

**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/VI	Sub No.	Subject status	Subject Title	Hrs/ week	Cre dits	Marks				
							Maximum			Passing minimum	
							Int.	Ext.	Tot.	Ext.	Tot.
V	III	33	Core - 7	Igneous Petrology	4	4	25	75	100	30	40
	III	34	Core – 8	Sedimentary and Metamorphic Petrology	4	4	25	75	100	30	40
	III	35	Elective - 1	Geostatistics and Computer Application in Geology or Petroleum and Coal Geology or Applied Geomorphology	5	5	25	75	100	30	40
		36	Elective - 2	Marine Geology Or Environmental Geology Or Planetary Geology	5	5	25	75	100	30	40
		37	Practical -V	Igneous Petrology	3	-	Practical exams in the even semester				
		38	Practical - VI	Sedimentary and Metamorphic petrology	3	-	Practical exams in the even semester				
		39	Practical -VII	Geostatistics and Computational Geology and Marine Geology	2	-	Practical exams in the even semester				
	IV	40	Skill Based subject (Common)	Personality Development/ Effective Communication/ Youth Leadership	4	4	25	75	100	30	40
				Subtotal	30	22					

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.
VI	III	41	Core - 9	Economic Geology	6	4	25	75	100	30	40
	III	42	Core – 10	Hydrogeology	6	4	25	75	100	30	40
	III	43	Core - 11	Applied Geology – I (Geophysics, Geochemistry, Engineering Geology, Mining Geology and Ore dressing)	5	4	25	75	100	30	40
		44	Elective – 3	Elective -Any one Geology of Tamil Nadu Or Applied Geology – II (Natural Hazards, Remote Sensing and Geographic Information System) or Medical Geology	5	5	25	75	100	30	40
		45	Major Practical -	Economic Geology and Hydrogeology,	3		50	50	100	20	40
		46	Major Practical -	Applied Geology (Geophysics, Geochemistry, Engineering Geology, Mining Geology and Ore Dressing and Elective Courses) and Marine Geology.	3		50	50	100	20	40
		47	Major Practical –	Geological mapping (One week mapping camp). Geological tour more than two weeks. Viva voce on Geological mapping and Geological tour Reports submission Specimen collection and short field trips.	2		50	50	100	20	40
			Core Practical III (EXAM	IGNEOUS PETROLOGY, SEDIMENTARY AND METAMORPHIC		4	50	50	100	20	40

			ANNUAL)	PETROLOGY, ELECTIVE 1 & ELECTIVE II							
			Core Practical IV	ECONOMIC GEOLOGY, HYDROGEOLOGY, APPLIED GEOLOGY I, ELECTIVE-3		4	50	50	100	20	40
			Core Practical V	GEOLOGICAL MAPPING(ONE WEEK MAPPING CAMP). GEOLOGICAL TOUR NOT MORE THAN TWO WEEKS DAYS. VIVA VOCE ON GEOLOGICAL MAPPING AND GEOLOGICAL TOUR REPORTS. SUBMISSION SPECIMEN COLLECTION AND SHORT FIELD TRIPS.		4	50	50	100	20	40
				Subtotal		30	29				

MSU/2016-17/ B. Sc Geology / Semester -V/ Core -7

IGNEOUS PETROLOGY

Unit – I

Nature and scope of petrology, Rock cycle, intrusive and extrusive forms of igneous rocks – textures and structures of igneous rocks.

Unit – II

Principles of classification of igneous rocks, outlines of the C.I.P.W., Tyrrell's tabular classifications and Rosenbusch classification.

Unit – III

Megascopic and microscopic petrography of the Granite clan, Granodiorite clan, Diorite clan, Syenite clan, the Gabbro clan and the Ultrabasic clan. Aplite, Pegmatite and Lamprophyres.

Unit – IV

Composition and constitution of magmas, Cystallisation of unicomponent magma, Binary magmas with simple eutectic (Diopside-Anorthite system) and with solid solution (Albite – Anorthite system) and with incongruent melting (Leucite – Silica system).

Unit – V

Bowen's Reaction principle and its bearing on igneous petrogenesis. Theories of differentiation, assimilation, petrographic provinces.

