MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI

UG COURSES – AFFILIATED COLLEGES

B.Sc. Geology

(Choice Based Credit System)

(with effect from the academic year 2016-2017 onwards)

(44th SCAA meeting held on 30.05.2016)

Sem.	Pt. I/II III/ IV/ V	Sub No.	Subject status	Subject Title	Hrs./ week	Cre - dits	Marks				
							Maximum			Passing minimum	
							Int.	Ext.	Tot.	Ext.	Tot.
III	I	17	Language	Tamil/Other Language	6	3	25	75	100	30	40
	II	18	Language	English	6	3	25	75	100	30	40
	III	19	Core - 5	STRUCTURAL GEOLOGY	4	4	25	75	100	30	40
		20	Major Practical – III	STRUCTURAL GEOLOGY	2	-	50	50	100	20	40
		21	Allied - III	PHYSICS (B.Sc. Physics Degree Programme)	4	4	25	75	100	30	40
		22	Allied Practical - III	PHYSICS (B.Sc. Physics Degree Programme)	2	-	50	50	100	20	40
	IV	23	Skilled Based subject - I	(A)EXPLORATION GEOPHYSICS (OR) (B) GEMMOLOGY	4	4	25	75	100	30	40
	IV	24	Non-Major Elective - I	(A)FUNDAMENTALS OF GEOLOGY (OR) (B)CLIMATOLOGY	2	2	25	75	100	30	40
Subtotal					30	20					

Sem.	Pt. I/II/ III/ IV/V	Sub. No.	Subject status	Subject Title	Hrs. / week	Cre-dits	Marks				
							Maximum			Passing minimum	
							Int.	Ext.	Tot.	Ext.	Tot.
IV	I	25	Language	Tamil/Other Language	6	3	25	75	100	30	40
	II	26	Language	English	6	3	25	75	100	30	40
	III	27	Core - 6	MINERALOGY	4	4	25	75	100	30	40
		28	Major Practical - IV	PRACTICAL EXAM (ANNUAL) – II STRUCTURAL GEOLOGY AND MINERALOGY	2	2	50	50	100	20	40
		29	Allied - IV	PHYSICS (B.Sc.Physics Degree Programme)	4	4	25	75	100	30	40
		30	Allied Practical - IV	PHYSICS (B.Sc. Physics Degree Programme)	2	2	50	50	100	20	40
	IV	31	Skill Based Subject -II	DISASTER MANAGEMENT	4	4	25	75	100	30	40
	IV	32	Non-Major Elective-II	(A) BASIC HYDROLOGY (OR) (B) MINERAL ECONOMICS	2	2	25	75	100	30	40
	V		Extension Activity	NCC,NSS, YRC, YWF		1					
Subtotal					30	25					

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STRUCTURAL GEOLOGY

Unit I

Definition and scope of structural geology – topographic features - topographic map - geological map - contour lines-stratum contours – outcrops and exposures. Attitude of beds - strike and dip of the formation – trends of outcrops and v-rules. true and vertical thickness of the formations.

Unit II

Clinometer and Brunton compass and their uses Folds - Definition and parts of fold – classification of folds - criteria of recognition of folds in the field and from map. Mechanics of folding .

Unit III

Description and classification of joints. Types of Unconformities- Criteria for recognition –overlap and offlap, inliers and outliers – Nappe-Klippe.

Unit IV

Faults – definition and parts of fault –classification of faults, mechanics of faulting – Horst and Graben.

Unit V

Elementary knowledge in the methods of sampling and preparation of geological report.

References:

1. Billings M. P 1974, Structural geology ,Prentice hall New Delhi.
2. Ragan ,D.M. 1985. Structural Geology.
3. Hobbs,B.E, Means, W.D 1976 & William ,P.F– an outline of structural geology, John Wiley,Newyork.
4. De Sitter,L.U.1956 – Structural geology ,McGraw Hill,New York
5. Gosh,S.K.1993 - Structural Geology fundamentals and modern developments.
6. Lahee -1917. Field geology.

Core Practical

Structural Geology and Mineralogy

Structural Geology : Tracing outcrops-three point problems. Interpretation of Geological maps.

Mineralogy:

Identification and description of the following minerals in thin sections. Quartz, Othoclase, Albite, Labradorite, Leucite, Nepheline, Sodalite, Hypersthene, Enstatite, Augite, Diopside, Hornblende, Actinolite, Tremolite, Biotite, Muscovite, Olivine, Garnet, Sphene, Tourmaline, Andalusite, Kyanite, Sillimanite, Cordierite, Staurolite, Topaz, Calcite, Apatite, Dolomite, Epidote.

