

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)

(A College with Potential for Excellence)

Bhimavaram, W.G.Dist, A.P

Syllabus for the Year 2018-2019

Department : **Geology**

Paper : 1A

Class: B.Sc

Semester: 1

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| Definition of Geology - Basic assumptions of Geology - Its relationship with other sciences |
| Branches of Geology – Aim, Scope and Applications of Geology. Earth as a planet |
| Movements of the Earth and their effects- Rotation, Revolution, Perihelion-Aphelion (Apogee), and Equinoxes-Solstices. |
| Origin of the Earth – Nebular, Planetesimal, Tidal, and Big-Bang hypotheses; their merits and demerits, Age of the earth |
| Geological processes - Exogenic and Endogenic, Definition of weathering - types of weathering of rocks - Physical and Chemical; Definition of erosion and denudation, Cycle of erosion - erosion, transportation and deposition. Agents of erosion. |
| Rivers :- Erosion, transportation and deposition of river (fluvial) cycle in different stages development of typical landforms by river erosion and deposition - V-shaped Valley, Waterfall, Alluvial fan, Meander, Ox-bow lake, Flood plain, Natural levee, Peneplain and Delta. Types of rivers. Drainage patterns. |
| Wind :- Development of characteristic features by wind (arid cycle) erosion and deposition pedestal rock - mushroom topography - inselberge, ventifacts, loess, sand dunes. |
| Glaciers :- Definition of a Glacier - types of glaciers - development of typical landforms by glacial erosion and deposition. |
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| Ground Water :- Storage of ground water - Porosity, Permeability, aquifer, water table-zone of saturation and zone of aeration. |
| Seas :- Offshore profile: Continental shelf, Continental slope, Abyssal plane, Oceanic Deep. Movements of sea-water. Interior of the earth: Structure & Constitution. P-wave and S-wave Shadow zones. |
| Volcanoes :- Parts of a typical volcano, Types of volcanoes. Products of volcanoes. Hot Spot. |
| Earthquakes :- Causes, kinds of earthquake waves, mode of propagation, intensity of earthquakes, Richter scale, Seismograph and Seismogram - Effects of earthquakes, Earthquake zones. |
| Crystallography: Definition of a crystal - amorphous and crystalline states, Morphology of crystals - face, edge, solid angle, interfacial angle. Forms: Simple, Combination, Closed and Open forms. Symmetry: Plane, Axis, Centre, Crystallographic axes, Parameters, Indices. Crystallographic Notation: Parameter system of weiss, Index system of Miller. Classification of Crystals into 7 systems |

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Syllabus for the Year 2018-2019

Department : **Geology**

Paper : 2A

Class: B.Sc

Semester: 3

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| Nature and scope of Petrology - Definition of Rock, Classification of rocks into Igneous, Sedimentary and Metamorphic; distinguishing features of three types of rocks |
| Forms-Lava flows, intrusions, sill, laccolith, bysmalith, lopolith, dykes, ring dykes, cone sheets, volcanic necks, phacolith and batholith. |
| Vesicular, amygdoloidal, block lava, ropy lava, pillow, flow, jointing, sheeting, plates, columnar, prismatic - structures. |
| Definition of structure, texture, microstructure, devitrification; allotriomorphic hypidiomorphic, panadiomorphic, ophitic, intergranular, intersertal, trachytoid, graphic and micrographic |
| Classification of Igneous rocks: C.I.P.W. and Tyrrel - Tabular. Composition and constitution of magma- Uni component, binary magma with eutectic and solid solution. |
| Origin of Igneous rocks - Bowen's reaction principle; Differentiation and Assimilation |
| Descriptive study of the following Igneous rocks - Granite, Granodiorite, Syenite, Nepheline syenite, Diorite porphyry, Pegmatite |
| Source of sediments - Mechanical and Chemical weathering; modes of transportation, sedimentary environments. Definition of diagenesis, Lithification, Cementation, Stratification. Types of bedding, surface marks, deformed bedding, solution structures. |
| Classification of Sedimentary rocks - Clastic - rudaceous, arenaceous, argillaceous; nonclastic- Calcareous, Carbonaceous, Ferruginous, Phosphatic, evaporates |
| Descriptive study of the following Sedimentary rocks : Conglomerate, Breccia, Grit, Sandstone, Arkose, Graywacke, Shale, Limestone, Shell limestone. |
| Definition of Metamorphism, Agents and types of metamorphism, Grades and Zones of Metamorphism. |
| Metamorphic minerals - stress and antistress minerals. Structures of Metamorphic rocks - Cataclastic, Maculose, Schistose, Granulose and Gneissose. Textures - Crystalloblastic, Palimpsest, Xenoblastic, Idioblastic. |
| Classification of Metamorphic rocks - Concept of Metamorphic facies. Cataclastic metamorphism of argillaceous and arenaceous rocks |
| Thermal metamorphism of argillaceous, arenaceous and calcareous rocks; Dynamothermal metamorphism of argillaceous, arenaceous and basic igneous rocks |
| Plutonic metamorphism, metasomatism and additive processes. Definitions of anatexis and palingenesis. |
| Descriptive study of the following rocks : Gneiss, Schist, Slate, Phyllite, Quartzite, Marble, Granulite, Eclogite, Amphibolite, Migmatite. Charnockite, Khondalite, Gondite. |

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Syllabus for the Year 2018-2019

Department : **Geology** Paper : 3A Class: B.Sc

Semester: 5

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| Stratigraphy: Definition of Stratigraphy. Principles of Stratigraphy |
| Nomenclature of Stratigraphy – Geochronologic units, Chronostratigraphic units |
| Biostratigraphic units and Lithostratigraphic units. Standard Geological Time Scale. |
| Principles of correlation |
| Physiographic divisions of India with their stratigraphic and structural characteristics. |
| A brief study of type areas, distribution in India |
| lithology, fossil content and economic importance of the following geological groups of India – Dharwars |
| lithology, fossil content and economic importance of the following geological groups of India – Cuddapahs |
| lithology, fossil content and economic importance of the following geological groups of India – Delhis |
| lithology, fossil content and economic importance of the following geological groups of India – Vindhya |
| lithology, fossil content and economic importance of the following geological groups of India – Kurnools |
| lithology, fossil content and economic importance of the following geological groups of India – Gondwanas |
| lithology, fossil content and economic importance of the following geological groups of India – Deccan Traps |
| lithology, fossil content and economic importance of the following geological groups of India – Siwaliks |
| lithology, fossil content and economic importance of the following geological groups of India – Jurassics and Triassics |
| lithology, fossil content and economic importance of the following geological groups of India – Cretaceous |