References:

1. Tyrrell, G.W. 1963. Principles of petrology, Methunn & Co.,.
2. Turner, F.J. and Verhoogen, J., 1960. Igneous and Metamorphic petrology, McGraw-Hill Book co.
3. Bowen, N.I., 1966. Evolution of Igneous Rocks, Dover publication,
4. Huang, Walter, T. 1962. Petrology, McGraw Hill book Co.
5. Hatch, F.H., Wells, A.K. and Wells, M.K. 1949. Petrology of Igneous Rocks. Thomas Murby & Co.
6. Hyndmann, Donald, W. 1972. Petrology of Igneous and Metamorphic rocks, McGraw – Book Co.
7. Albert Johannsen, 1962, Allied pacific private limited, Bombay.

SEDIMENTARY AND METAMORPHIC PETROLOGY

Unit – I

Weathering – decomposition and disintegration of rocks – Erosion – Transportation – Deposition – A brief idea of diagenesis and lithification. Size and shape of sediments. Relative abundance, composition and textures of sedimentary rocks. Classification of sedimentary rocks into clastic, residual, chemical and organic.

Unit – II

Descriptive study of the rocks formed by the residual, mechanical, chemical and organic processes. An outline of heavy mineral analysis and its utility in the provenance studies.

Unit – III

Definition and types of metamorphism – Factors of metamorphism – Zones, grades and facies of metamorphism – Stress and antistress minerals – Metamorphic textures and structures.

Unit – IV

Effects of Dynamic, Contact and Regional (Dynamothermal and burial) Metamorphism on the following rocks. Carbonates, pelites, psammites, ferruginous and acid, intermediate, basic and ultrabasic igneous rocks.

Unit – V

Metamorphic differentiation – Metasomatism – Anatexis – Palingenesis – Diaphthoresis – An outline of granitisation. A brief discussion on the origin of amphibolite, charnockite, migmatite and eclogite.

Reference:

1. Tyrrell, G.W. 1963. Principles of Petrology, Methunn, Co.,.
2. Winkler H.G.F. 1974. Petrogenesis of Metamorphic rocks, Third Edn. Springer Verlag.
3. Turner F.J. 1968. Metamorphic Petrology, McGraw Hill.
4. Miyashiro, A. 1973. Metamorphism and metamorphic belts Allan and Unwin.
5. Hyndman, F.D. 1972. Petrology of Igneous & Metamorphic rocks McGraw Hill.
6. Blatt H. Middleton, G and Murray R. 1972. Origin of Sedimentary Rocks, Prentice Hall.
7. Folk F.L. 1968. Petrology of Sedimentary Rocks Hempill's University Station Texas,.
8. Krumbein W.C. and Pettijohn F.J. 1960. Manual of Sedimentary Petrology, Appleton Century Co.,.
9. Pettijohn F.J. Potter, P.E. Silver, R., 1972. Sand and Sand Stones, Springer Verlag.
10. Pettijohn F.J. 1957. Sedimentary Rocks, Harper & Row.

MSU/2016-17/B. Sc Geology/ Semester -V/ Elective – 1 (A)

GEOSTATISTICS AND COMPUTER APPLICATIONS IN GEOLOGY

Unit I

Definition of Statistics - Sampling and population. Measures of central tendency -- mean, median, mode, standard deviation, skewness and kurtosis. Nominal, Ordinal, Interval and Ratio scales. Discontinuous and continuous data. Ungrouped and grouped scores. Graphical representation of data; bar charts, histograms, line graph, XY graph, frequency and cumulative frequency curves. Hypothesis testing, χ^2 student's 't' and Snedecor's 'F' tests.

Unit II

Geological Data types - Parametric Statistics and Nonparametric Statistics. Karl Pearson's correlation, Spearman's rank correlation - Probability and normal distribution - - Simple Linear Regression - Goodness of fit tests: Chi-square test. Scales of measurements:

UNIT - III

Geological Data Analyses - Principal component analysis – Discriminant analysis - Time series analyses - map analysis – Cluster analysis – Factor analysis.

Unit IV

Computer capabilities – General structure of a computer – Hardware components. Input devices (keyboard and mouse) output devices (dot matrix printers and Inkjet Printers) and storage devices (Disk organization, Floppy Disks, Hard disks and Compact discs) Computer applications in geology – Structured programming, algorithm and flowchart.

