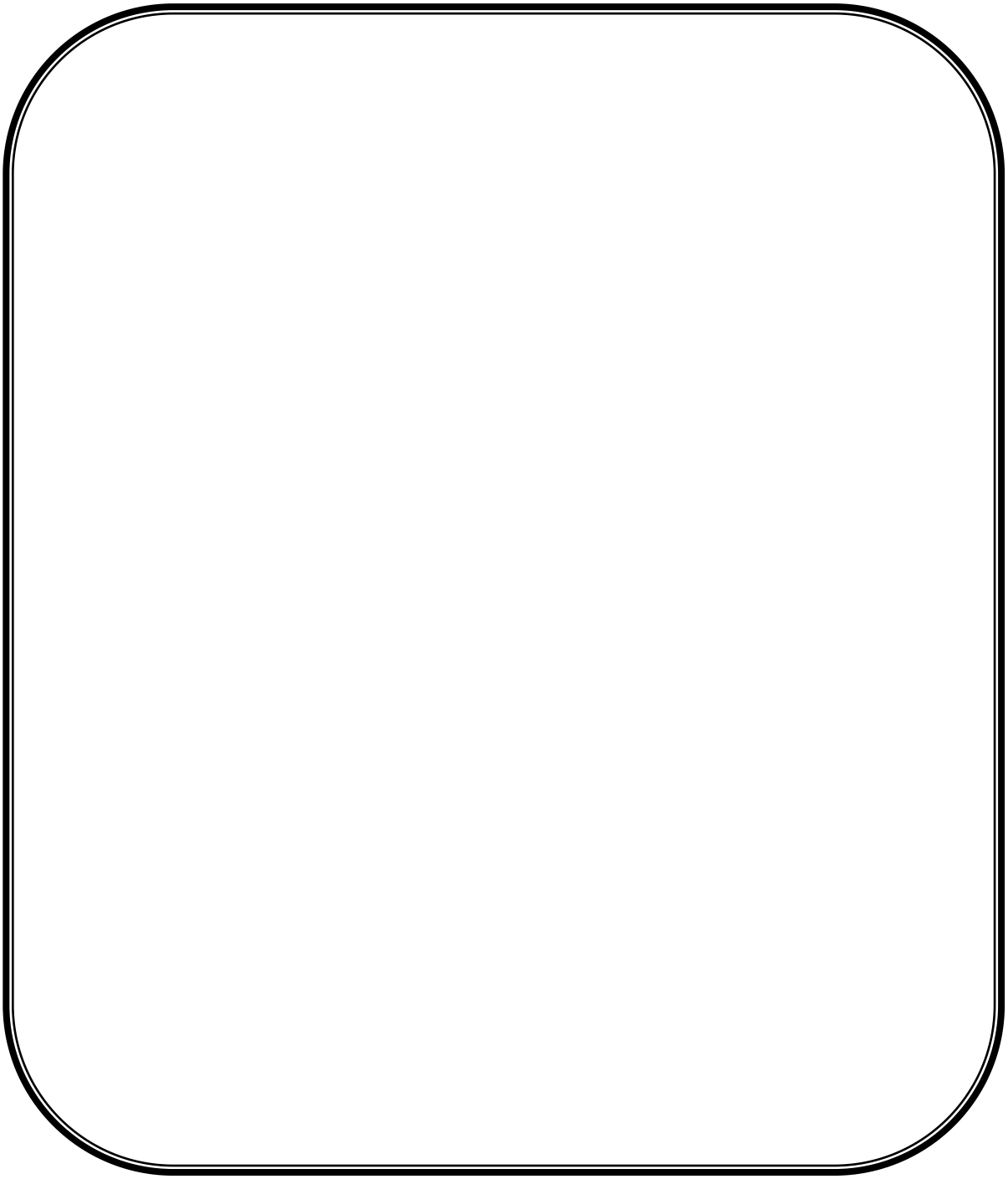

M.Sc. CREDIT SYSTEM WITH EFFECT FROM ACADEMIC YEAR 2013-2014

PROGRAM: M.Sc. II SECOND YEAR

COURSE: GEOLOGY

SEMESTER III THEORY

SEMESTER	PAPER CODE	PAPER	CREDITS	TOTAL CREDITS
III	PSGE301	GEOPHYSICAL PROSPECTING	2	08
	PSGE302	PALEONTOLOGY AND MICROPALEONTOLOGY	2	
	PSGE303	ELECTIVE I a) COAL GEOLOGY b) ENVIRONMENTAL GEOLOGY	2	
	PSGE304	ELECTIVE II a) PETROLEUM GEOLOGY b) MARINE GEOLOGY	2	
PRACTICAL				
III	PSGEP5	PSGE301 & 302	4	08
	PSGEP6	PSGE303 & 304	4	

M.Sc. Semester III and Semester IV GEOLOGY Syllabus
Credit Based and Grading System
To be implemented from the Academic year 2017-2018
Semester III Detail Syllabus