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Syllabus for the Year 2018-2019

Department : **Geology**

Paper : 4A

Class: B.Sc

Semester: 5

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| Definition of Economic Geology, Global tectonics & metallogeny, Mineral resources and their peculiarities, Ore, Gangue, Industrial minerals |
| Tenor, grade Syngenetic deposits, Epigenetic and Endogenetic and Exogenetic deposits. |
| Classification of Mineral deposits – Bateman's classification modified by Jenson. |
| Processes of formation of Mineral deposits |
| Magmatic concentration, Contact Metasomatism, Hydrothermal |
| Cavity filling and replacement |
| Sedimentation, Residual and Mechanical concentration (Placers) |
| Oxidation and Supergene enrichment, Metamorphism. |
| Study of important Ores – their chemical composition, Physical Properties |
| Mode of Occurrence, distribution in India and uses of the following metals – Gold, Copper |
| Mode of Occurrence, distribution in India and uses of the following metals – Lead and Zinc |
| Mode of Occurrence, distribution in India and uses of the following metals – Iron and Alluminum |
| Manganese, Chromium, Uranium and Thorium (Radioactive minerals) |
| Chemical compositions, Physical properties, Mode of occurrence and distribution in India of Minerals required for the following Industries |
| Refractories, Abrasives, Steel, Cement, Ceramic, Insulators, Glass, Fertilizers & Chemicals, Gemstones and Dimensional stones |
| Fuels – Coal, Petroleum, their Origin, Occurrence and Distribution in India. Major Mineral resources of A.P. Asbestos, Barites, Coal, Mica, Clays. |

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Syllabus for the Year 2017-2018

Department : **Geology** Paper : 1B Class: B.Sc Semester: 2

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| Odd Semester Examination |
| Odd Semester Examination |
| Definition of a mineral - Classification of minerals into rock-forming and ore-forming minerals. |
| Physical properties of minerals - Colour, Streak, Transparency, Lustre, Form, Hardness, Tenacity, Cleavage, Fracture, Specific gravity. |
| Chemical properties of minerals - Isomorphism - Solid solution, Polymorphism - Allotropy, Pseudomorphism, Radioactivity, Silicate structures. |
| Magnetic properties, Electrical properties: Pyro & Peizo electricity. |
| Descriptive Mineralogy: Study of physical properties, chemical properties and mode of occurrence of the following mineral groups: Nesosilicates - Olivine, Garnet, Aluminium silicates |
| Study of physical properties, chemical properties and mode of occurrence of the following mineral groups : Sorosilicates – Epidote, Cyclosilicates – Beryl. |
| CAT-I |
| Study of physical properties, chemical properties and mode of occurrence of the following mineral groups: Inosilicates - Pyroxene & Amphibole |
| Study of physical properties, chemical properties and mode of occurrence of the following mineral groups: Phyllosilicates - Mica & Hydrous magnesium silicates |
| Study of physical properties, chemical properties and mode of occurrence of the following mineral groups: Tectosilicates - Feldspars, Feldspathoids, Quartz. Forms of Silica |
| Study of physical properties, chemical properties and mode of occurrence of the following mineral groups: Tectosilicates - Feldspars, Feldspathoids, Quartz. Forms of Silica |
| Miscellaneous - Staurolite, Tourmaline, Zircon, Calcite, Corundum, Apatite. |
| CAT-II |
| General principles of optics. Optical properties of Minerals - Isotropic & Anisotropic substances. |
| Polarized light, Refractive index, Double refraction, Uniaxial and Biaxial Minerals. |
| Nicol Prism and its construction, Concept of crossed nicols. |
| Petrological (Polarising) Microscope - its mechanical and optical parts. |
| Behaviour of isotropic and anisotropic minerals between crossed nicols - Extinction, Pleochroism, Interference colours. |

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 Syllabus for the Year 2017-2018

Department :Geology Paper : 2B Class: B.Sc Semester:4

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| Odd Semester Examination |
| Odd Semester Examination |
| Definition of Structural Geology; Aim and objectives of structural Geology. Importance of study of structures - Primary and Secondary structures. |
| Bed, bedding planes, out crop, attitude of beds-strike, dip and apparent dip; use of Clinometer, primary structures as markers. |
| Folds-description, geometric classification; recognition of folds in the field. |
| Faults - Geometric and genetic classification, recognition of faults in the field, effects of faults on out crops. |
| Joints - Geometric and genetic classification. |
| Unconformities - Definition of unconformity, types of unconformities, recognition of unconformities in the field; distinguishing the faults from unconformities. |
| Definitions of overlap, off-lap, outlier, inlier, cleavage, schistosity, foliation and lineation |
| Definitions of palaeontology and fossilization, conditions for preservation, modes of preservation, uses of fossils |
| Introduction to Geo-Chronological units. Study of taxonomy |
| classification, morphology, geological and geographical distribution of the invertebrates: Phylum Echinodermata. Study of the following fossils: Cidaris, Micraster, Holaster, Hemiaster. |
| Phylum Brachiopod, Phylum Hemichordata, Phylum Coelenterata. Phylum Arthropoda. Study of the following fossils: : Spirifer, Productus, Rhynchonella. |
| Phylum Brachiopod, Phylum Hemichordata, Phylum Coelenterata. Phylum Arthropoda. Study of the following fossils Terebratula; Monograptus, Diplograptus. |
| Study of the following fossils: Tetragraptus; Calceola, Zaphrentis, Montlivaltia, Favosites: Calymene, Paradoxides |
| Phylum Mollusca, (Pelecypoda, Gasteropoda and Cephalopoda). Study of the following fossils: Natica, Turritella, Cypraea, |
| Phylum Mollusca, (Pelecypoda, Gasteropoda and Cephalopoda). Study of the following fossils: Voluta, Murex, Physa; |
| Pecten, Arca, Gryphea, Exogyra, Cardita, Meretrix ; Nautilus, Goniatites, Ceratites, Belemnites . Glossopteris, Gangamopteris, Ptylophyllum. |