Unit V

Windows 2013:- Introduction – Graphical user interface objects:- windows, icons, menus, pointers. desktop features: - short cut, task Bar, start, time and status. MS – WORD 2000: Introduction – menu bar – tool bar – drawing tools bar – Document creation and formatting. MS – EXCEL 2013: Worksheet concept – menu Bar, tool Bar, building formulas. Data Analysis using MS – Excel 2013: Data file creation – calculation of summary statistics.

References:

1. Krishna, N. 2001. Computer Fundamentals and windows with Internet Technology, SCITECH, Tirunelveli,.
2. Davies, J.C. 1973. Statistics and data analysis in Geology, Wiley,.
3. Harbaugh, J.W. & Merriam, D.F.1965. Computer application in Stratigraphic analysis, Wiley..
4. Krumbein W.C. and Gray bill F.A. 1965. An introduction to statistical models in Geology, McGraw Hill,.
5. Miller R.L. Kahn, J.S. 1962. Statistical analysis in the Geological Sciences, Wiley.

MSU/2016-17/B.Sc Geology/Semester-V/ Elective -1 (B)

PETROLEUM AND COAL GEOLOGY (Elective I)

Unit – I

Origin, Migration and entrapment of natural hydrocarbons, Composition and constituents of petroleum.

Unit – II

Characters of source and reservoir rocks; structural, stratigraphic and combinations traps, Salt domes.

Unit – III

Petroleum exploration through well logging method. Geographical and geological distributions of onshore and offshore petroliferous basins of India.

Unit – IV

Definition and origin of coal. Fundamentals of coal petrology, microscopic constituents of coal, peat, lignite, bituminous and anthracite coal.

Unit – IV

Industrial application of coal petrology, Coal Fields of India.

References:

1. Levorsen, A.L. 1954. Geology of Petroleum, McGraw Hill Book Co.,.
2. Gokhale, K.V.G.K.D. Rao, T.C., 1973. Ore deposits of India. Thosman Press India Ltd., Delhi – 6.
3. Krishnaswamy, S. 1972. India's Mineral Resources, Oxford & IBH Publishing Co..
4. Stanton, R.L. 1972. Ore petrology, McGraw – Hill Book Co.,.
5. Bateman, Alan M. 1961. Economic Mineral Deposits, Asia Publishing House,.
6. Serra, O. 1985. Sedimentary environments from wireline logs. Schlumberger,
7. Umopathy, R.M. 2006. Mineral deposits of India. Dattsons, Nagur.

APPLIED GEOMORPHOLOGY

Unit-I

Definition of geomorphic agent, gradation, degradation. – Geomorphic cycle and cycle of erosion – Definition of processes, climatic influences and products.

Unit-II

Tectonic landforms – Tectonic scarps – Fault valleys – Landforms made by folding – volcanic landforms.

Unit-III

Fluvial Geomorphology – Drainage basin evolution – Drainage patterns – Fluvial erosional and depositional features.

Unit-IV

Glacial Geomorphology – glacial erosion, transportation and deposition. – Mass wasting and hill slopes.

Unit-V

Coastal Geomorphology – Processes and coastal landforms – Karst topography – Applications of remote sensing techniques in geomorphological interpretation.

References

1. Bloom, A.L., 2003, Geomorphology, A systematic Analysis of Late Cenozoic – Landforms. Third Edition, PHI Pvt.Ltd., NewDelhi – 110001.
2. Arthur Holmes – Principles of physical Geology, ELBS, III Edition, 1981.
3. Thornbury – Principles of Geomorphology, John Willey & sons Newyork, 1969.
4. Longwell, Flint and Sanders. 1969. Physical Geology, John Willey and sons, Newyork.
5. Radhakrishnan, V. 1997. General Geology, VVP Publishers Tuticorin, 282p.

MARINE GEOLOGY

Unit – I

History of Marine Geology. Principles of Echo sounder. Side scan sonar. Position fixing at Sea, Bottom sediment samplers.

Unit – II

Waves- Classification, types and parts of waves. Tides- Classification and types.

Unit – III

Tsunamis – Ocean Currents – Littoral processes.

Unit – IV

Geomorphology of the ocean floor – Sea floor spreading – Coastline classification – Beach materials.

Unit – V

Eustatic Sea level changes, Marine deposits, Laws of the sea – Coastal zone regulation.