Identification and description of the following silicate minerals. Quartz and its varieties, Feldspar group, Feldspathoids, Pyroxene group, Amphibole group, Epidote, Mica, Garnet, Aluminum Silicate group.

1 (A). EXPLORATION GEOPHYSICS

Unit – I

Electrical Methods: Electrical properties of rocks, Flow of current through ground surface, apparent resistivity, Electrode arrangements (Wenner, schlumberger method) VES (Vertical Electrical Sounding) - qualitative interpretation and quantitative interpretation of VES curves for groundwater exploration.

Unit – II

Magnetic method: Geomagnetic field, Induced magnetism, Remanent magnetism, Susceptibility, Field survey method, Equipment, Data processing, Qualitative and quantitative interpretation of magnetic data.

Unit – III

Gravity method: Gravitational force; Gravitational acceleration; Gravitational potential, Earth's gravitational field, Collections; corrections and presentation of Gravity data, Regional and residual anomalies. Induced Polarization Methods: Earth's polarization, IP measures, Time and frequency domain techniques, Field surveys, Equipments, Data acquisition and interpretation.

Unit – IV

Seismic Methods: Basic principles, Types of seismic waves and their propagation characteristic, Seismic velocities in Earth's materials, Refraction and reflection seismic methods: Basic principal, field procedure, data acquisition and interpretation, Siesmic startigraphy, Radiometric Methods: Basic principles, radioactive elements in rocks, Data collection and interpretation.

Unit – V

Borehole geophysics- well logging, electric logging, radioactive logging, induction logging, Sonic logging - Airborne survey, Data acquisition, Equipment, Measurement, Data processing and interpretation.

References:

1. Ramachandra Rao, M.B., Prasaranga, 1975. Outlines of Geophysical Prospecting - A manual for geologists by University of Mysore, Mysore,.

2. Bhimasarikaram V.L.S. 1990. Exploration Geophysics - An Outline by., Association of Exploration Geophysicists, Osmania University, Hyderabad,.

3. Dobrin , 1984. An introduction to Geophysical Prospecting by, M.B. McGraw Hill, New Delhi.

4. Telford W.M. Geldart L.P., Sheriff, R.E. and Keys D.A. 1976, Applied Geophysics. Oxford and IBH Publishing Co. Pvt., Ltd. New Delhi,

1. Parasnis, D.S 1975.Principles of applied Geophysics, Chapman and Hall.

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Skill Based

1 (B). GEMMOLOGY

Unit – I

The nature of crystals – crystal systems – Introduction to Gems and precious stones – kinds of Gemstones.

Unit – II

Physical and Chemical properties of various Gemstones – Form, colour, density, cleavage, fracture, lustre, Hardness, Specific gravity, isotropism, Anisotropism, Birefringence, simple and double refraction, colour and dispersion .

Unit – III

Precious stones – Diamond ,Chrysoberyl, Topaz ,Zircon, Emerald Ruby,Sapphire,Coral and pearl – semi precious stones – varieties of quartz, Garnets, Pyroxenes, Amphiboles, Epidotes- Feldspathoids.

Unit – IV

Gem Identification – Megascopic and Microscopic identification, Gemmological refractometer, Spectroscopy, Examination of Fluorescence – Cutting of Gemstones.

Unit – V

Gems and Health, Gem Therapy, Origin and mode of occurrences of Gemstones, Gems and Global Tectonics.

References:

1. Kennie Lymen,1984. Guide to Gems and precious stones,Simon and Schuster inc,Newyork, 604p.

2. E.S.Data,1935,A Text Book of Minerlogy,John Wiley & sons.

3. Deer,W.A.,Howie,R.A and Zussman,J.1966,An Introdution to the Rock forming Minerals,Longmans.

4. Berry Mason, L.G.1961 MINEROLOGY W.H.Freeman and Co.

MSU/2016-17/UG - Colleges /Part-IV /B. Sc Geology / Semester -III/ Ppr.no.24 (A) /

Non- Major Elective

1 (A). FUNDAMENTALS OF GEOLOGY

Unit – I

Geology and its perspectives – Geology as a science and its relationship with other sciences – subdivisions of Geology.

Unit – II

A brief review of the various theories regarding the origin and age of the earth .Interior of the Earth – study of internal constitution of the earth with the help of seismic waves.