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Syllabus for the Year 2017-2018

Department :Geology

Paper : 3B

Class: B.Sc

Semester:6

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| Odd Semester Examination |
| Odd Semester Examination |
| Definitions of hydrology and hydrogeology. Scope and applications of hydrogeology. |
| Concept of Hydrologic Cycle - Precipitation, Evapotranspiration, Runoff, Infiltration. |
| Origin and classification of groundwater. |
| Occurrence and vertical distribution of groundwater. Zones of aeration and saturation water table, springs, recharge and discharge areas. |
| Aquifers: types and properties. |
| Coastal aquifers - Salt water intrusion. Groundwater balance. |
| Water bearing properties of rocks - Igneous, Sedimentary and Metamorphic. Favourable Geological conditions for Groundwater. |
| Porosity, Permeability, Specific yield and specific retention. |
| Hydraulic conductivity. Darcy's law. |
| Methods of locating groundwater, surface and subsurface evidence with special reference to electrical resistivity prospecting methods. |
| Quality of groundwater : physical, chemical. |
| Quality of groundwater : bacterial characteristics. |
| Suitability of groundwater for drinking, irrigation and industrial purposes |
| Groundwater contamination. |
| Groundwater potential and Provinces in India with special reference to Andhra Pradesh |

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Syllabus for the Year 2017-2018

Department :Geology

Paper :4B

Class: B.Sc

Semester:6

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| Odd Semester Examination |
| Odd Semester Examination |
| Definitions of Prospecting and Exploration. |
| Reconnaissance, Preliminary and Detailed survey. |
| Geological prospecting: Guides and Criteria. Structural Guides. |
| Geological prospecting: Lithological Guides. |
| Geological prospecting: Stratigraphic Guides. |
| Geochemical prospecting, Dispersion, Path finder elements. |
| Geophysical prospecting (Magnetic method, Gravity method, Electrical method and Seismic method). |
| Types of ore reserves and their calculations |
| Ore estimation – Included and Extended area Methods. |
| Fundamentals of Mineral Beneficiation. |
| Sampling Methods – Channel, Chip, Grab, Car, groove, Wagon, Pitting and trenching and drill hole sampling |
| Sampling Methods –Pitting and trenching and drill hole sampling |
| Coning and quartering. Average Assay |
| Mining: Alluvial, Quarrying (Open cast mining) and Underground mining |
| Drilling Methods – Rotary drilling and Percussion drilling. |
| Remote sensing techniques in mineral exploration. |

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Department :Geology Paper : 5B Class: B.S Semester:6

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| Odd Semester Examination |
| Odd Semester Examination |
| Concept of environmental - Historical perspective - environmental awareness |
| Role of Geologist in environmental Protection and Planning. |
| Land and use planning. Soils,Types of soils. |
| Classification of soils - Site selections -Constructions and urbanization. |
| Waste disposal - environmental effects Waste recycling - recycling of resources. |
| Land cover: Application of remote sensing: mapping soil cover, forest cover. |
| Land cover:Application of remote sensing:degraded land, surface water reservoirs. |
| Mining impact on the environment - Health Hazards |
| Mineral resource depletion. |
| Environmental considerations in location and construction of dams. |
| Environmental considerations in location and construction reservoirs and tunnels. |
| Geological Hazards - floods, shifting of river courses |
| land slides - earthquakes -Prediction and Protection. Man - made Hazards. |
| Beach erosion sedimentation - coastal zone protection |
| Management – coastal engineering constructions - their effects remedial measures. |
| Mass Wasting - land scarification, Migration of dunes – stabilization |

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Syllabus for the Year 2017-2018

Department :Geology

Paper : 6B

Class: B.Sc

Semester:6

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| Odd Semester Examination |
| Odd Semester Examination |
| Aerial Photography- Introduction, Normal Aerial Photography, Map, Aerial Photo, Imagery |
| Types of Aerial Photographs, Mosaics, Types of Stereoscopes. |
| Photo Geological Studies – Interpretation. |
| Remote Sensing definition. Space, Sensor and Ground segments. |
| Electromagnetic spectrum. Remote Sensing platforms. |
| Sensors used in Remote Sensing. |
| Indian Remote Sensing Satellites. |
| Remote Sensing applications. |
| GIS and its applications, Remote Sensing for GIS. |
| Data models, Main Segments of GIS, Components of GIS. |
| GIS – Integration, Study of the coastal area of West Godavari district through satellite imagery. |
| Role of Geological studies in engineering projects. |
| Rock as a constructing material. Engineering properties of rocks. |
| Role of geologist in the construction of Bridges and Roads. |
| Role of geologist in the construction of Dams and Reservoirs. |
| Role of geologist in the construction of Tunnels. |

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Syllabus for the Year 2016-2017