References:

1. Kuenen, Ph.H., Marine Geology. John Wiley and Sons, 1950
2. King, C.A.M. – Beaches and coasts, Edward Arnold, London 1959.
3. King, C.A.M. – Introduction to marine Geology and Geomorphology. Edward Arnold, London, 1975.
4. Manimaran,G. 2007. Indian Ocean Tsunami and Related events. Renuga publications. Tirunelveli.pp.72
5. Radhakrishnan, V. General Geology V.V.P. Publishers, Tuticorin, 1996.
6. Siddhartha, K. 2002. Oceanography: A Brief Introduction, Kosalaya Publications Pvt Ltd, 347p.
7. Shepard, F.P. Geological Oceanography, Heinmann, London, 1978.
8. The Ocean, A Scientific American book, W.H. Freeman and company, SanFrancisco, 1969.

ENVIRONMENTAL GEOLOGY

Unit – I

Geological agents and their impact on environment, renewable and non-renewable earth resources, Environmental impact of mineral extraction and mining.

Unit – II

Carbon-di-oxide in atmosphere, limestone deposits in the geological sequences. Global Warming and Green House Effect.

Unit – III

Impact assessment of degradation and contamination of surface water and ground water quality due to industrialization and urbanisation.

Unit – IV

Environmental problems related to natural disasters and their mitigation – earthquakes, Valcanoes, Tsunami, Floods, droughts and storms.

Unit –V

Medical Geology – Introduction to Geomedicines, Heavy metals and health hazards – Mineral induced diseases: Minameta, Fluorosis, Silicosis, Itai-itai, Goitre and cretin, Keshan, Enviro Scar, Mesothelioma, Anaemia, Lung Cancer, Wilson’s diseases. Mineral remedies to diseases including Gem Therapy. Drugs from ocean.

References:

1. Strahler and Strahler .1973. Environmental Geosciences.
2. Valdiya, K.S. 1987. Environmental Geology, Indian Context. Tata McGraw Hill publishing Co. New Delhi,
3. Davis, S.N. 1992. Physical environment.
4. Balasubramanian, A.1995. Ecology, Environment and pollution, Indira publishers, Mysore.
5. Cannon, H.L. and Hopps, H.C., 1972. Geochemical environment in relation to health and diseases,Newyork Academy of science.
6. Keller, E.A., 1985. Environmental Geology, CBS publishers, NewDelhi,.
7. Libes, S.M. 1992. An introduction to marine biogeochemistry John wiley & Sons, Newyork,.
8. Trace elements in Human Nutrition and Health, 1996. world Health Organisation,.
9. Varley, H., 1988. Practical clinical biochemistry. IV Ed. CBS publishers, NewDelhi,.
10. Saha N.N. 1984. Healing through Gems, Sterling Publ. Pvt. Ltd., New Delhi.

PLANETARY GEOLOGY

Unit-I

Introduction - Solar system – Origin of Universe – Big Bang theory – the Galaxy – Origin of the solar system.

Unit-II

Sun as star – Black spots – Solar phenomena- Major and minor planets of the solar system.

Unit-III

Lunar Geology – The moon – Earth relationship – Chemical and mineral composition of the moon. – Description of lunar rocks.

Unit-IV

Meteorites – their types – chemical composition –Major, minor and trace and rare earth elements - Distribution and scientific information.

Unit-V

Salient features of the various Planets – Mercury, the Earth, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto.

References

1. Radhakrishnan, V., 1996, General Geology, V.V.P. Publishers, (Second Revised Edition), Tuticorin – 628008.
2. Bhandari, N., 2008, The Mysterious Moon and Indian's Chandrayaar Mission, Vigyan Prasar, DST., NOIDA – 201607.
3. Moorees and Twiss, T.T. 1995, Tectonics, Freeman.
4. Spencer. E.W. 2003. Earth science. McGraw Hill.
5. <http://solarsystem.nasa.gov/index.cfm> NASA's Solar System Exploration site

MSU/2016-17/B. Sc Geology/ Semester -VI/ Core - 9

(Geophysics, Geochemistry, Engineering Geology, Mining Geology and Ore Dressing)

Unit- I

Fundamental principles – Electrical Resistivity method – Gravity method – Magnetic method – Seismic Methods – Instrumentation and field procedures.

Unit-II

Definition, aims and scope, Geochemical structure and composition of the earth. Distribution of elements in the geosphere. Geochemical affinity. Geochemical classification of elements.

Unit-III

The role of Geology in civil engineering. Properties of rocks – Strength and elastic properties. Properties of building stones concrete aggregates, rail and road material. Types of earth movements and their classification and preventive measures. Geological investigations pertaining to the foundations of dams, reservoirs and tunnels.

