
**Deccan Education Society's
FERGUSSON COLLEGE (AUTONOMOUS),
PUNE**

**Syllabus
for**

S.Y.B.Sc. (Geology)

[Pattern 2019]

(B.Sc. Semester-III and Semester-IV)

From Academic Year

2020-21

Deccan Education Society's
Fergusson College (Autonomous), Pune

S.Y.B.Sc. Subject (Pattern 2019)

From academic year 2020-21

Particulars	Name of Paper	Paper Code	Title of Paper	No. of Credits
S.Y. B.Sc. Semester III	Theory Paper - 1	GLY2301	Principles of Stratigraphy and Sedimentation	2
	Theory Paper - 2	GLY2302	Structural Geology	2
	Practical Paper - 1	GLY2303	Geology Practical related to GLY 2301 and 2302 Practical -III	2
S.Y. B.Sc. Semester IV	Theory Paper - 3	GLY2401	Global tectonics and geodynamics of the lithosphere	2
	Theory Paper - 4	GLY2402	Environmental geology and geogenic disasters	2
	Practical Paper - 2	GLY2403	Geology Practical related to GLY 2401 and 2402+ 4-5 Days Field Component Practical -IV	2

S.Y. B.Sc. Semester III		
Title of the Course and Course Code	Principles of Stratigraphy and Sedimentation (GLY2301)	Number of Credits : 02
Course Outcomes (COs)		
On completion of the course, the students will be able to:		
CO1	Describe the concept, various elements of stratigraphy and give their importance.	
CO2	Explain the various processes of stratification.	
CO3	Illustrate the various primary sedimentary structures formed in different depositional environments.	
CO4	Classify sedimentary rocks on the basis of different characters like mineral composition, textures, structures, etc.	
CO5	Compare the sedimentary facies associated with various depositional environments.	
CO6	Prepare a report about sedimentary rock samples collected individually during the study tour.	

Unit. No.	Title of Unit and Contents	No. of Lectures
I	<p>Principles of Stratigraphy and Stratification</p> <p>A) Introduction: Definition, Development of stratigraphic concepts, Importance of Stratigraphy, Various principles of Stratigraphy</p> <p>B) Stratigraphic Classification & Nomenclature: Study of stratigraphic elements, Lithostratigraphy, Chronostratigraphy, Biostratigraphy, Inter-relationship between lithostratigraphic, Chronostratigraphic and Bio stratigraphic units.</p> <p>C) Methods of Collecting Stratigraphic Data: Outcrop and Sub surface procedures.</p> <p>D) Stratification: Introduction to concept of basin, Processes of stratification, Controlling factors-physical, chemical and biological, Vertical succession, alternations, varves,cycles.</p> <p>E) Stratigraphic Correlation: Definition and evidence for correlation- physical and palaeontological</p>	18
II	<p>Sedimentation:</p> <p>A) Nature of sediment formation, transport and deposition: Processes of sediment formation, source of sediments, Transportation of sediments and deposition of sediments, Wilson's cycle, lithification, diagenesis and post depositional changes, carbonates and otherprecipitates</p> <p>B) Significance of Textures of sedimentary rocks and primary sedimentary structures: detrital, chemical andbiochemical</p> <p>C) Sedimentary facies: Introduction to sedimentary facies: Definition, nomenclature & types of Sedimentaryfacies.</p> <p>D) Depositional environments: Introduction to depositional</p>	18

	environment and classification.	
	E) Classification of sedimentary rocks: Classification of sandstone and limestone	

Learning Resources:

1. Krumben and Sloss (1963) Stratigraphy and Sedimentation, W.H. Freeman
2. Friedman & Sanders, (1978) Principles of Sedimentology. John Wiley and sons.
3. Petti john, F.J., (1975), Sedimentary rocks, Harper & Bros. 3rd Ed.
4. Sengupta. S., (1997), Introduction to sedimentology. Oxford-IBH.
5. Petti john F.J. (1984) Sedimentary Rocks (3rd Edition), CBS Publishers and Distributors, New Delhi.
6. IUGS Stratigraphic nomenclature
7. GSI stratigraphic nomenclature

Structural Geology (GLY2302)		
Title of the Course and Course Code	Structural Geology (GLY2302)	Number of Credits : 02
Course Outcomes (COs)		
On completion of the course, the students will be able to:		
CO1	State various types of forces involved in deformation of rocks and describe attitude of structures.	
CO2	Distinguish types of deformational structures.	
CO3	Examine deformational structures produced by various deformational processes.	
CO4	Classify deformational structures based on their characteristics features.	
CO5	Evaluate the processes involved in formation of deformational structures.	
CO6	Prepare a report of structural data collected during field work.	