Department : Geology Paper : 1A Class: B.Sc

Semester:1

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| Definition of Geology - Basic assumptions of Geology - Its relationship with other sciences - Branches of Geology – Aim, Scope and Applications of Geology. |
| Earth as a planet - its shape, size and density - Movements of the Earth and their effects- Rotation, Revolution.Perihelion-Aphelion (Apogee), and Equinoxes-Solstices.Origin of the Earth – Nebular, Planetesimal, Tidal, and Big-Bang hypotheses; their merits and demerits, Age of the earth |
| Geological processes - Exogenic and Endogenic, Definition of weathering - types of weathering of rocks - Physical and Chemical; Definition of erosion and denudation, Cycle of erosion - erosion, transportation and deposition. Agents of erosion. |
| Rivers :- Erosion, transportation and deposition of river (fluvial) cycle in different stages development of typical landforms by river erosion and deposition - V-shaped Valley, Waterfall, Alluvial fan, Meander, Ox-bow lake, Flood plain, Natural levee, Peneplain and Delta. Types of rivers. Drainage patterns. Wind :- Development of characteristic features by wind (arid cycle) erosion and deposition pedestal rock - mushroom topography - inselberge, ventifacts, loess, sand dunes. |
| Glaciers :- Definition of a Glacier - types of glaciers - development of typical landforms by glacial erosion and deposition : Cirque, U-shaped valley, Hanging valley, Roche- moutonnee, Moraine, Drumlin, Kame, Esker and Varve. |
| Ground Water :- Storage of ground water - Porosity, Permeability, aquifer, water table-zone of saturation and zone of aeration, artesian well, spring, geyser - development of typical landforms by erosion and deposition by ground water (Karst Topography) sinkhole, cavern, stalactites and stalagmites. |
| Seas :- Offshore profile: Continental shelf, Continental slope, Abyssal plane, Oceanic Deep. Movements of sea-water : tides, currents, waves, development of typical landforms by sea erosion and deposition - sea cliff, sea cave, spit, marine deposits, coral reefs. Lacustrine deposits. Atmospheric circulation, weather and climatic changes, land air, sea interaction. Earth's heat budget and global climatic changes. |
| Volcanoes :- Parts of a typical volcano, Types of volcanoes. Products of volcanoes. Hot Spot. Earthquakes :- Causes, kinds of earthquake waves, mode of propagation, intensity of earthquakes, Richter scale, Seismograph and Seismogram - Effects of earthquakes, Earthquake zones. Interior of the earth: Structure & Constitution. P-wave and S-wave Shadow zones. |
| Crystallography: Definition of a crystal - amorphous and crystalline states, Morphology of crystals - face, edge, solid angle, interfacial angle. Forms: Simple, Combination, Closed and Open forms. Symmetry: Plane, Axis, Centre, Crystallographic axes, Parameters, Indices. |
| Crystallographic Notation: Parameter system of weiss, Index system of Miller. Classification of Crystals into 7 systems |

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Syllabus for the Year 2016-2017

2017

Department : Geology

Paper : 2A

Class: B.Sc

Semester:3

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| Nature and scope of Petrology - Definition of Rock, Classification of rocks into Igneous, Sedimentary and Metamorphic; distinguishing features of three types of rocks. Forms-Lava flows, intrusions, sill, laccolith, bysmalith, lopolith, dykes, ring dykes, cone sheets, volcanic necks, phacolith and batholith. |
| Vesicular, amygdoloidal, block lava, ropy lava, pillow, flow, jointing, sheeting, plates, columnar, prismatic - structures. Definition of structure, texture, microstructure, devitrification; allotriomorphic hypidiomorphic, panadiomorphic, ophitic, intergranular, intersertal. |
| Classification of Igneous rocks: C.I.P.W. and Tyrrel - Tabular. Composition and constitution of magma- Uni component, binary magma with eutectic and solid solution. |
| Origin of Igneous rocks - Bowen's reaction principle; Differentiation and Assimilation. Descriptive study of the following Igneous rocks - Granite, Granodiorite, Syenite, Nepheline syenite, Diorite porphyry, Pegmatite, Aplite, Gabbro, Anorthosite |
| Source of sediments - Mechanical and Chemical weathering; modes of transportation, sedimentary environments. Definition of diagenesis, Lithification, Cementation, Stratification. |
| Types of bedding, surface marks, deformed bedding, solution structures. |
| Classification of Sedimentary rocks - Clastic - rudaceous, arenaceous, argillaceous; nonclastic- Calcareous, Carbonaceous, Ferruginous, Phosphatic, evaporites. |
| Descriptive study of the following Sedimentary rocks : Conglomerate, Breccia, Grit, Sandstone, Arkose, Graywacke, Shale, Limestone, Shell limestone. |
| Definition of Metamorphism, Agents and types of metamorphism, Grades and Zones of Metamorphism. Metamorphic minerals - stress and antistress minerals. |
| Structures of Metamorphic rocks - Cataclastic, Maculose, Schistose, Granulose and Gneissose. Textures - Crystalloblastic, Palimpsest, Xenoblastic, Idioblastic. |
| Classification of Metamorphic rocks - Concept of Metamorphic facies. Cataclastic metamorphism of argillaceous and arenaceous rocks; |
| Concept of Metamorphic facies. Cataclastic metamorphism of argillaceous and arenaceous rocks; |
| Thermal metamorphism of argillaceous, arenaceous and calcareous rocks. |
| Dynamothermal metamorphism of argillaceous, arenaceous and basic igneous rocks. Plutonic metamorphism, metasomatism and additive processes. Definitions of anatexis and palingenesis |
| Descriptive study of the following rocks : Gneiss, Schist, Slate, Phyllite, Quartzite, Marble, Granulite, Eclogite, Amphibolite, Migmatite. Charnockite, Khondalite, Gondite. |

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Syllabus for the Year 2016-2017

2017

Department : Geology Paper : 3A Class: B.Sc

Semester:5

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| Definitions of palaeontology and fossilization, conditions for preservation, modes of preservation, uses of fossils. |
| study of taxonomy, classification, morphology, geological and geographical distribution of the invertebrates: Phylum Echinodermata, Phylum Brachiopod, Phylum Hemichordata, Phylum Coelenterata |
| Phylum Mollusca Study of the following fossils: Monograptus, Diplograptus, Tetragraptus; Calceola, Zaphrentis, Montlivaltia, Favosites; Cidaris, Micraster, Holaster, Hemiaster ; Spirifer, Productus, Rhynchonella, Terebratula ; Natica, Turritella, Cypraea, Voluta, Murex, Physa; Pecten, Arca, Gryphea, Exogyra, Cardita, Meretrix ; |
| Phylum Arthropoda. Study of the following fossils: Nautilus, Goniatites, Ceratites, Belemnites ; Calymene, Paradoxides; Glossopteris, Gangamopteris, Ptylophyllum. |
| Definition of Stratigraphy, Stratigraphic Principles, |
| Lithostratigraphy, Standard Geological Time Scale, Principles of correlation. |
| Physiographic divisions of India with their stratigraphic and structural characteristics. |
| A brief study of type areas, distribution in India, lithology, fossil content and economic importance of the following geological groups of India – Dharwar, Peranas – Cuddapahs. |
| A brief study of type areas, distribution in India, lithology, fossil content and economic importance of the following geological groups of India – Vindhya, Kurnool. |
| Gondwanas, Triassic of spiti, |
| Jurassic of Kutch, Cretaceous of Trichy. |
| Deccan traps and their age. |
| Siwaliks with vertebrate fossils. |
| Geology of Andhra Pradesh. Stratigraphic contacts-boundaries between Archaean and proterozoic and |
| Geology of Andhra Pradesh. Stratigraphic contacts-boundaries between cretaceous and tertiary boundaries. |