Unit-IV

Prospecting sampling and evaluation of ore resources. Outline of the method of metal mining. Opencast and underground mining, Methods of coal mining.

Unit - V

Principles and scope of ore dressing, Physical and chemical properties as applied to ore dressing. A brief study of common crushers, grinders, and classifiers, Concentration of ore minerals by magneto – electrostatic and floatation processes.

References:

1. Dobrin M.B., and Savit C.H.,1988. Introduction to Geophysical Prospecting (4th ed.,) McGraw – Hill, New York.
2. Parasnis D. S .1997, Principles of applied geophysics, Chapman & Hall, 2-6 Boundary Row, London SE1 8HN, UK.
3. Ramachandra Rao, M.B., Prasaranga, 1975. Outlines of Geophysical Prospecting - A manual for geologists by University of Mysore, Mysore,.
4. Kruskopt E.B. 1967. Introduction to Geochemistry. Mc. Graw Hill 1967
5. Rankama, K. and Sahama, 1950, Geochemistry, University of Chicago Press
6. Brain Mason, 1966. Principles of Geochemistry.Willey 1966
7. Krynine and Judd. 1957. Principles of Engineering Geology and Geo-techniques. Mc. Graw Hill.
8. Peters W.C.Exploration Mining Geology. John Willey.
9. Arogyasamay, R.N.P. Course in Mining Geology. Oxford & I.B.H.Publishing Co.
10. Sinha R.K., & Sharma, N.L, Mineral Economics , Oxford & I.B.H.Publishers.
11. Reedman.J.H.Techniques in mineral economics. Allied Scientific Publishers.
12. Sathya Narayanswami, B.S., Engineering geology. Chaparral & co. Delhi,2000.

6.4.2. APPLIED GEOLOGY - II (Natural Hazards, Remote Sensing and GIS)

Unit-I

Introduction to natural hazards – Types of natural hazards and their classification.

Unit-II

Earthquakes – Types of elastic waves – Kinds of earthquakes – Seismograms – Richter's and movement scales – Causes, prediction and prevention of earthquakes.

Unit-III

Landslides – Classification – Driving forces and causes – Mitigation of landslides.

Unit-IV

Introduction to remote sensing – Electromagnetic spectrum – Sensors – Aerial platforms – Resolution of satellite data – Visual interpretation of satellite images – Application of satellite remote sensing in geological sciences.

Unit-V

Application of GIS in earth science, Basic principles of geographic information system – Basic geographic concepts – spatial awareness, spatial measurement, spatial location and reference, spatial patterns Map Basics: Nature of maps, map scale, map projections, Grid Systems for mapping. GIS data models: vector and raster data models.

References

1. Gary L. Prost 2001. Remote Sensing for geologists Guide to Image Interpretation. Gordon and Breach Science Publishers pp. 374,
2. Michale N.DeMers , 2005. Fundamental of Geographic Information Systems. Wiley India (p) Ltd.pp.467.
3. Kang-tsung chang. 2002. Introduction to Geographic Information Systems. McGraw-Hill companies, pp 348.
4. Ian Heywood, Sarah Cornelius and steve carver. 2003. An Introduction to Geographic Information Systems, Pearson, pp 295.

MEDICAL GEOLOGY

Unit I

Medical geology: perspective and prospects-Natural distribution and abundance of elements – Anthropogenic distribution sources- uptake of elements from a chemical point of view- Uptake of elements from a biological point of view.

Unit II

Biological functions of the elements- Geological impacts on nutrition – responses of elements- Volcanic emissions and health- Radon in air and water.

Unit III

Arsenic in groundwater and the environment- Fluoride in natural waters- Water hardness and health effects- Bioavailability of elements in soil- Selenium deficiency and toxicity in the environment- Soil and iodine deficiency.

Unit IV

Geophagy and the involuntary ingestion of soil – The ecology of soil-borne human pathogens- Animals and medical geology- Environmental pathology.Toxicology- GIS application in human health studies- Histochemical and microprobe analysis in medical geology. Introduction to Geomedicines

Unit V

Heavy metals and health hazards – Mineral induced diseases: Minamata, Fluorosis, Silicosis, Itai-itai, Goitre and cretin, Keshan, Environ Scar, Mesothelioma, Anaemia, Lung Cancer, Wilson's diseases. Mineral remedies to diseases including Gem Therapy. Drugs from ocean.

