अध्ययन मंडल बैठक दिनांक 28.08.2024

विषय – भूगर्भ शास्त्र

विश्वविद्यालय अन्तर्गत संचालित एम.एस.सी. भू–गर्भशास्त्र प्रोग्राम में केन्द्रीय अध्ययन मंडल द्वारा तैयार किये गये चार वर्षीय स्नातक प्रोग्राम के चतुर्थ वर्ष (VII एवं VIII सेमेस्टर) के पाठ्यक्रम को राष्ट्रीय शिक्षा नीति 2020 के अनुरूप स्नातकोत्तर प्रोग्राम के प्रथम एवं द्वितीय सेमेस्टर में लागू करने हेतु दिनांक 28/08/2024 को आयोजित अध्ययन मंडल की बैठक के कार्यवाही विवरण में संशोधित करते हुए निम्नानुसार अनुशंसा की जाती है:–

Program : M.Sc. Geology									
Course Type	Course Code	Course Title	Paper	Semester	Credits	Max Marks	Min Marks	CIA	ESE
First Semester									
DSC	GESC -07T	Economic Geology - 1: Ore Genesis	T	I	4	100	40	30	70
DSE	GESC-13T	Structural Geology	T	I	3	100	40	30	70
DSE	GESC-13P	Lab Course	P	I	1	50	20	15	35
DSE	GESC-14T	Crystallography & Crystal Optics	T	I	4	100	40	30	70
DSE	GESC-15T	Mineralogy	T	I	3	100	40	30	70
DSE	GESC-15P	Lab Course	P	I	1	50	20	15	35
DSE	GESC-16T	Geo Chemistry and Geodynamics	T	I	4	100	40	30	70
Second Semester									
DSC	GESC -07T	Economic Geology - 2: Ore Deposit	T	I	3	100	40	30	70
DSC	GESC -07P	Lab Course	P	I	1	50	20	15	35
DSE	GESC-17T	Metamorphic Petrology	T	II	4	100	40	30	70
DSE	GESC-18T	Sedimentology and Tectonics	T	II	4	100	40	30	70
DSE	GESC-19T	Igneous Petrology	T	II	3	100	40	30	70
DSE	GESC-19P	Lab Course	P	I	1	50	20	15	35
DSE	GESC-20T	Stratigraphy principle and Indian Geology	T	II	4	100	40	30	70

आज दिनांक 20.09.2024 को भूगर्भ शास्त्र अध्ययन मंडल की ऑनलाईन बैठक में निम्नलिखित अध्यक्ष/सदस्य उपस्थित हुये।

क्र.	नाम	पदनाम	अध्यक्ष/सदस्य	हस्ताक्षर
1.	A. S. JHA	A. P.	CHAIRMAN	

M.Sc. GEOLOGY NEP PROGRAM
DEPARTMENT OF GEOLOGY
COURSE CURRICULUM

PART-A: Introduction			
Program: Masters in Geology		**Semester: I**	**Session:2024-2025**
1	Course Code	**DSC-GESC-**	
2	Course Title	**ECONOMIC GEOLOGY 1: ORE GENEISS**	
3	Course Type	Discipline Specific Course (Theory)	
4	Pre-requisite (if any)	As per Government norms	
5	Course Learning Outcomes (CLO)	On completion of this course, the students will be able to demonstrate the acquisition of: 1) Strategies for developing and implementing an ore-geological project 2) How and where to gather basic geological information and, together with fellow students, how to write a sober report that communicates the required information for investors, clients, and other decision-makers that eventually may sponsor the project	
6	Credit Value	4-Credit	(Credit=15 hours-learning & observation)
7	Total Marks	Max. Marks: 100(70+30)	Min Passing Marks: 40

PART- B: CONTENT OF THE COURSE

Total No. of Teaching-learning Periods (01 hour per period)- 45 Periods (45 Hours)

