslides – Their causes (natural and man made.) Prevention and planning
 12. Floods – physical characteristics.
 13. Origin and causes of flooding. Prevention of soil cover loss.
 14. Human influence on climate and weather changes. Global warming and ozone layer depletion.
 15. Coastal environments – Salinization. Desertification
 16. Coastal water pollution.
 17. Air pollution- acid precipitation, weather and climatic effects.
 18. Water pollution – Impact of waste disposal (Soil/liquid) on water quality degradation.
 19. Environment management – Definition of Problem and Objectives.
 20. Role of the geologist in urban area planning
 21. Natural resource management and natural hazards.
 22. Environmental policies of the country.
 23. Environmental law.

भाग-2 (ब) :: भू-विज्ञान (खनि निरीक्षक के लिए) ::

1. सामान्य भू-विज्ञान:- पृथ्वी की उत्पत्ति तथा आंतरिक संरचना का प्रारंभिक ज्ञान, रेडियो एक्टिव पदार्थ से चट्टानों का तिथि निर्धारण, पृथ्वी की आयु, ज्वालामुखी उनके कारण तथा उत्पत्ति, ज्वालामुखी क्षेत्र, भूकम्प उनके कारण, भू-गर्भीय प्रभाव तथा भूकम्पीय तथा ज्वालामुखी क्षेत्र का संबंध, भू-अभिनति तथा उनके वर्गीकरण, समस्थिति पहाड़ उनके आकार तथा उनकी उत्पत्ति, महाद्विपीय विस्थापना संबंधी संक्षिप्त विचार महाद्विपीय तथा महासागरों की उत्पत्ति।
2. भू-आकृति विज्ञान:- भू-आकृति विशिष्टता, स्थलाकृति, स्थलाकृतिक संरचनाओं तथा भू-आकृति विज्ञान से उसका संबंध, प्रमुख भू-आकृतियाँ, जल विकास पद्धति, भारतीय उप महाद्वीप का भू-आकृतिक विशेषताएँ।
3. संरचनात्मक भू-विज्ञान:- बलन एवं भ्रंश उनका नामकरण, वर्गीकरण उन्हें पहचानना तथा दृश्यांशों पर उनका प्रभाव, संक्षिप्त उनका वर्गीकरण तथा महत्व, विषयक विन्यास अतिव्याप्ति, अव्याप्ति, पुरातन साथी तथा नवांत साथी, शल्कन तथा संरेखण

की परिभाषा तथा वर्गीकरण, नवीन संस्तरों की अभिदिशा सुनिश्चित करने के लिए शीर्ष तथा अधस्थल कसौटी।

4. स्तरित शैल विज्ञान:- स्तरिकी के सिद्धान्त स्तरिक वर्गीकरण तथा नाम पद्धति, मानक स्तरित माप, भारतीय उपमहाद्वीप के शैल समूहों का विस्तृत अध्ययन, भू-वैज्ञानिक अतीत के दौरान भारतीय उप महाद्वीप में जलवायु तथा अग्रिय कार्यकलापों का संक्षिप्त अध्ययन, पुराभौगोलिक पुनर्निर्माण।
5. खनिज विज्ञान:- क्रिस्टल रसायन के तत्व बंधन के प्रकार, आयनिक रेडों समन्वय संख्या के प्रकार, समाकृति कूटरूपिता, सिलिकेटों संरचनात्मक वर्गीकरण, निम्नलिखित शैल निर्माणकारी खनिजों का भौतिकीय रासायनिक एवं प्रकाशीय गुणों के आधार पर अध्ययन जैसे फेल्सपार, पाइरोक्सीन, एम्पीबोल्स, अम्ब्रक, गार्नेट, ऑलिवीन फेल्सपिथाइड, स्फटिक, केलसाइट, कायनाइट ऐन्डालूसाइट सिलेमेनाइट।
6. शैलीकीय विज्ञान:- मैग्मा, इसका उत्पादन, मैग्मा की प्रकृति तथा संगठन, द्विआंगी तथा त्रिआंगी पद्धतियों के सरल अवस्था आरेख (डायग्राम) तथा उनका महत्व, बावेन की प्रतिक्रिया सिद्धान्त, चुम्बकीय विभेदीकरण, रवागीकरण, मैग्मा का गठन और संरचना तथा उनका शैल संबंधी महत्व, आग्नेय, शैलों का वर्गीकरण, महत्वपूर्ण शैल प्रकारों का शैलीय तथा शैल जनन महत्व। अवसादी शैलों के निर्माण की प्रक्रिया पसघनन तथा अध्यमीभवन, अवसादी शैलों का गठन संरचना तथा उनका महत्व, खण्डजां तथा अखण्डजां अवसादी शैलों का वर्गीकरण।
मूल अध्ययन में भारी खनिज तथा इनका महत्व, सामान्य शैल प्रकारों का शैलीकीय अध्ययन।
कायान्तरण के परिवर्तनशील तत्व, कायान्तरण के प्रकार, कार्यान्तरी श्रेणियाँ, क्षेत्र तथा संलक्षणी, कायान्तरी शैलों की गठन, संरचनाएँ तथा नाम पद्धतियाँ, महत्वपूर्ण शैल प्रकारों की शैलीकीय तथा सैलोत्पत्ति।
7. आर्थिक भू-विज्ञान:- अयस्क की धारणा, अयस्क खनिज तथा गैंग, अयस्कों का औसत प्रतिशत, खनिज निक्षेपों के निर्माण की प्रक्रिया, अयस्क निक्षेपों के सामान्य आकृति तथा संरचनाएँ, अयस्क निक्षेपों का वर्गीकरण, अयस्क निक्षेपण का नियंत्रण, महत्वपूर्ण धात्विक तथा आधात्विक निक्षेपों का अध्ययन, छत्तीसगढ़ एवं भारत की खनिज सम्पदा।
8. पूर्वक्षण एवं अन्वेषण:- पूर्वक्षण तथा अन्वेषण की परिभाषाएँ एवं पद्धति का वर्गीकरण, भू-वैज्ञानिक, भू-भौतिकी, भू-रासायनिक, अन्वेषण की प्राथमिक पद्धति। अयस्क के मार्गदर्शक।
9. थ्योडोलाइट सर्वेक्षण:- थ्योडोलाइट के प्रकार, वर्नियर थ्योडोलाइट के विभिन्न मार्गों का वर्णन, थ्योडोलाइट से पहुँच एवं पहुँचविहीन स्थल की ऊँचाई एवं दूरी का मापन। थ्योडोलाइट से सतह एवं भूमिगत ट्रेवर्स, खुले एवं बंद ट्रेवर्स की पुष्टि, थ्योडोलाइट सर्वेक्षण में त्रुटि के स्रोत एवं उसके उपाय।
10. सुदूर संवेदन:- सुदूर संवेदन की शब्दावली, सुदूर संवेदन आकडों के लाभ एवं हानि, सैटेलाइट आकडों को प्राप्त करने की रीति, सुदूर संवेदन से संबंधित हार्डवेयर तथा सॉफ्टवेयर।