References

1. Trace elements in Human Nutrition and Health, 1996. World Health Organisation,.
2. Varley, H., 1988. Practical clinical biochemistry. IV Ed. CBS publishers, New Delhi.
3. Saha.N.N.1984. Healing through Gems, Sterling Publ. Pvt. Ltd., New Delhi.
4. Bowman, C.A. and Bobrowsky, P.T., 2002, Urban geochemistry and associated health hazards in the sediments of Victoria, British Columbia (abs):Geological Society of America Program with Abstracts, vol. 34, no. 6, pp.419.
5. Mills, C.F., 1996, Geochemical aspects of aetiology of trace elements and related diseases.
6. Mayer. A.I.2007. Medical Geography, APH pub.corp.
7. Vohra.S.B. and Athar. M. 2008. Mineral Drugs. Norosa Publishing house, New Delhi. 207pp.
8. Selinus, O. 2005. Essential of medical geology. Impact of natural environment on public Health. Academic Press.1030.

GEOLOGY OF TAMILNADU

UNIT-I

Geological Time scale of India. General Geological setting of Tamil Nadu. Geomorphology: Physiography - Western and Eastern Ghats of Tamil Nadu and their structural aspects.

Unit-II

Structure and Tectonics of TamilNadu. Shear zones of Tamilnadu- Palghat – Cauvery, Moyar – Bhavani, Salem-Attur and Gangavalli- Achankovil shear Zones.

Unit-III

Archean systems – Sathiyamangalam Greenstone Belt – Penninsular gneiss, Charnockite, Khondalites. Proterozoic formations- Charnockite-Migmatite and Granite.

Unit-IV

Gondwana formations – Sivaganga formations, Sriperambalur beds, Terani formations, Cretaceous of Trichinopoly marine formations.

Unit-V

Tertiary formations – Cuddalore formations – Neyveli Lignite formation, Kariaikal formations, Panamparai Sandstone – Recent Sub-recent – fluvio-marine coastal deposits – Manavalakuruchi, Thoothukudi. Mineral wealth of Tamilnadu.

References

1. Subramanian. K.S. and Selvan, T.A. 2001. Geology of Tamilnadu and Pondicherry. Geological Society of India, Bangalore- 192 p.
2. Krishnan M.S.. 1968. Geology of India and Burma, Higginbothams, 1968.
3. Wadia D.N. 1953. Geology of India, Macmillian and Co.
4. Kumar. 1985. Fundamentals of Historical Geology and Stratigraphy of India.

APPLIED GEOLOGY - II (Natural Hazards, Remote Sensing and GIS)

Unit-I

Introduction to natural hazards – Types of natural hazards and their classification.

Unit-II

Earthquakes – Types of elastic waves – Kinds of earthquakes – Seismograms – Richter's and movement scales – Causes, prediction and prevention of earthquakes.

Unit-III

Landslides – Classification – Driving forces and causes – Mitigation of landslides.

Unit-IV

Introduction to remote sensing – Electromagnetic spectrum – Sensors – Aerial platforms – Resolution of satellite data – Visual interpretation of satellite images – Application of satellite remote sensing in geological sciences.

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Application of GIS in earth science, Basic principles of geographic information system – Basic geographic concepts – spatial awareness, spatial measurement, spatial location and reference, spatial patterns Map Basics: Nature of maps, map scale, map projections, Grid Systems for mapping. GIS data models: vector and raster data models.

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1. Gary L. Prost 2001. Remote Sensing for geologists Guide to Image Interpretation. Grdon and Breach Science Publishers pp. 374,
2. Michale N.DeMers , 2005. Fundamental of Geographic Information Systems. Wiley India (p) Ltd.pp.467.
3. Kang-tsung chang. 2002. Introduction to Geographic Information Systems. McGraw-Hill companies, pp 348.
4. Ian Heywood, Sarah Cornelius and steve carver. 2003. An Introduction to Geographic Information Systems, Pearson, pp 295.

MEDICAL GEOLOGY

Unit I

Medical geology: perspective and prospects-Natural distribution and abundance of elements – Anthropogenic distribution sources- uptake of elements from a chemical point of view- Uptake of elements from a biological point of view.

Unit II

Biological functions of the elements- Geological impacts on nutrition – responses of elements- Volcanic emissions and health- Radon in air and water.