Unit – III

Solar system – its size, shape, density and movements of the Earth .Atmosphere, Lithosphere and Hydrosphere.

Unit – IV

Exodynamic Process – Weathering and its types and effect on geological formations – Brief outlines of the geological work of wind, rivers and underground water – Mechanism of erosion, transportation and deposition.

Unit – V

Geological work of lakes, Glaciers, Seas and Oceans - Brief outlines of earthquakes, its nature and origin – Volcanoes – Types and causes of volcanism.

References:

1. Homer, A., 1992, Principles of Physical Geology, chapman & Hall, London.

2. Radhakrishnan, V., 1987, General Geology, V.V.P publishers, Tuticorin.

3.Jacobs, J.A.,Russel,R.D,&Wilson,J.T., 1974. Understanding the Earth Edition .,London

4. Wyllie, P.J., 1971, The Dynamic Earth, John Wiley &sons

5. Spencer, E.V, 1962, Basic Concepts of Physical Geology, oxford&IBH.

Non- Major Elective

1 (B). CLIMATOLOGY

Unit – I

Atmoshphere- Fundamental principles of climatology – Earth's radiation balance – longitudinal and seasonal variation of insolation.

Unit – II

Weather elements– Temperature, pressure, humidity, clouds, wind, sunshine and rainfall – monsoon patterns.

Unit – III

Cyclones – their types and their effects and geographic distribution

Unit – IV

Classification of climates –Koppen's and Thornthwaite's scheme of classification – climate change.

Unit – V

Global warming – acid rain – ozone depletion

References:

1. Spencer, E.W .2003. Earth science, McGraw Hill,518p

2. Abbott, L.P . 2002. Natural Disasters, McGraw Hill 422p

3. Beer, T. 1997. Environmental Oceanography,VRC Press, Florida, 367p.

4. Valdiya K.S. 1987. Environmental Geology, Indian context, Tata Mc-Graw Hill,NewDelhi,581p.

MINERALOGY

UNIT-I

PHYSICAL PROPERTIES OF MINERAL: Mineral–Definition and Classification – Physical properties of minerals: Color, Luster, Transparency or diaphaneity, Crystal Habits, Cleavage, Fracture, Hardness, Specific gravity, Streak, tenacity, feel, taste, odour, electrical, magnetic and thermal Properties - chemistry of minerals: general principals of chemistry as applied to minerals: atom, ions, molecules, atomic number, mass number, valence, ionic radii – bonding in minerals –atomic substitution and solid solution - Isomorphism, polymorphism and pseudomorphism. A brief outline of silicate structure.

UNIT-II

ORTHO AND RING SILICATES: Physical properties, chemical composition, Classification, diagnostic properties and mode of occurrence of Ortho and Ring silicates:Garnet group, Alumino silicates-Epidote group, Zircon, Staurolite, Beryl, Cordierite and Tourmaline.

UNIT-III

SHEET SILICATES AND CHAIN SILICATES: Physical properties, chemical composition, Classification, diagnostic properties and mode of occurrence of Sheet silicates and Chain silicates: Mica group, Chlorite group and clay minerals. Pyroxene group, Amphibole group.

UNIT-IV

FRAME WORK SILICATES: Physical properties, chemical composition, Classification, diagnostic properties and mode of occurrence of Frame work silicates: Quartz group, Feldspar group, Feldspathoid group and Zeolite group.

UNIT–V

Optical Mineralogy: Nature of light - Ordinary light and Plane polarized light – Reflection and Refraction – Refractive Index – Critical angle – Total internal reflection – Single refraction. Polarising / Petrological microscope and its parts - Behaviour of light in its passage through petrological microscope – Optical properties of minerals: Colour, Form, Cleavage, Refractive Index, Relief, Alteration, inclusions, Zoning, Pleochroism, Pleochroic haloes, Twinkling, Isotropism and anisotropism, Extinction, Polarisation colors, Birefringence, Twinning - Optical accessories and their uses: Gypsum plate – Mica plate – Quartz wedge. Optical properties of Uniaxial and biaxial minerals.

References:

1. Dana, E.S.1935. A text book of mineralogy, John Wiley and Sons, New York.
2. Read,H.H. 1916. Rutleys elements of mineralogy, Thomas Murphy & co,. London.
3. Kerr, Paul. 1977. Optical mineralogy, McGraw hill, New York.
4. Deer, Howie and Zussman . 1964. an introduction to rock-forming minerals orient , Longman, London.
5. Naidu,P.R.J. 1967. Optical Mineralogy.