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Syllabus for the Year 2016-2017

Department : Geology Paper : 4A Class: B.Sc

Semester:5

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| Definitions of hydrology and hydrogeology. Scope and applications of hydrogeology. |
| Concept of Hydrologic Cycle - Precipitation, Evapotranspiration, Runoff, Infiltration. |
| Origin and classification of groundwater. |
| Occurrence and vertical distribution of groundwater. |
| Zones of aeration and saturation; water table, springs, recharge and discharge areas. |
| Aquifers: types and properties. |
| Coastal aquifers - Salt water intrusion. Groundwater balance. |
| Water bearing properties of rocks - Igneous, Sedimentary and Metamorphic. |
| Favourable Geological conditions for Groundwater. |
| Porosity, Permeability, Specific yield and specific retention. |
| Hydraulic conductivity. Darcy's law. |
| Methods of locating groundwater, surface and subsurface evidence with special reference to electrical resistivity prospecting methods. |
| Quality of groundwater : physical, chemical and bacterial characteristics. |
| Suitability of groundwater for drinking, irrigation and industrial purposes. |
| Groundwater contamination. |
| Groundwater potential and Provinces in India with special reference to Andhra Pradesh. |

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Syllabus for the Year 2015- 2016

Department : GEOLOGY

Paper : 1B Class: B.Sc

Semester:2

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| End of odd semester examinations. |
| End of odd semester examinations. |
| Mineralogy: Definition of a mineral - Classification of minerals into rock-forming and ore-forming minerals. Physical properties of minerals - Colour, Streak, Transparency, Lustre, Form, Hardness, Tenacity, Cleavage, Fracture, Specific gravity. |
| Chemical properties of minerals - Isomorphism - Solid solution, Polymorphism - Allotropy, Pseudomorphism, Radioactivity, Silicate structures. Magnetic properties, Electrical properties: Pyro & Peizo electricity. |
| Descriptive Mineralogy: Study of physical properties, chemical properties and mode of occurrence of the following mineral groups: Nesosilicates - Olivine, Garnet, Aluminium silicates Sorosilicates – Epidote, Cyclosilicates – Beryl. |
| Study of physical properties, chemical properties and mode of occurrence of the following mineral groups: Inosilicates - Pyroxene & Amphibole |
| Study of physical properties, chemical properties and mode of occurrence of the following mineral groups: Phyllosilicates - Mica & Hydrous magnesium silicates |
| Study of physical properties, chemical properties and mode of occurrence of the following mineral groups: Tectosilicates - Feldspars, Feldspathoids, Quartz. Forms of Silica |
| Miscellaneous - Staurolite, Tourmaline, Zircon, Calcite, Corundum, Apatite. |
| Optical Mineralogy: General principles of optics. Optical properties of Minerals - Isotropic & Anisotropic substances. Polarized light, Refractive index. |
| Double refraction, Uniaxial and Biaxial Minerals. Nicol Prism and its construction, Concept of crossed nicols. |
| Petrological (Polarising) Microscope - its mechanical and optical parts. |
| Behaviour of isotropic and anisotropic minerals between crossed nicols - Extinction, Pleochroism, Interference colours. |
| Optical properties of important minerals. |

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)

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Bhimavaram, W.G.Dist, A.P

Syllabus for the Year 2015- 2016

Department :GEOLOGY

Paper :2B Class: B.Sc

Semester:4

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| End of odd semester examinations. |
| End of odd semester examinations. |
| Definition of Metamorphism, Agents and types of metamorphism, Grades and Zones of Metamorphism. Metamorphic minerals - stress and antistress minerals. |
| Structures of Metamorphic rocks - Cataclastic, Maculose, Schistose, Granulose and Gneissose. Textures - Crystalloblastic, Palimpsest, Xenoblastic, Idioblastic. |
| Classification of Metamorphic rocks - Concept of Metamorphic facies. Cataclastic metamorphism of argillaceous and arenaceous rocks; Thermal metamorphism of argillaceous, arenaceous and calcareous rocks; Dynamothermal metamorphism of argillaceous, arenaceous and basic igneous rocks. |
| Plutonic metamorphism, metasomatism and additive processes. Definitions of anatexis and palingenesis. |
| Descriptive study of the following rocks: Gneiss, Schist, Slate, Phyllite, Quartzite, Marble, Granulite, Eclogite, Amphibolite, Migmatite. Charnockite, Khondalite, Gondite. |
| Definition of Structural Geology; Aim and objectives of structural Geology. Importance of study of structures - Primary and Secondary structures. |
| Bed, bedding planes, out crop. |
| Attitude of beds-strike, dip and apparent dip; use of Clinometer, primary structures as markers; |
| Folds-description, geometric classification; recognition of folds in the field |
| Faults - Geometric and genetic classification, recognition of faults in the field, effects of faults on out crops |
| Joints - Geometric and genetic classification. |
| Unconformities - Definition of unconformity, types of unconformities, recognition of unconformities in the field; distinguishing the faults from unconformities. |
| Definitions of overlap, off-lap, outlier, inlier, cleavage, schistosity, foliation and lineation |

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Syllabus for the Year 2015- 2016

Department :GEOLOGY Paper :3B

Class: B.Sc

Semester:6

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| End of odd semester examinations. |
| End of odd semester examinations. |
| Definition of Economic Geology, Global tectonics & metallogeny. Mineral resources and their peculiarities. |
| Ore, Gangue, Industrial minerals, Tenor, grade. Syngenetic deposits, Epigenetic and Endogenetic and Exogenetic deposits. |
| Classification of Mineral deposits – Bateman’s classification modified by Jenson. |
| Processes of formation of Mineral deposits – Magmatic concentration. Contact Metasomatism, Hydrothermal – Cavity filling and replacement. |
| Sedimentation, Residual and Mechanical concentration (Placers), Oxidation and Supergene enrichment, Metamorphism |
| Study of important Ores – their chemical composition, Physical Properties, Mode of Occurrence, distribution in India and uses of the following metals – Gold, Copper, Lead, Zinc, Aluminum, Iron. |
| Manganese, Chromium, Uranium and Thorium (Radioactive minerals) Chemical compositions, Physical properties. |
| Mode of occurrence and distribution in India of Minerals required for the following Industries: Refractories, Abrasives, Steel, Cement, Ceramic. |
| Insulators, Glass, Fertilizers & Chemicals, Gemstones and Dimensional stones. |
| Fuels – Coal, Petroleum, their Origin, Occurrence and Distribution in India. |
| Major Mineral resources of A.P. Asbestos, Barites, Coal, Mica, Clays, Limestone, Bauxite. |
| Major Mineral resources of A.P. Petroleum, Manganese, Gemstones and Dimensional stones. |