Unit. No.	Title of Unit and Contents	No. of Lectures
I	Introduction to Structural Geology A) Introduction- Definition and its relation with other branches of geology, Tectonic and Non-tectonic structures, Scale of tectonic structures (Micro, Meso, Macro Regional) B) Components of deformation - Force, Confining / Hydrostatic pressure & differential forces, Stress & Strain, Rupture strength, Ultimate strength & Fundamental strength, Factors controlling rock deformation: Confining pressure, temperature, time, solution C) Planar/Linear Structures- Attitude of planar feature - Strike and Dip, Attitude of Linear Feature, Bearing, Plunge and Rake of Lineation and linear structures.	18

	D) Determination of Top of Beds with The Help of Primary Structures (Sedimentary & Igneous)	
	E) Unconformities	
II	Unit II -Deformation Structures • Definition, Elements, Types and Nature of – Joints, Fractures, Shear zones, Faults and Folds	18

Learning Resources:

1. Jain, A.K., (2014) An introduction to structural geology. Textbook series in Geological Sciences for Graduate Students, Geological Society of India, Bangalore
2. Billings, M.P., (1972) Structural Geology. PrenticeHall
3. Davis, G.R., (1984) Structural Geology of Rocks and Region. JohnWiley

Geology Practical related to GLY 2301 and 2302 (GLY2303)		
Title of the Course and Course Code	Geology Practical related to GLY 2301 and 2302 (GLY2303)	Number of Credits : 02
Course Outcomes (COs)		
On completion of the course, the students will be able to:		
CO1	Identify different primary sedimentary structures.	
CO2	Distinguish between different megascopic sedimentary rocks.	
CO3	Calculate attitude of beds from given structural data.	
CO4	Compare different sedimentary rocks under microscope.	
CO5	Measure attitude and thickness of beds from geological maps.	
CO6	Construct litho sections and biostratigraphic charts from given data	

List of practicals (Compulsory 10 + 2 Activity)

PRAC. NO.	PARTICULARS
I	Megascopic study and identification of the following sedimentary rocks. Arkose, Grit, Sandstones (siliceous, ferruginous and calcareous), Nummulitic Limestone, Miliolitic Limestone, Oolitic Limestone.
II	Microscopic study and identification of the following sedimentary rocks. Ferruginous Sandstone, Arkose, Oolitic Limestone, Nummulitic Limestone. Study of Primary sedimentary structures.
III	Construction of litholog from the given data.
IV	Construction of various biostratigraphic charts from the given data
V	Study of geological maps with a series of horizontal beds
VI	Study of geological maps with a series of inclined beds
VII	Structural Problems I- involving hill slope (hill slope given/ hill slope to be determined), true dip, true thickness, true width of outcrop and vertical thickness of the bed.

VIII	Structural Problems II- involving true and apparent Dip, true and apparent thickness, true and apparent width of outcrop and vertical thickness of the bed (True dip & true thickness/ Vertical thickness/ width of the outcrop given).
IX	Structural Problems III- involving true and apparent dip of the bed- i) True dip of the bed given- To find out apparent dip amount in the given apparent dip direction ii) True dip of the bed given- To determine apparent dip direction for given apparent dip amount. iii) Two apparent dip amounts in two different directions given- To find out strike direction, true dip direction and true dip amount. Note- (Problems II and III to be solved by using descriptive geometry method involving construction of vertical section in desired directions)
X	Revision

S.Y. B.Sc. Semester IV

Title of the Course and Course Code	Global Tectonics and Geodynamics of Lithosphere (GLY2401)	Number of Credits : 02
Course Outcomes (COs)		
On completion of the course, the students will be able to:		
CO1	Describe the interior of the earth along with their physical and chemical properties.	
CO2	Explain Earth's magnetic field and the theory of plate tectonics.	
CO3	Classify the characteristic features of tectonic plates.	
CO4	Analyze the processes involved in plate movements.	
CO5	Compare the nature of boundaries of tectonic plates and associated features.	
CO6	Reconstruct plate movements based on observed features in the field.	