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Structural Geology and Mineralogy

Structural Geology : Tracing outcrops-three point problems. Interpretation of Geological maps.

Mineralogy:

Identification and description of the following minerals in thin sections. Quartz, Othoclase, Albite, Labradorite, Leucite, Nepheline, Sodalite, Hypersthene, Enstatite, Augite, Diopside, Hornblende, Actinolite, Tremolite, Biotite, Muscovite, Olivine, Garnet, Sphene, Tourmaline, Andalusite, Kyanite, Sillimanite, Cordierite, Staurolite, Topaz, Calcite, Apatite, Dolomite, Epidote.

Identification and description of the following silicate minerals. Quartz and its varieties, Feldspar group, Feldspathoids, Pyroxene group, Amphibole group, Epidote, Mica, Garnet, Aluminum Silicate group.

MSU/2016-17/UG - Colleges / Part-III / B. Sc Geology/ Semester - IV/ Ppr.no.31/Skill Based

II (A). DISASTER MANAGEMENT

Unit I:

Disaster: Meaning, Factors and Significance, causes and effects of disaster, Disasters: A global view. Disaster profile of India – Regional and seasonal.

Unit II :

Earthquakes: General characteristics, Pre-Casers: Instrumental and non –instrumental vulnerability, impact and effects, Nature of damage, earthquakes prone areas in India.

Unit III :

Floods: Causal phenomena and characters of floods, vulnerability, predictability, forecasting and warning, preparedness mitigation with special reference to flood plain zoning adverse effects of flood.

Unit IV:

Cyclones: Characteristics, forecasting and warning systems, preparedness, such reduction measures, effects, cyclones prone areas in India.

Unit V:

Land slide and snow avalanches: Characteristics and causes of land slide and snow avalanche. Characteristics and causes, vulnerability, Risk reduction measures, preparedness, effects and impacts.

References:

1. Aravind Kumar Anmal, 2006, Disaster Management – Recent Approaches by Publication.
2. Ghorh. G.K.Disaster Management.2006. A.P.H.Publishy Corporation.
3. Singh, 2006. Disaster Management. Rawat Publication.
4. Narayan, B.2006. Disaster Management , A.P.H.Publishy Corporation.
5. Nikij Kumar.2006.Disaster Management. Alfa Publication,2006.

II (A). BASIC HYDROLOGY

Unit – I

Origin of Water- Water resources – Categorization of water resources - Surface water resources from Dams and Lakes.

Unit – II

Hydrologic cycle – Various components of hydrological cycle – Precipitation, Run-off, Infiltration, Evaporation and transportation - Rain gauges and their distribution.

Unit – III

Groundwater occurrence and movement – Aquifers – Definition and types – Hydrogeological Properties of rocks .Basic Principles of groundwater exploration.

Unit – IV

Running water – source – weathering, erosion, transportation and deposition – process and its features – Water Shed Management.

Unit – V

Rainwater harvesting – Definition, method and their importance.

References:

1. Alley.W.M. 1993. Regional groundwater quality – VNR- New York.
2. Arul P. 2000 A text book of Ground water, 1st Edition, 105 – 122
3. Bouwer, H., 1978, Groundwater Hydrology,McGraw-Hill Book co.,NY
4. Davies, S.N., & Dewilest, R.J.M., 1966, Hydrogeology, John Wiley & Sons Inc., N
5. Fetter.C.W. 1990. Applied Hydrology. Merill Publishing.
6. Karanth.K.R. 1987. Groundwater assessments and management – Tata Mc-graw Hall
7. H. M. Raghunath 2007 Ground Water, New Age International , 520p

II (B). MINERAL ECONOMICS

Unit – I

Mineral Economics and its concept - A brief outline of world's mineral resources.

Unit – II

National Mineral Policy and conservation of minerals – an overview of the mines and minerals (regulation and development) act.

Unit – III

Tenor – grade and specification of ores – classification and gradation of coal – Gradation of important minerals and ores.

Unit – IV

Strategic - critical and essential minerals – classification of minerals from military point of view.

Unit –V

Marine mineral resources – Laws of seabed, marine mineral resources – Mineral taxation.

References:-

1. Evans, A.M, 1993, Ore Geology and industrial minerals, Blackwell.
2. Sinha,R.K, & Sharma, N.L, 1973, Mineral Economics ,Oxford & IBH publishing co.
3. Krishnaswamy, S., 1972, India's Mineral Resources, Oxford & IBH publishing co.