SWMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Scheme of B.Sc. Programme in GEOLOGY (Science Faculty) Under CBCS

Sem.	Course Opted	Course Name	Hours / week	Total period	CA	ESE	Total marks	Credits*
III	Core Course Geology –III (CCG-III)	**Section-A** Optical and Descriptive Mineralogy- Paper No.VI	03	45	10	40	50	2
		Section-B Dynamics of the Earth and Igneous petrology Paper No.VII	03	45	10	40	50	2
IV	Core Course Geology –IV (CCG-IV)	**Section-A** Structural geology- Paper No.VIII	03	45	10	40	50	2
		Section-B Sedimentary and MetamorphicPetrology Paper No.IX	03	45	10	40	50	2
Total Credit of CCG III and IV								**8**
Annual	Core course Geology Practical –III (CCGP-III)	Practical-X (Practical based on Paper No.VI andVII)	04	12	25	25	50	2
	Core course Geology Practical –IV (CCGP-IV)	Practical-XI (Practical based on Paper No.VIII and IX)	04	12	25	25	50	2
Total Credit of CCGP-III and IV								**4**
	Skill Enhancement Course in Geology-I (SECG-I)	SEC-I Geology A)Water quality analysis Or B) Soil Analysis	02	25	25	25	50	2
	Skill Enhancement Course in Geology-II (SECG-II)	SEC-II Geology A)Roof water harvesting Or B) Sieve Analysis of Soil /Sediments	02	25	25	25	50	2
Total Credit of Skill Enhancement Course								**4**
Total semester Credits of III and IV								**16 (12+4*)**

***1 credit is of 25 Marks**

B.Sc. II
Semester-III

(CCG-III) : Core Course Geology –III

Section A - Optical And Descriptive Mineralogy -(Credits -2)

Unit – I Optical Mineralogy : (Periods 20, Marks,25)

Introduction to petrological microscope. Nature of Light reflection, refraction, double refraction, total internal reflection and critical angle. Nicol's prism, position of extension, and extinction angle isotropism and anisotropism,isotropic and anisotropic minerals. Birefringence, refractive index, use of accessory plates, compensation and determination of interference colour. Newton's scale, determination of sign of elongation where 'C' axis is known. Vibration direction and optic orientation, anomalous colours, pleochroism and absorption. Uniaxial and biaxial interference figures and determination of optic sign of uniaxial and biaxial minerals.

Methods of determination of refractive index; Central illumination method and Oblique illumination method. Study of optical properties of minerals.

Unit – II Descriptive Mineralogy : (Periods 20, Marks,25)

Introduction to mineral, silicate structure, isomorphism, polymorphism and pseudomorphism. Classification of minerals. Study of structure, Chemistry, physical and optical properties, paragenesis and uses of the following mineral groups: Olivine, garnet, alumino-silicate, pyroxene, amphibole, mica, silica, feldspar, felspathoid.

Section B -Dynamics Of The Earth and Igneous Petrology

Unit – I- Dynamics Of The Earth (Periods 20, Marks,25)

Isostasy: Concept and theories of Isostasy, evidence of continental drift and sea-floor spreading. Origin and significance of Mid-oceanic ridges. Island arc and trench. Evolution of plate tectonic theories, nature and types of plate margins. Evolution of ocean and continents, Wilson cycle. Palaeomagnetism. Geosynclines.

Unit – II: Igneous Petrology (Periods 20, Marks,25)

Formation of glass and crystal. Crystallisation of unicomponent magma. Crystallisation of binary magma, eutectics, mixed crystals. Crystallization of Ternary magma. Reaction relation and Bowen's reaction series. Textural characters such as granularity, shape of the crystal, mutual relation of crystals, textures and their types. Microstructures and structures of igneous rocks. Classification of igneous Rocks. Theories of differentiation and assimilation. Crystallisation of Granitic and Basaltic magma. Study of common igneous rocks.

B.Sc. II
Semester-III

CCG-(IV) : Core Course Geology -IV

Section A -Structural Geology- (Credits -2)

Unit -I (Periods 20, Marks,25)

Introduction, Attitude of beds, strike and dip, study of clinometers compass, Brunton compass and its application in the field survey.

Fold: Parts of fold, nomenclature of folds, plunge of folds, types of fold field study of folds, determination of top of beds by primary features.

Fault: General characteristic of fault, types of movement, classification of fault

Based on genetic, net slip, attitude of faults relative to attitude of beds, fault pattern and value of dip of fault. Criteria for reorganization of fault such as discontinuity of strata, repetition and omission of beds, feature characteristic of fault plane and physiographic criteria.

Unit-II (Periods20,Marks,25)

Joint: Introduction, Genetic and geometric classification of joints.

Unconformity: Introduction, general significance of unconformity. Types of unconformities such as disconformities, angular unconformity, non-conformity, local unconformity, overlap, off lap, overstep, outlier and inliers.

. Lineation and Foliation : Introduction, descriptive terminology, kinds origin and relation to major structures.

Section B - Sedimentary And Metamorphic Petrology - (Credits -2)

Unit-I Sedimentary Petrology : - (Periods 20, Marks,25)

Formation of sediments and different types of depositional environment Such as eolian, fluvial and sea environment. Mineral composition of sedimentary rocks. Textural characters such as grain size, sphericity, roundness, shape. Mechanical, chemical and organic structures. Maturity of sediments Heavy Minerals. Mineralogy, Texture, Structure and Classification of conglomerate, sand stones and lime stones. Study of common sedimentary rocks.