Course Code	Title	Credits
PSGE301	Geophysical Prospecting	4
Unit I: Introduction and application 1. Geophysics in oil and mining industry 2. Relationship between exploration geophysics and basic sciences 3. Various methods of exploration for various minerals and their application 4. Methods of geophysical modelling and selection of exploration methods 5. Integration of geophysical data and case histories		
Unit II: Gravity and magnetic exploration 1. Fundamental principles of gravity prospecting 2. Earth's gravity and concept of isostasy 3. Instruments, field measurements and interpretation 4. Fundamental principles of magnetic prospecting 5. Earth's magnetism 6. Instruments, field measurements and interpretation 7. Introduction to airborne magnetic survey		
Unit III: Seismic prospecting 1. Seismic wave propagation 2. Earthquakes and structure of earth 3. Seismic reflection and refraction method 4. Instruments and field measurements 5. Processing and interpretation of seismic data. 6. Applications in petroleum industry		
Unit IV: Electrical prospecting methods and prospecting for radioactive minerals 1. Self-potential method and equipotential line method 2. Resistivity method 3. Telluric currents and naturally alternating magnetic fields 4. Induced polarization method 5. Fundamentals of radioactivity and detection of radiation 6. Common radioactive minerals and prospecting techniques 7. Examples of radioactivity survey		

Course Code	Title	Credits
PSGE302	Paleontology and Micropaleontology	4
Unit I: Paleontology 6. A general account of fossils, organic evolution and systematic paleontology. 7. Grade growth and spatial distribution of organisms. 8. Stratigraphy, paleontology and paleoecology.		
Unit II: Vertebrate fossils 8. Major subdivisions of vertebrates. 9. Outline of morphology and skeletal elements of vertebrates. 10. Geological history of vertebrates. 11. Dinosaurs 12. Evolution of horses and elephants 13. Primates and ancestry of man 14. Record of vertebrate fossils of India		
Unit III: Plant microfossils General morphology of spores and pollen, fossil seeds		
Unit IV: Micropaleontology 8. Introduction to micropaleontology 9. Record of microfossils from Phanerozoic rocks of India 10. Collection, preparation and preservation of microfossils (invertebrate) 11. Foraminifera: foraminifera test, ecology 12. Ostracoda: morphology, ornamentatio and orientation of carapace 13. Conodonts: characteristics of conodonts, origin 14. Radiolaria: applied micropaleontology, environmental significance		

Course Code	Title	Credits
PSGE303	Elective I: Coal Geology	4
Unit I: Origin of Coal Origin and mode of occurrence of coal, chemical and physical constituents of coal		
Unit II: Classification of Coal Classification of coal, structural features of coal seams		
Unit : III: Mining of coal Sampling of coal in mines and in the laboratory: prospecting for coal, methods of coal mining, washing and briquoting, utilization of coal, coal as a source of petroleum		
Unit : IV: Study of Indian coals A detailed study of Indian coal fields with reference to geology, grade of coal, economic reserves and future prospects, problems of the coal industry and its future prospects.		

Course Code	Title	Credits
PSGE303	Elective I: Environmental Geology	4
Unit I: Introduction 1. Introduction to environmental geology. 2. Management of natural resources.		
Unit II: Environment and climate 1. Air pollution and global climate changes. 2. Environmental controls for erosion, desertification and coastal degradation.		
Unit III: Geological hazards and environment 1. Geological hazards such as floods, landslides, earthquakes, volcanoes, glaciers and shoreline processes, their remedial measures. 2. Environmental impact of mining, dams, reservoirs, highways, their assessment and controls. Cleaner sources of energy.		
Unit IV: Man and environment 1. Industrial pollution, waste disposal, groundwater contaminations, river lake and marine pollution and their impact on human health. 2. Geological aspects of human health. Trace elements and health hazards.		

Course Code	Title	Credits
PSGE304	Elective II: Marine Geology	4
Unit I: Ocean Currents Waves, currents, Catastrophic waves from the sea Beaches, Continental Shelves		
Unit II: Landforms of the oceans Continental slopes, Trenches & Canyons		
Unit III: Ocean floor and tectonics Deep ocean floor and various topographic features- ridges, sea mounts Coral reefs		
Unit IV: Ocean sediments and mineral resources Sediments, mineral deposits of sea bed Man & ocean		

Course Code	Title	Credits
PSGE304	Elective II: Petroleum Geology	4
Unit I: Origin of Petroleum 1. Physical and chemical properties of petroleum 2. Origin of petroleum 3. Petroleum traps and reservoirs		
Unit II: Migration and prospecting of petroleum 1. Migration and accumulation of petroleum 2. Geophysical prospecting for petroleum 3. Drilling, logging and subsurface correlation		
Unit III: Sedimentary basins of world and oil belts 1. Oil belts of the world 2. Detailed study of the potential sedimentary basins and oil fields of India		
Unit IV: Petroleum industry of India 1. Petroleum and petrochemical industry in India 2. Synthesis of petroleum, India's position as regards to petroleum and natural gas and future prospects		