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Syllabus for the Year 2015- 2016

Department : GEOLOGY Paper :4B Class: B.Sc

Semester:6

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| End of odd semester examinations. |
| End of odd semester examinations. |
| Aerial Photography- Introduction, Normal Aerial Photography, Map, Aerial Photo, Imagery. |
| Types of Aerial Photographs, Mosaics, Types of Stereoscopes, Photo Geological Studies – Interpretation. |
| Remote Sensing definition. Space, Sensor and Ground segments. Electromagnetic spectrum. |
| Remote Sensing platforms. Sensors used in Remote Sensing. Indian Remote Sensing Satellites. Remote Sensing applications. |
| GIS and its applications, Remote Sensing for GIS. Data models, Main Segments of GIS, Components of GIS, GIS – Integration, Study of the coastal area of West Godavari district through satellite imagery. |
| Definitions of prospecting and exploration. Stages of exploration activities Reconnaissance, Preliminary, Detailed survey. Geological prospecting: Guides and Criteria. Structure and Stratigraphy. |
| Geochemical prospecting, Dispersion, Path finder elements. |
| Sampling Methods: Channel, Chip and Drill Samplings Methods. |
| Types of ore reserves and their calculations, Ore estimation – Included and Extended area Methods. |
| Geophysical prospecting. Drilling: Percussion & Rotary. Mining: Alluvial, Quarrying (Open cast mining) and underground mining |
| Role of Geological studies in engineering projects. Geotechnical considerations in selections of sites. Rock as a constructing material. Engineering properties of rocks. |
| Role of geologist in the construction of: Bridges and Roads, Tunnels, Dams and Reservoirs |

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 Syllabus for the Year 2014- 2015

Department : GEOLOGY Paper :1A Class: B.Sc

Semester:1

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| General aspects, definition of Geology - Basic assumptions of Geology - Its relationship with other sciences -Branches of Geology - Aim and Applications of Geology. |
| Geological processes - Exogenic and Endogenic, Definition of weathering - types of weathering of rocks - Physical and Chemical; Definition of erosion and denudation, Cycle of erosion - erosion, transportation and deposition. Agents of erosion. |
| RIVERS :- Erosion, transportation and deposition of river (fluvial) cycle in different stages development of typical landforms by river erosion and deposition - V-shaped Valley, Waterfall, Alluvial fan, Meander, Ox-bow lake, Flood plain, Natural levee, Peneplain and Delta. Types of rivers. |
| GLACIERS :- Definition of a Glacier - types of glaciers - development of typical landforms by glacial erosion and deposition : Cirque, U-shaped valley, Hanging valley, Roche-moutonnee, Moraine, Drumlin, Kame, Esker and Varve. Characteristic features of glaciated regions. |
| GROUND WATER :- Storage of ground water - Porosity, Permeability, aquifer, water table-zone of saturation, artesian well, spring, geyser - development of typical landforms by erosion and deposition by ground water (Karst Topography) sinkhole, cavern, stalactites and stalagmites. |
| WIND :- Development of characteristic features by wind (arid cycle) erosion and deposition pedestal rock - mushroom topography - iceberg, ventifacts, loess, sand dunes. |
| SEAS :- Offshore profile : Continental shelf, Continental slope, Abyssal plane, Oceanic Deep, Movements of sea-water : tides, currents, waves, development of typical landforms by sea erosion and deposition - sea cliff, sea cave, spit, marine deposits, coral reefs. |
| LAKES :- Origin of lake basins, geological importance of lakes, lacustrine deposits. |
| EARTH AS A PLANET - its shape, size and density - movement and their effects. |
| ORIGIN OF THE EARTH |
| AGE OF THE EARTH |
| INTERIOR OF THE EARTH: Structure & Constitution. |
| EARTHQUAKES :- Causes, kinds of earthquake waves, mode of propagation, intensity of earthquakes, Richter scale, Seismograph and Seismogram - Effects of earthquakes, Earthquake zones. |
| VOLCANOES :- Parts of a typical volcano, products of volcanoes, origin of volcanoes. |
| MOUNTAINS :- Types, causes of mountain building. |
| BASIC CONCEPTS OF:- Isostasy, Continental drift and Plate tectonics. |

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Syllabus for the Year 2014- 2015

Department :GEOLOGY

Paper : 2A

Class: B.Sc

Semester:3

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| Nature and scope of Petrology - Definition of Rock, Classification of rocks into Igneous, Sedimentary and Metamorphic. |
| Distinguishing features of three types of rocks. Classification into Plutonic, Hypabyssal and Volcanic rocks. |
| Forms-Lava flows, intrusions, sill, laccolith, bysmalith, lopolith, dykes, ring dykes, cone sheets, volcanic necks, phacolith and batholith. |
| Vesicular, amygdoloidal, block lava, ropy lava, pillow, flow, jointing, sheeting, plates, columnar, prismatic - structures. Definition of structure, texture, microstructure, devitrification. |
| allotriomorphic hypidiomorphic, panadiomorphic, ophitic, intergranular, intersertal, trachytoid, graphic and micrographic, microgranitic, felsitic, porphyritic, poikilitic ; Reaction structures - corona, myrmekitic, orbicular, spherulitic, perilitic. |
| Classification of Igneous rocks: C.I.P.W. and Tyrrel - Tabular. |
| Composition and constitution of magma-Uni component, binary magma with eutectic and solid solution. |
| Origin of Igneous rocks - Bowen's reaction principle; Differentiation and Assimilation. |
| Descriptive study of the following Igneous rocks - Granite, Granodiorite, Syenite, Nepheline syenite, Diorite porphyry, Pegmatite, Aplite, Gabbro, Anorthosite, Peridotite, Pyroxenite, Dunite, Dolerite, |
| Rhyolite, Obsidian, Pumice, Trachyte, Andesite, Basalt, Pitchstone, Dacite, Phonolite. |
| Source of sediments - Mechanical and Chemical weathering; |
| modes of transportation, sedimentary environments. Definition of diagenesis, Lithification, Cementation, Stratification. |
| Types of bedding, surface marks, deformed bedding, solution structures. |
| Classification of Sedimentary rocks - Clastic - rudaceous, arenaceous, argillaceous. |
| Nonclastic- Calcareous, Carbonaceous, Ferruginous, Phosphatic, evaporites. |
| Descriptive study of the following Sedimentary rocks : Conglomerate, Breccia, Grit, Sandstone. |
| Descriptive study of the following Sedimentary rocks : Arkose, Graywacke, Shale, Limestone, Shell limestone. |