PART-2 (B) :: GEOLOGY (For Mining Inspector) ::

1. **General Geology-** Elementary ideas of origin and interior of the Earth. Dating of rocks by radioactive methods; age of the Earth. Volcanoes - causes and products. volcanic belts. Earthquakes causes, geological effect and distribution, relation to volcanic belts. Geosynclines and their classification. Isostasy. Mountains types and origin, Brief ideas about continental drift. Origin of continents and oceans.
2. **Geomorphology-** Relief features: topography and its relation to structures and lithology, Major landforms Drainage system. Geomorphic features of Indian subcontinents.
3. **Structural Geology-** Folds, Faults - their nomenclature, classification recognition and their effect on outcrops. Joints-their classification and importance. Unconformity, overlap, offlap, outliers and inliers. Definition and classification of foliation and lineation. Top and bottom criteria for determining the direction of young formation.
4. **Stratigraphy-** Principles of Stratigraphy. Stratigraphic Classification and nomenclature. Standard stratigraphical scale. Detailed study of various geological formations of Indian subcontinent. Brief study of climates and igneous activities in India subcontinent during geological past Paleogeographic reconstruction.

5. **Mineralogy-** Elements of crystal chemistry, types of bonding Ionic radii coordination number. Isomorphism and pseudomorphism. Structural classification of silicates, study of the following rock forming minerals with respect to the physical chemical and optical properties - feldspars pyroxenes, amphiboles Mica garnets, olivine feldspathoids, quartz, calcite kyanite andalusite sillimanite.
6. **Petrology-** Magma. Its generation, nature and composition simple phase diagrams of binary and ternary systems and their significance, Bowen's Reaction Principles, Magnetic differentiation, assimilation. Texture and structure and their petrogenetic significance. Classification of igneous rocks. Petrography and petrogenesis of important rock-types.
- Processes of formation of sedimentary rocks. Diagenesis and lithification. Texture and structures and their significance. Classification of sedimentary rocks. elastic and non-elastic Heavy Minerals and their significance in provenance studies Petrography of common rock types.
- Variables of metamorphism. Types of metamorphism, metamorphic grades, Zones and facies Textures, structures, and nomenclature of metamorphic rocks. Petrography and petrogenesis of important rock types.
7. **Economic geology-** Concept of ore, ore mineral gangue tenor of ores, processes of formation of mineral deposits common forms and structures of ore deposits, Classification of ore deposits. Controls of ore deposition, Study of important metallic and non metallic deposits, Mineral wealth of Chhattisgarh and India.
8. **Prospecting and Exploration:-** Prospecting and Exploration Their definitions and Classification of Methods; Elementary Methods of Geological, Geophysical, Geochemical Prospecting; Guides To Ores.
9. **Theodolite Surveying:-** Types of theodolites; Description of various parts of theodolite; Theodolites; Measurements of height and distance of accessible and inaccessible points; Traversing with. Theodolite on surface and underground; Checks on Closed and Open traverses; Sources of errors and their prevention in survey.
10. **Remote Sensing:-** Terminology in Remote Sensing Advantage and Disadvantages of Remote Sensing Data. Procedure for Obtaining Satellite Data. Hardwares and Software related to Remote Sensing.

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