Course Code	Note: Practicals depend on the elective chosen.		
PSGEP5	Paleontology Hand identification of fossils from various Phylla (invertebrate fossils only) along with study of their evolution. ********** Micropaleontology Identification of micro fossils of planktic and benthic foraminifera, ostracoda, pteropoda and radiolaria	**4**	**8**
PSGEP6	Geophysical Prospecting Problems and maps related with gravity, electrical and seismic prospecting. ********** Ore Mineralogy Identification and study of origin and Indian occurrence of 20 ore minerals.	**4**	**8**

EXAMINATION

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M.Sc. Geology
SEMESTER III & IV: Recommended Reading

GEOPHYSICAL PROSPECTING

1. Dobrin, Milton B. (1960): Introduction to Geophysical Prospecting, McGraw-Hill Book Company, Inc.
2. Milsom, J. and Asger, E. (2011): Field Geophysics, 4th edition, Wiley and Sons Ltd.
3. Committee on Geodesy, National Research Council (1995): Airborne Geophysics and Precise Positioning: Scientific Issues and Future Directions, National Academics Press
4. Gadallah, M. and Fisher, R. (2009): Exploration Geophysics, Springer-Verlag Berlin Heidelberg.
5. Kalyan Kumar Roy (2008): Potential Theory in Applied Geophysics, Springer-Verlag Berlin Heidelberg.

PALAEONTOLOGY & MICROPALAEONTOLOGY

1. Blatt, Harvey, Middleton, Gerard & Murray, Raymond (1972) Origin of Sedimentary Rocks. Prentice-Hall, Inc., N.J.,U.S.A .
2. Clarkson, E.N.K. (1986) Invertibrate Palaeontology and Evolution. ELBS Allen & Unwin
3. Ellis Moore, R. C. Invertebrate fossils, latest Ed., McGraw Hill.
4. Jenkins, D.G. and Murray J.W., (1981) Stratigraphy of fossils foramimfera.
5. Muller, German (1967) Methods in Sedimentary Petrology. Hafner Publishing Co.
6. Pettijohn, F. J. (1984) Sedimentary Rocks, 3'« edition, CBS Publishers and Distributors, NewDelhi. ,
7. Prothero Donald R. & Schwab Fred (1996) An introduction to Sedimentary Rocks and Stratigraphy. W. H. Freeman and Co. New York.
8. Sengupta, Supriya (1994) Introduction to Sedimentology. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
9. Stow Dorrik A. V. (2005) Sedimentary rocks in the field. Mason Publishing Ltd., U.K.
10. Tucker, Maurice E. (2001) Introduction to Sedimentology. Blackwell Publishing, U.S.A.
11. Tasch, P., (1980) Paleobiology of Invertebrate , John Wiley.
12. Wright, Ramil & Boltovskoy, Esteban (1976) Recent Foraminifera. Dr. W. Junk

b.v.-Publishers- The Hague. University Press, U.K.
13. Banner, F. T. and F. Jord, A.R., (1982) Aspects of micropaleontology. Allen and Unwin.
14. Bignot, G., (1985) Elements of micropaleontology. Graham and Trotman.
15. Cooper J.D., (1986) A trip through time: Principles of historical geology.
16. Dasgupta Amal (2005) An Introduction to Palaeontology. The World Press Pvt. Ltd., Kolkata.
17. Haq, B. and Boersma, A. (1980) Introduction to Marine Paleontology , Elsevier.
18. Horwood. Hughes, Norman F. (1994) The Enigma of angiosperm Origins. Cambridge
19. Jones, Daniel J. (1969) Introduction to Microfossils. Hafner Publishing Co. New York.
20. Raup, David M. & Stanley, Steven M. (1985) Principles of Palaeontology. CBS Publishers and Distributors.. New Delhi.
21. Tucker, V.C.T. & Noeld, E.W. (1985) Palaeontology Pergaman Press.

ENVIRONMENTAL GEOLOGY

1. Aharma, V. K., (1986) Geomorphology Earth surface processes and form McGraw Hill
2. Chorley, R. J., (1984) Geomorphology Methuen.
3. Drury, S. A., 1986, Image Interpretation in Geology Allen & Unwin Inc U K
4. Selby, M.J. (1996) Earths Changing Surface. Oxford University Press UK
5. Thornbury w. D., (199J) Principles of Geomorphology Wiley Eastern Ltd., New Delhi
6. Valdiya, K. S (1987) Environmental Geology - Indian Context. Tata McGraw Hill new Delhi.
7. Keller, E.A., (2000) Environmental Geology latest Ed., 'Shales E. Merril Publishing Co.,Columbus, Ohio.
8. Montgomery, C, (1984) Environmental Geology John Wiley and Sons, London.
9. Bird, Eric (2000) Coastal Geomorphology: An Introduction. John Wiley & Sons, Ltd. Singapore.
10. Hails, John R. (1977) Applied Geomorphology. Elsevier Scientific Publishing Co.New York.
11. Liu, B.C. (1981) Earthquake Risk and Damage Westview.

COAL & PETROLEUM GEOLOGY

1. Coal by E.S.Moore
2. Coal Geology by Van Krevelyn & Schuyer
3. Petroleum Geology by A.I. Levorsen
4. Courses in Mining Geology by R.N.P Arogyaswaml
5. Industrial Minerals and Rocks of India by S.Deb
6. Coal deposits of India by N.L.Sharma