Unit	**Topics (Course Contents)**	**No. of Period**
I	1.1. Magma, rocks and minerals deposits 1.2 modern concepts of ore genesis. Global perspective 1.3. Processes of formation of mineral deposits - magmatic concentration, contact metamorphism, hydrothermal processes, sedimentation. 1.4. Oxidation and supergene enrichment. Residual and mechanical concentration. 1.5. Active ore forming systems, methods of mineral deposit studies including ore microscopy	15
II	2.1. Concept of ore bearing fluids, their origin and migration 2.2. Fluid inclusion in ores- limitation and application 2.3. Structural, physio-chemical and stratigraphical control of ore localization. 2.4. Texture, paragenesis and zoning in ores. 2.5. Wall rock alteration	15
III	3.1. Ortho magmatic ore of mafic - ultramafic association - Diamond in Kimberlite, REE in Carbonatites 3.2. Ti-V ores, Chromite and PGE, Ni ores 3.3. Cyprus type Cu-Zn ore deposits 3.4. Ore of silicic igneous rocks- Kiruna type Fe-P. Pegamoids, Greisen and Skarn deposits 3.5. Porphyry associations - Zn-Pb-Cu, Malanjkhand type Cu-Mo deposits	15
IV	4.1. Ores of Sedimentary affiliations _ Chemical and Clastic sediments. 4.2. Ores of Metamorphic affiliations. Metamorphism of ores and metamorphogenic ores. 4.3. Ores related to weathered surfaces – Bauxite, Ni and Au laterite. 4.4. Stratiform and Stratabound ore deposits. (Fe, Mn, nonferrous). Placers and paleoplacers.	15

Part - C
Learning Resource: Text Books, Reference Books, Others
Text Books Recommended- 1. Ore Genesis - A Holistic Approach Asoke Mookherjee 1999. Allied publishers 2. Ore Deposits Geology Jhon Ridley Cambridge University Press 3. The Geology of Ore Deposits GUILBERT J.M. 2013 CBS Publisher 4. ECONOMIC MINERAL DEPOSITS, 3RD Edn. Book Selection Centre 5. Economic Geology Economic Mineral Deposits 2Ed (Pb 2019) CBS Publisher **Online Resourses** https://www.mooc-list.com/course/minerals-and-mining-business-edx

PART -D: Assessment and Evaluation -Theory		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Marks Continuous Internal Assessment (CIA): 30 Marks End Semester Exam (ESE): 70 Marks		
Continuous InternalAssessment (CIA): (By CourseTeacher)	Internal Test / Quiz-(2): 20 +20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective **– 10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

PART -D:Assessment and Evaluation -Practical		
Suggested Continuous Evaluation Methods: Maximum Marks: 50 Marks Continuous Internal Assessment (CIA): 15 Marks End Semester Exam (ESE): 35 Marks		
Continuous InternalAssessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks -**15**	Better marks out of the two Test / Quiz +obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** A. Performed the Task based on lab. work - 20 Marks B. Spotting based on tools & technology (written) – 10 Marks **C.** Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:

Signature of Convener & Members (CBoS) :

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Prof. P.S. Gaur – Member

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Miss. Priyank Kashyap - Member

M.Sc. GEOLOGY NEP PROGRAM
DEPARTMENT OF GEOLOGY
COURSE CURRICULUM

PART-A: Introduction			
Program: Masters in Geology		**Semester: I**	**Session:2024-2025**
1	Course Code		
2	Course Title	STRUCTURAL GEOLOGY	
3	Course Type	Discipline Specific Course (Theory)	
4	Pre-requisite (if any)	As per Government norms	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to – 1) Demonstrate the use of Clinometer compass and Brunton compass in measurement of attitude of rock bed. 2) Explain about parts of fold and classify various folds. 3) Recognize and classify the faults in the field and on geological map. 4) Identify and classify Unconformities. 5) Discuss about various types of Joints. 6) Explain various types of foliations and lineation. 7) Identify the top and bottom	
6	Credit Value	3-Credit	(Credit=15 hours-learning & observation)
7	Total Marks	Max. Marks: 100(70+30)	Min Passing Marks: 40

PART- B: CONTENT OF THE COURSE

Total No. of Teaching-learning Periods (01 hour per period)- 45 Periods (45 Hours)

Unit	Topics (Course Contents)	No. of Period
I	**Attitude of rocks, Unconformity and Structure and tectonics:** 1.1. Concept of Line and Plane; Attitude of Plane and a line; Bedding plane; Plunge and trend; Dip and strike and their measurement. 1.2. Criteria for determination of Top & Bottom of sedimentary, metamorphic and igneous rocks in a structurally deformed terrain. 1.3. Unconformity and its type. Onlap. Offlap, Outlier, Inlier and Tectonic Window. 1.4. Structure and tectonics of India.	11
II	**Rock deformation** 2.1 Rock deformation: Stress & strain, their relationship; Factors controlling rock deformation. 2.2 Properties of elastic, plastic and brittle materials 2.3 Strain analysis: types of strain; strain ellipse; strain ellipsoid; geological application of strain theory. 2.4 Stress analysis: compressive and shear stress; biaxial and triaxial stress. Mohr's Circle and envelope.	11
III	**Fold and fault:** 3.1 Fold: Definition; classifications - geometrical and genetic; its types. 3.2 Mechanism of Fold formation. 3.3 Superimposed fold; outcrop pattern of superimposed structure comprising of two-fold system. 3.4 Fault: types and mechanism of faulting; Principal stress orientation for the three main fault types.	11
IV	**Joint, Foliation, Lineation and Cleavage & Schistosity** 4.1 Joints and its types; their analysis and relationship to major structures. 4.2 Cleavage & Schistosity: definition and types 4.3 Lineation: definition and its types; 4.4 Petrofabric Analysis: Field and laboratory techniques; Preparation of petrofabric diagrams and their interpretation.	12