Unit III

Arsenic in groundwater and the environment- Fluoride in natural waters- Water hardness and health effects- Bioavailability of elements in soil- Selenium deficiency and toxicity in the environment- Soil and iodine deficiency.

Unit IV

Geophagy and the involuntary ingestion of soil – The ecology of soil-borne human pathogens- Animals and medical geology- Environmental pathology.Toxicology- GIS application in human health studies- Histochemical and microprobe analysis in medical geology.
Introduction to Geomedicines

Unit V

Heavy metals and health hazards – Mineral induced diseases: Minamata, Fluorosis, Silicosis, Itai-itai, Goitre and cretin, Keshan, Environ Scar, Mesothelioma, Anaemia, Lung Cancer, Wilson's diseases. Mineral remedies to diseases including Gem Therapy. Drugs from ocean.

References

1. Trace elements in Human Nutrition and Health, 1996. World Health Organisation.
2. Varley, H., 1988. Practical clinical biochemistry. IV Ed. CBS publishers, New Delhi.
3. Saha.N.N.1984. Healing through Gems, Sterling Publ. Pvt. Ltd., New Delhi.
4. Bowman, C.A. and Bobrowsky, P.T., 2002, Urban geochemistry and associated health hazards in the sediments of Victoria, British Columbia (abs):Geological Society of America Program with Abstracts, vol. 34, no. 6, pp.419.
5. Mills, C.F., 1996, Geochemical aspects of aetiology of trace elements and related diseases.
6. Mayer. A.I.2007. Medical Geography, APH pub.corp.
7. Vohra.S.B. and Athar. M. 2008. Mineral Drugs. Norosa Publishing house, New Delhi. 207pp.
8. Selinus, O. 2005. Essential of medical geology. Impact of natural environment on public Health. Academic Press.1030.

PALAEONTOLOGY AND CRYSTALLOGRAPHY PRACTICAL (EXAM - ANNUAL)

PALAEONTOLOGY PRATICAL

Identification and Description of Following Fossils.

Coelenterata	– Montlivaltia, Zaphrentis
Brachiopoda	– Productus, Spirifer, Terebratula, Rhynchonella.
Pelecypoda	– Arca, Spondylus, Trigonina, Meretrix, Venus, Alectryonia, Ostreae, Gryphaea, Exogyra.
Gasteropoda	– Physa, Turritella, Fusus, Trochus, Conus.
Cephalopoda	– Nautilus, Ceratite, Aconthoceras and Belemnites.
Trilobites	– Paradoxides, Calymene.
Echinoids	– Hemiaster, Micraster, Stigmatopygous.
Plant Fossils	– Glossopteris, Gangamopteris, Ptillophyllum, Wood fossil.

CRYSTALLOGRAPHY PRACTICAL :

Cubic System	: Normal Class – Galena, Spinel, Garnet, Fluorite, Diamond. : Pyritohedral class – Pyrite.
Tetragonal System	: Normal Class – Zircon, Rutile, Cassiterite, Vesuvianite, Apophyllite.
Hexagonal System	: Normal Class – Beryl. : Hemimorphic Class – Zincite : Rhombohedral class – Calcite and Corundum.
Orthorhombic System	: Normal class – Barite, Staurolite, Sulphur, Topaz. : Hemimorphic class – Calamine. : Sphenoidal class – Epsomite.
Monoclinic System	: Normal class – Gypsum, Epidote, Orthoclase.
Triclinic System	: Normal class – Axinite and Albite.

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, Orthoclase, 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/B. SC GEOLOGY/ SEMESTER -VI/ PRACTICAL – 3 (EXAM – ANNUAL)

IGNEOUS PETROLOGY

Megascopic identification and description of the following rocks in hand specimen.