Unit. No.	Title of Unit and Contents	No. of Lectures
I	Geodynamics of Lithosphere A. Evolution and Structure of Lithosphere, Asthenosphere, core etc. B. Lithospheric – Asthenosphere Interactions C. Concept of isostasy D. Earth's Magnetic field & Geodynamo E. Historical background of the plate tectonics theory	18
II	Plate tectonics A. Characteristics of lithospheric plates, Concept of plate margin & plate boundary. B. Three plate boundaries - (Divergent, Convergent & Transform fault -description & examples) C. Present motion of world's large plates. D. Concept of triple junctions with their examples. E. Concept of plate tectonics.	18

	F. Concept of hot plumes & hot spots with examples	
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Learning Resources:

1. Patwardhan, A.M. (2012) The dynamic Earth System, PHI Learning Pvt.Ltd.,
2. Moores E.M. and Twiss R.J. (1995) Tectonics, W. H.Freeman
3. Condie, K.C. (1989) Plate Tectonics & Crustal Evolution, Butterworth-Heinemann
4. Billings, M.P. (1942) Structural Geology, Prentice Hall,
5. Badgley, P. C. (1965) Structural & Tectonic Principles, Harper & Row
6. Valdiya K.S. (2014) Making of India, Springer.
7. Helmut G.F. Winkler (1967, 1986), Petrogenesis of metamorphic rocks, Springer-verlag

Environmental Geology and Geogenic Disaster (GLY2402)		
Title of the Course and Course Code	Environmental Geology and Geogenic Disaster (GLY2402)	Number of Credits : 02
Course Outcomes (COs)		
On completion of the course, the students will be able to:		
CO1	Recall the concept of Environmental Geology and Geogenic disaster.	
CO2	Discuss the various types of pollution.	
CO3	Solve the various environmental issues by taking remedial measures.	
CO4	Explain the concept of Environmental Impact Assessment.	
CO5	Classify the geogenic disaster and evaluate geogenic disaster prone areas.	
CO6	Prepare a report on any geogenic disaster prone area.	

Unit. No.	Title of Unit and Contents	No. of Lectures
I	Environmental Geology A) Scope, Concepts and Objectives of Environmental Geology. B) Physical, Biological and Socio-geological Environment, Bio-geochemical cycles. C) Environmental Impact Assessment - Introduction and Methodology D) Pollution - Water quality, BIS/ UNESCO/WHO Standards, Organic, inorganic and Heavy metal pollution, Sampling methods & monitoring.	18
II	Geogenic disasters and hazards, and Solid Waste Management A) Definition, type, natural hazard zones, Distinction between hazard and disaster B) Impact assessment, Natural hazard zonation maps C) Role of Geologists in disaster management plan. D) Geogenic hazards – Earthquake, Volcanoes, Cyclones, Floods, Mass movements, Mining Hazards, Coastal Hazards (Tsunami) E) Conservation of Natural Resources F) Solid Waste Management - Generation, Collection, Segregation, Characterization, Disposal, Recycling	18

	and Reuse, Its effects with geological perspective	
	G) Urban Geology	

Learning Resources:

1. Valdiya, K. S., (1987) Environmental Geology - Indian Context. Tata McGraw Hill New Delhi.
2. Keller, E. A., (2000) Environmental Geology. Shales E. Merrill Publishing Co., Columbus, Ohio.
3. Montgomery, C., (1984) Environmental Geology. John Wiley and Sons, London.
4. Bird, Eric, (2000) Coastal Geomorphology: An Introduction. John Wiley & Sons, Ltd. Singapore.
5. Liu, B.C., (1981) Earthquake Risk and Damage, Westview.
6. Sharma J. P., Environmental Studies, Laxmi Publications (P) Ltd, New Delhi UGC Document on LOCF Geology 42
7. Urban Geology: Geology & cities.

Geology Practical related to GLY 2401 and 2402 (GLY2403)		
Title of the Course and Course Code	Geology Practical related to GLY 2401 and 2402 (GLY2403)	Number of Credits : 02
Course Outcomes (COs)		
On completion of the course, the students will be able to:		
CO1	Identify different tectonic features of the world.	
CO2	Classify different regions in India according to their hazard zonation and different types of soils.	
CO3	Calculate water quality index.	
CO4	Detect different water quality parameters using simple instruments.	
CO5	Measure attitude and thickness of beds and classify the types of faults observed in geological maps.	
CO6	Write a report on different rocks and structural features observed during the study tour.	

List of practical's (Compulsory 10 + 2 Activity)

PRAC. NO.	PARTICULARS
I	Study of tectonic plates, plate boundaries, hot spots and triple junctions on the world map.
II	Study of geological maps with a conformable series with one vertical dyke.
III	Study of geological maps with two conformable series.
IV	Study of geological maps with a conformable series with one or two vertical faults.
V	Study of Hazard zonation maps of India and world.
VI	Measurement and analysis of different water quality parameters.
VII	Estimation of various water quality parameters.
VIII	Calculation of water quality index.
IX	Soil analysis
X	Revision Practical