Unit -II Metamorphic Petrology - (Periods 20, Marks,25)

Kinds if metamorphism. Concept of depth **zones**, Facies and grades of Metamorphism. Eskola's concept of metamorphic facies pressure-Temperature Diagram. Metamorphic minerals (stress and antistress minerals) Texture and structure of metamorphic rocks. Process of formation of metamorphic rocks such as cataclastic Metamorphism, thermal metamorphism, dynamothernmal metamorphism, plutonic Metamorphism and their products. Metasomatism, pneumatolytic metamorphism, injection metamorphism and Auto-metamorphism. Lit-per-lit gneiss, composite gneiss. A***n***atexis and palingenesis. Study of common metamorphic rocks.

(CCGP_III) : Core Course Geology –Practical-III (Credits -2)

Practical Based on Core course Section A and B

1) Study of Optical Properties of Following Minerals:
   Quartz, Orthoclase, Microcline, Plagioclase, Augite, Hypersthene, Hornblende, Actinolite, Olivine, Muscovite, Biotite, Garnet, Calcite, Chlorite, Kyanite, Sillimanite and Andalusite.
2) Newton's scale of interference colours,
3) Determination of sign of elongation.
4) Determination of optic sign of uniaxial/biaxial minerals.
5) Calculation of Hess Metasilicate of Pyroxene Minerals.
6) Identification and description of Plate Margins in the given diagram/Map
7) Study of Following Igneous Rocks in Hand Specimen.
   Porphyritic Granite, Granite, Nephilian syenite, Norite Felsite, Peridotite Graphic granite Obsidian Granodiorite ,Gabbro, Dunite Rhyolite, Trachyte, Andesite,
8) Identification of various Basalts .
9) Study of the Optical Properties of Following Rocks:
   Granite, Syenite, Diorite, Gabbro, , Rhyolite, Trachyte, Andesite and Basalt
10) Study of structures of Igneous Rocks in hand specimen

(CCGP_IV) : Core Course Geology –Practical-IV (Credits -2)

Practical- Practical Based on Core course Section A and B

1) Study of Structural Geological Maps Covering Faults, Unconformity, Folds and Dykes.
2) Orthographic Methods of Solving Structural Problems.
3) Stereographic Methods of Solving Structural Problems
4) Study of Following Sedimentary Rocks in Hand Specimen:
   Sandstone and its types, Grit, Carbonaceous Shale, Fossiliferous Limestone, Shelly Limestone, Breccia, Marl, Mudstone, Greywacke, Conglomerate, Arkose, Quartzite,
5) Study of Following Metamorphic Rocks in Hand Specimen
   Marble, Mica-Garnet schist, Actinolite schist, Sillimanite Schist, Gneisses, Granulite Eclogite, Schorl, Amphebolite.
6) Study of the Optical Properties of Following Sedimentary Rocks :
   Sandstone, Limestone, Breccia, Conglomerate, Oolitic limestone, Fossiliferous limestone, Quartzite, Shale. Quartzite,
7) Study of the Optical Properties of Following metamorphic Rocks
   Marble, Mica-Garnet schist, Actinolite schist, Sillimanite Schist, Trimolite Schist, Augen Gneiss, Granulite. Schorl,Eclogite
8) Study of structures of Sedimentary Rocks in hand specimen.
9) Study of structures of Metamorphic Rocks in hand specimen.
10) Preparation of Geological report based on field tour of four days duration.

Skill enhancement Course in Geology-I -(Credits -2)

A) Water quality analysis

Introduction, sampling methods, materials and methods of Water quality analysis, permissible limits of water quality, health hazards in relation to surface or groundwater.

Or

B) Soil Analysis

Introduction, formation of soil, types of soils, sampling methods, materials and methods of soil analysis, physical and chemical characteristics of soil, problems and potentials of soil.

Skill enhancement Course in Geology-II -(Credits -2)

A) Roof water harvesting

Introduction to Roof Water Harvesting, basics of hydrology, Water Harvesting, Conservation, tools and techniques of Roof Water Harvesting, utility and awareness.

Or

B) Sieve Analysis of Soil /Sediments

Introduction, sampling methods, materials and methods of sieve analysis, grain size analysis of soil/sediments, scientific significance and practical application.

Books Recommended for B.Sc. II

1. Billings, M.P., 1972. Structural Geology. Prentice Hall.
2. Davis, G.R., 1984. Structural Geology of Rocks and Region. John Wiley
3. Hills, E.S., 1963. Elements of Structural Geology. Farrold and Sons, London.
4. Singh, R. P., 1995. Structural Geology, A Practical Approach. Ganga Kaveri Publ., Varanasi.
5. Nesse, D.W., 1986. Optical Mineralogy. McGraw Hill.
6. Read, H.H., 1968. Rutley's Element of Mineralogy (Rev. Ed.). Thomas Murby and Co.
7. Berry and Mason, 1961. Mineralogy. W.H. Freeman & CoKerr, B.F., 1995
8. Optical Mineralogy 5th Ed. Mc Graw Hill, New York.
9. Turner, F.J. & Verhoogen, J., 1960, Igneous & Metamorphic petrology. McGraw Hill Co
10. Moorhouse, WW., 1969. The study of rocks in thin sections. Harper and sons.
11. Friedman & Sanders, 1978. Principles of Sedimentology. John Wiley and sons.
12. Pettijohn, F.J., 1975. Sedimentary rocks, Harper & Bros. 3rd Ed.
13. Prasad, C., 1980. A text book of sedimentology.
14. Sengupta. S., 1997. Introduction to sedimentology. Oxford-IBH.
15. Turner, F.J., 1980. Metamorphic petrology. McGraw Hill.
16. Mason, R., 1978. Petrology of Metamorphic Rocks. CBS Publ.
17. Winkler, H.G.C., 1967
18. Bose, M.K., 1997. Igneous petrology. World press 3. Tyrell, G. W., 1989.