Mica Granite, Hornblende Granite, Pegmatite, Aplite, Mica Syenite, Hornblende syenite, Pyroxene syenite, Peridotite, Nepheline Syenite, Dolerite, Gabbro, Norite, Dunite, Pyroxenite, Anorthosite, Dolerite, Dolerte porphyry, Rhyolite, Trachyte, Andesite, Felsite, Basalt, Obsidian, Pitchstone, Pumice, Volcanic tuff, Volcanic breccia Vitrophyre,

Microscopic identification and description of the following rocks in thin section:

Muscovite Biotite granite, Hornblende granite, alkali granite, Tourmaline granite, Pegmatite, Aplite, Mica syenite, Hornblende syenite, Nepheline syenite, Quartz diorite, Gabbro, Olivine Norite, Dunite, Peridotite, Pyroxenite, Granite Porphyry, Syenite Porphyry. Diorite porphyry, Dolerite, Rhyolite, Trachyte, Phonolite, Andesite, Basalt, Olivine basalt, Obsidian, Pitch-stone,

PRACTICAL II

SEDIMENTARY AND METAMORPHIC PETROLOGY

Megascopic identification and description of the following rocks in hand specimen.

Conglomerate, Breccia, Sandstone Arkose, Grit, Flagstone, Shale, Laterite, Limestone, Clay, Chalk, flint, Chert, Phosphatic nodule, Peat, Lignite Bituminous coal, Anthracite, Mica gneiss, Hornblende gneiss, Banded Gneiss, Garnetiferous Biotite gneiss, Cordierite – Sillimanite gneiss, Augen gneiss, Leptynite, Mica schist, Hornblende schist, Chlorite schist, Chlorite magnetite schist, Chlorite garnet schist, Mica garnet schist, Mica staurolite schist, Talc schist, Graphite schist, Phyllite, Grayslate, Redslate, Quartzite, Marble, Dolomite, Ophicalcite, Quartz magnetite rock, Amphibolite, Eclogite, Khondalite, Gondite, Charnockite and Calc granulite.

Microscopic identification and description of the following rocks in thin section:

Conglomerate, Breccia, Sandstone, Arkose, Grit, Shale, Laterite Limestone, Oolitic Limestone, Shell limestone, Clay, Chalk, Flint, Chert, Coal, Mica schist, Chlorite schist, Hornblende schist, Staurolite schist, Kyanite schist, Granetiferous mica schist, Chiastolite slate, Mica gneiss, Pyroxene gneiss, Charnockite, Marble, Eclogite, Amphibolite, Khondalite, Cordierite Sillimanite gneiss.

GEOSTATISTICS AND COMPUTER APPLICATIONS IN GEOLOGY

GEOSTATISTICS: Manual determination of statistics (Measures of Central Tendency, Standard Deviation, Skewness and Kurtosis) – Hypothesis testing by Chi-square, Student's 't' and 'F' tests – Linear Regression and Linear correlation.

COMPUTER APPLICATIONS IN GEOLOGY

Data file creation – Statistical solution of geological problems using MS-EXCEL 2000 – Construction of Histograms, Pie charts and Bivariate Plots using Excel 2000.

MARINE GEOLOGY

Beach profile measurement and classification of beach morphology. Heavy and light mineral separation and identification.

MSU/2016-17/B. SC GEOLOGY/ SEMESTER -VI/ PRACTICAL-4 and Applied Geology I.

ECONOMIC GEOLOGY, HYDROGEOLOGY and Applied Geology I Elective subjects: (Geophysics, Geochemistry, Engineering Geology, Mining Geology and Ore Dressing)

Economic geology:

Identification and description of the following economic minerals:

Magnetite, Ilmenite, Hematite, Pyrite, Pyrolusite, Psilomelane, Chromite, Wulframite, Chalcopyrite, Malachite, Galena, Magnesite, Bauxite, Stibnite, Cinnabar, Gypsum, Barite, Monazite, Rutile, Sillimanite, Kyanite, Corundum, Calcite, Dolomite, Beryl, Asbestos, Orpiment.

Hydrogeology:

Analysis of rainfall data and resistivity data.

ELECTIVE SUBJECT - APPLIED GEOLOGY I

Geophysics, Geochemistry, Engineering Geology, Mining Geology and Ore Dressing

Elementary analysis of seismic reflection and refraction data.

Geochemistry:

Classification of ground water and rock types based on geochemical data.

Engineering Geology:

Calculation of compressive strength, Shearing strength and Tensile strength of rocks.
Select a suitable site from geological and topographical maps for dam and tunnel construction.

Mining Geology:

Estimation of ore reserves.

Problems and maps related to geology of Tamilnadu / Remote sensing and GIS/Medical Geology.

FIELD AND INDUSTRIAL TRAINING

Geological mapping (One week mapping camp)

Geological tour more than two weeks days

Viva voce on Geological mapping and Geological tour

Reports submission

Specimen collection and short field trips.