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Syllabus for the Year 2014- 2015

Department :GEOLOGY Paper :3A Class: B.Sc

Semester:5

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| Definitions of palaeontology and fossilization, conditions for preservation, modes of preservation, uses of fossils, study of taxonomy, |
| classification, morphology, geological and geographical distribution of the invertebrates: Phylum Echinodermata, Phylum Brachiopod. |
| classification, morphology, geological and geographical distribution of the invertebrates: Phylum Hemichordata, Phylum Coelenterata. |
| classification, morphology, geological and geographical distribution of the invertebrates: Phylum Mollusca, Phylum Arthropoda. |
| Study of the following fossils: Monograptus, Diplograptus, Tetragraptus; Calceola, Zaphrentis, Montlivaltia, Favosites; |
| Study of the following fossils: Cidaris, Micraster, Holaster, Hemiaster . |
| Study of the following fossils: Spirifer, Productus, Rhynchonella, Terebratula ; Natica, Turritella, Cypraea, Voluta, Murex, Physa. |
| Study of the following fossils: Pecten, Arca, Gryphea, Exogyra, Cardita, Meretrix ; Nautilus, Goniatites, |
| Study of the following fossils: Ceratites, Belemnites ; Calymene, Paradoxides; Glossopteris, Gangamopteris, Ptylophyllum. |
| Definition of Stratigraphy, Stratigraphic Principles, Lithostratigraphy, Standard Geological Time Scale, Principles of correlation. |
| Physiographic divisions of India with their stratigraphic and structural characteristics. |
| A brief study of type areas, distribution in India, lithology, fossil content and economic importance of the following geological groups of India – Dharwars, Peranas. |
| A brief study of type areas, distribution in India, lithology, fossil content and economic importance of the following geological groups of India – Cuddapahs, Vindhya, Kurnools. |
| Gondwanas, Triassic of spiti, Jurassic of Kutch, Cretaceous of Trichy. |
| Deccan traps and their age, Siwaliks with vertebrate fossils. |
| Geology of Andhra Pradesh. Stratigraphic contacts-boundaries between Archaean and proterozoic. |
| Geology of Andhra Pradesh. Stratigraphic contacts-boundaries between cretaceous and tertiary boundaries |

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Syllabus for the Year 2014- 2015

Department :GEOLOGY
Semester:5

Paper : 4A Class: B.Sc

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| Definitions of hydrology and hydrogeology. Scope and applications of hydrogeology. |
| Concept of Hydrologic Cycle - Precipitation, Evapotranspiration, Runoff, Infiltration. |
| Origin and classification of groundwater. |
| Occurrence and vertical distribution of groundwater. |
| Zones of aeration and saturation; water table, springs, recharge and discharge areas. |
| Aquifers: types and properties. Coastal aquifers. |
| Salt water intrusion. Groundwater balance. |
| Water bearing properties of rocks - Igneous, Sedimentary and Metamorphic. |
| Favourable Geological conditions for Groundwater. |
| Porosity, Permeability, Specific yield and specific retention. |
| Hydraulic conductivity. Darcy's law. |
| Methods of locating groundwater, surface and subsurface evidence with special reference to electrical resistivity prospecting methods. |
| Quality of groundwater : physical, chemical characteristics. |
| Quality of groundwater : bacterial characteristics. |
| Suitability of groundwater for drinking, irrigation |
| Suitability of groundwater for industrial purposes. Groundwater contamination. |
| Groundwater potential and Provinces in India with special reference to Andhra Pradesh. |

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Syllabus for the Year 2013- 2014

Department : GEOLOGY

Paper : 1B

Class: B.Sc

Semester:2

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| Crystallography : Definition of a crystal - amorphous and crystalline states, Morphology of crystals - face, edge, solid angle, interfacial angle. |
| Forms : Simple, Combination, Closed and Open forms. Symmetry : Plane, Axis, Centre, Crystallographic axes, Parameters, Indices. Crystallographic Notation : Parameter system of weiss, Index system of Miller. |
| Classification of Crystals into 7 systems Morphological study of the following classes of symmetry 1. Cubic system - Normal Class (Galena Type) 2. Tetragonal system - Normal Class (Zircon Type) |
| Morphological study of the following classes of symmetry : 3. Hexagonal system - Normal Class (Beryl Type) 4. Trigonal system - Normal Class (Calcite Type) |
| Morphological study of the following classes of symmetry : 5. Orthorhombic system - Normal Class (Barytes Type) 6. Monoclinic system - Normal Class (Gypsum Type) 7. Triclinic system - Normal Class (Axinite Type) Twinning in crystals - definitions of twin, twinplane, twin axis, composite plane. |
| Optical Mineralogy : Optical properties of Minerals - Isotropic & Anisotropic substances. Polarized light, Refractive index, Double refraction, Uniaxial and Biaxial Minerals . |
| Nicol Prism and its construction, Concept of crossed nicols. Petrological (Polarising) Microscope - its mechanical and optical parts. |
| Behaviour of isotropic and anisotropic minerals between crossed nicols - Extinction, Pleochroism, Interference colours. Optical properties of important minerals. |
| Mineralogy : Definition of a mineral - Classification of minerals into rock-forming and ore-forming minerals. Physical properties of minerals - colour, streak, play of colours, opalescence, asterism, transparency, lustre, luminescence . |
| fluorescence & phosphorescence, form, hardness, tenacity, cleavage, parting, fracture, sp.gravity, magnetic properties, electrical properties : pyro & peizo electricity. Chemical properties of minerals - Isomorphism - Solid solution, Polymorphism - Allotrophy, Pseudomorphism, Radio-activity. Silicate structures. |
| Descriptive Mineralogy - Study of physical properties, chemical properties and mode of occurrence of the following mineral groups : Nesosilicate - Olivine, Garnet, Aluminium silicates , Sorosilicate – Epidote. |
| Descriptive Mineralogy - Study of physical properties, chemical properties and mode of occurrence of the following mineral groups : Cyclosilicate – Beryl ,Inosilicate - Pyroxene & Amphibole. |
| Phyllosilicate - Mica & Hydrous magnesium silicates Tectosilicate - Feldspars, Feldspathoids, Quartz |
| Miscellaneous - Staurolite, Tourmaline, Zircon, Calcite, Corundum, Apatite |