M.Sc. GEOLOGY NEP PROGRAM
DEPARTMENT OF GEOLOGY
COURSE CURRICULUM

PART-A: Introduction			
Program: Masters in Geology		**Semester: I**	**Session:2024-2025**
1	Course Code		
2	Course Title	**LAB. COURSE**	
3	Course Type	Discipline Specific Course (Practical)	
4	Pre-requisite (if any)	As per Government norms	
5	Course Learning Outcomes (CLO)	On completion of Course, the students should be able to – 1) Use of Clinometer compass and Brunton compass. 2) Recognize the folds, faults, unconformities and joints in specimens and models. 3) Completion of outcrops and preparation of Geological cross section and interpretation of geological history.	
6	Credit Value	1-Credit	(Credit=30 hours Laboratory or Field learning/ Training)
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20

Part B: Content of the Course		
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)		
Module	**Topics (Course contents)**	**No. of Period**
Lab./Field Training/ Experiment Contents of Course,	1) Study of Natural Structures in specimens. 2) Study of structures models. 3) Completion of outcrops. 4) Preparation of geological section from simple to complex geological maps and its interpretation. 5) Introductory idea of stereographic projection in structural geology. 6) Survey	30

Part - C
Learning Resource: Text Books, Reference Books, Others
Text Books Recommended- (1) Structural Geology. M.P. Billings. (2) Theory of Structural Geology; Gokhale, N.W. CBS (3) Exercises on Geological maps and dip-Strike: Gokhale, N.W. CBS. (4) Outlines of structural Geology. E.S. Hills. (5) Structural Geology- Hobbs. Means and Williams. (4) Geological maps- Chiplonkar and Pawar. E-resources: 1. https://epgp.inflibnet.ac.in/Home 2. https://archive.org/details/in.ernet.dli.2015.233340/page/n15/mode/2up 3. https://egyankosh.ac.in/ 4. https://sites.google.com/ignou.ac.in/bscgeology 5. SWAYAM-https://swayam.gov.in/explorer?searchtext 6. National digital library https://ndl.iitkgp.ac.in 7. e-PG pathshala (MHRD) portal, https://egpg.inflibnet.ac.in

PART -D: Assessment and Evaluation -Theory		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Marks Continuous Internal Assessment (CIA): 30 Marks End Semester Exam (ESE): 70 Marks		
Continuous InternalAssessment (CIA): **(By CourseTeacher)**	Internal Test / Quiz-(2): 20 +20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

PART -D:Assessment and Evaluation -Practical			
Suggested Continuous Evaluation Methods: Maximum Marks: 50 Marks Continuous Internal Assessment (CIA): 15 Marks End Semester Exam (ESE): 35 Marks			
Continuous InternalAssessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks -**15**	Better marks out of the two Test / Quiz +obtained marks in Assignment shall be considered against **15** Marks	
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** D. Performed the Task based on lab. work - 20 Marks E. Spotting based on tools & technology (written) – 10 Marks **F.** Viva-voce (based on principle/technology) - 05 Marks		Managed by Course teacher as per lab. status

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M.Sc. GEOLOGY NEP PROGRAM
DEPARTMENT OF GEOLOGY
COURSE CURRICULUM

PART-A: Introduction			
Program: Masters in Geology		**Semester: I**	**Session:2024-2025**
1	Course Code		
2	Course Title	**CRYSTALLOGRAPHY & CRYSTAL OPTICS**	
3	Course Type	Discipline Specific Course (Theory)	
4	Pre-requisite (if any)	As per Government norms	
5	Course Learning Outcomes (CLO)	After successfully completing this course, the students will be able to: 1) Explain about the basics of crystallography, various crystal forms, crystallographic axes and symmetry elements. 2) Understand various forms of normal classes of various crystal systems.	
6	Credit Value	4-Credits	(Credit=15 hours-learning & observation)
7	Total Marks	Max. Marks: 100(70+30)	Min Passing Marks: 40

PART- B: CONTENT OF THE COURSE

Total No. of Teaching-learning Periods (01 hour per period)- 45 Periods (45 Hours)