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Syllabus for the Year 2013- 2014

Department : GEOLOGY

Paper : 2B

Class: B.Sc

Semester:4

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| Definition of Metamorphism, Agents and types of metamorphism, Grades and Zones of Metamorphism. Metamorphic minerals - stress and antistress minerals. |
| Structures of Metamorphic rocks - Cataclastic, Maculose, Schistose, Granulose and Gneissose. Textures - Crystalloblastic, Palimpsest, Xenoblastic, Idioblastic. |
| Classification of Metamorphic rocks - Concept of Metamorphic facies. |
| Cataclastic metamorphism of argillaceous and arenaceous rocks. Thermal metamorphism of argillaceous. |
| arenaceous and calcareous rocks; Dynamothermal metamorphism of argillaceous, arenaceous and basic igneous rocks. |
| Plutonic metamorphism, metasomatism and additive processes. Definitions of anatexis and palingenesis. |
| Descriptive study of the following rocks : Gneiss, Schist, Slate, Phyllite, Quartzite, Marble, Granulite, Eclogite. |
| Descriptive study of the following rocks : Amphibolite, Migmatite. Charnockite, Khondalite, Gondite. |
| Definition of Structural Geology; Aim and objectives of structural Geology. Importance of study of structures - Primary and Secondary structures. |
| Bed, bedding planes, out crop, attitude of beds-strike, dip and apparent dip; use of clinometer, primary structures as markers. |
| Folds -description, geometric classification; recognition of folds in the field. |
| Faults - Geometric and genetic classification, recognition of faults in the field, effects of faults on out crops. |
| Joints - Geometric and genetic classification. |
| Unconformities - Definition of unconformity, types of unconformities, recognition of unconformities in the field; |
| Distinguishing the faults from unconformities. |
| Definitions of overlap, off-lap, outlier, inlier, cleavage, schistosity, foliation and lineation. |

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Syllabus for the Year 2013- 2014

Department : GEOLOGY

Paper : 3B

Class: B.Sc

Semester:6

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|---|
| Definition of Economic Geology, Global tectonics & metallogeny. |
| Mineral resources and their peculiarities, Ore, Gangue, Industrial minerals, Tenor, grade Syngenetic deposits, Epigenetic and Endogenetic and Exogenetic deposits. |
| Classification of Mineral deposits – Bateman’s classification modified by Jenson. |
| Processes of formation of Mineral deposits – Magmatic concentration, Contact Metasomatism. |
| Hydrothermal – Cavity filling and replacement, Sedimentation. |
| Residual and Mechanical concentration (Placers), Oxidation and Supergene enrichment, Metamorphism. |
| Study of important Ores – their chemical composition, Physical Properties, Mode of Occurance, distribution in India and uses of the following metals – Gold, Copper, Lead. |
| Study of important Ores – their chemical composition, Physical Properties, Mode of Occurance, distribution in India and uses of the following metals – Zinc, Aluminium, Iron. |
| Study of important Ores – their chemical composition, Physical Properties, Mode of Occurance, distribution in India and uses of the following metals – Manganese, Chromium, Uranium and Thorium(Radioactive minerals) |
| Chemical compositions, Physical properties, Mode of occurrence and distribution in India of Minerals required for the following Industries : Refractories, Abrasives, Steel, Cement, Ceramic, Insulators, Glass, Fertilizers & Chemicals, Gemstones and Dimensional stones. |
| Chemical compositions, Physical properties, Mode of occurrence and distribution in India of Minerals required for the following Industries : Refractories, Abrasives, Steel, Cement, Ceramic, Insulators, Glass, Fertilizers & Chemicals, Gemstones and Dimensional stones. |
| Fuels – Coal, Petroleum, their Origin, Occurrence and Distribution in India. |
| Major Mineral resources of A.P. Asbestos, Barites, Coal, Mica, Clays, LimeStone, Bauxite, Petroleum. |
| Major Mineral resources of A.P. Manganese, Gemstones and Dimensional stones. |

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Syllabus for the Year 2013- 2014

Department : GEOLOGY

Class: B.Sc

Paper : 4B

Semester:6

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| Aerial Photography- Introduction , Normal Aerial Photography, Map . |
| Aerial Photo , Imagery , Types of Aerial Photographs , Mosaics . |
| Types of Stereoscopes , Photo Geological Studies – Interpretation . |
| Remote Sensing definition. Space, Sensor and Ground segments. |
| Electromagnetic spectrum. Remote Sensing platforms. Sensors used in Remote Sensing. |
| Indian Remote Sensing Satellites. Remote Sensing applications . |
| GIS and its applications , Remote Sensing for GIS. Data models , Main Segments of GIS , Components of GIS . |
| GIS – Integration , Study of the coastal area of West Godavari district through satellite imagery. |
| Definitions of prospecting and exploration. Stages of exploration activities Reconnaissance, Preliminary, Detailed survey. |
| Geological prospecting : Guides and Criteria. Structure and Stratigraphy. Geochemical prospecting , Dispersion , Path finder elements . |
| Sampling Methods: Channel , Chip and Drill Samplings Methods . Types of ore reserves and their calculations , Ore estimation – Included and Extended area Methods. |
| Geophysical prospecting. Drilling : Percussion & Rotary. Mining : Alluvial, Quarrying (Open cast) Underground. |
| Role of Geological studies in engineering projects. Geotechnical considerations in selections of sites. |
| Rock as a constructing material. Engineering properties of rocks. |
| Role of geologist in the construction of : Bridges and Roads, Tunnels, Dams and Reservoirs. |