Unit	**Topics (Course Contents)**	**No. of Period**
I	**CRYSTALLOGRAPHY** 1.1 Crystal growth. 1.2. Space lattices and point systems. X-ray analysis of crystal structure. 1.3. Internal structure and Morphology of crystals. Fundamental Laws of Crystallography. 1.4. Symmetry elements. Classification of Crystals in 32 Classes.	15
II	**CRYSTALLOGRAPHY** 2.1 Symmetry and forms of crystals of isometric system 2.2 Tetragonal and hexagonal systems. 2.3 Symmetry and forms of crystals of orthorhombic, monoclinic and triclinic systems. 2.4 Crystal Aggregates, Twinning, Irregularities & Imperfections in Crystals.	15
III	**CRYSTAL OPTICS** 3.1 Principles of transmission and reflection of light from crystals. Classification of minerals according to the interaction of light. Interference. 3.2 Refraction and Refractometry. Methods of determination of R.I. 3.3 Birefringence in Crystals. Significance and use of plates, wedge and Bereck Compensator. Pleochroism in Crystals.	15
IV	**CRYSTAL OPTICS** 4.1 Classification of Crystals into isotropic, Uniaxial and Biaxial minerals and their optical characters. 4.2 Isotropic, uniaxial and biaxial indicatrix. 4.3. Optical Orientation – Extinction angle, Universal stage, Construction & Use. Dispersion in mineral, optic axial angle. 4.4 Systematic determination of optical properties of minerals.	15

Part - C

Learning Resource: Text Books, Reference Books, Others

Text Books Recommended-

1. Gribble,C.D. Rutley'sElementsofMineralogy.CBS,2005.
2. FordW.E.;Dana's TextBookof Mineralogy.CBS, 2006.
3. Perkins, D.; Mineralogy, Prentice HallIndia, 3rded.2012.
4. Rathore, B.S.; BasicsofCrystallography, MineralogyandGeochemistry. Notion Pressin dia,2020
5. Sharma, R.S.andSharma, Anurag; CrystallographyandMineralogyConceptsandMethods. Geol.Soc. Ind., Bengaluru, 2013.

E-resources

1. https://www.mindat.org
2. https://www.mooc-list.com/tags/minerals
3. https://epgp.inflibnet.ac.in/Home
4. https://archive.org/details/in.ernet.dli.2015.233340/page/n15/mode/2up
5. https://egyankosh.ac.in/
6. https://sites.google.com/ignou.ac.in/bscgeology
7. SWAYAM-https://swayam.gov.in/explorer?searchtext
8. National digital library https://ndl.iitkgp.ac.in
9. e-PG pathshala (MHRD) portal, https://egpg.inflibnet.ac.in

PART -D:Assessment and Evaluation -Theory

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks
Continuous Internal Assessment(CIA): 30 Marks
End Semester Exam (ESE): 70 Marks

Continuous InternalAssessment (CIA): (By CourseTeacher)	Internal Test / Quiz-(2): 20 +20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

PART -D:Assessment andEvaluation -Practical

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks
Continuous Internal Assessment (CIA):15 Marks
End Semester Exam (ESE): 35 Marks

Continuous InternalAssessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks -**15**	Better marks out of the two Test / Quiz +obtained marks in Assignment shall be considered against **15** Marks	
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** A. Performed the Task based on lab. work - 20 Marks B. Spotting based on tools & technology (written) – 10 Marks **C.** Viva-voce (based on principle/technology) - 05 Marks		Managed by Course teacher as per lab. status

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M.Sc. GEOLOGY NEP PROGRAM
DEPARTMENT OF GEOLOGY
COURSE CURRICULUM

PART-A: Introduction			
Program: Masters in Geology		**Semester: I**	**Session:2024-2025**
1	Course Code		
2	Course Title	**MINERALOGY**	
3	Course Type	Discipline Specific Course (Theory)	
4	Pre-requisite (if any)	As per Government norms	
5	Course Learning Outcomes (CLO)	After successfully completing this course, the students will be able to: 1) Classify the minerals in various silicate groups and explain their varieties. 2)Understand physical properties of various minerals. 2) Understand optical characteristics of various minerals.	
6	Credit Value	3-Credits	(Credit=15 hours-learning & observation)
7	Total Marks	Max. Marks: 100(70+30)	Min Passing Marks: 40

PART- B: CONTENT OF THE COURSE

Total No. of Teaching-learning Periods (01 hour per period)- 45 Periods (45 Hours)

Unit	Topics (Course Contents)	No. of Period
I	**Mineralogy:** 1.1. Composition of minerals and Mineraloids. 1.2. Physical Properties of Minerals depending on Crystal Growth, Crystal Structure, Chemical Composition and Interaction with light. 1.3. Electrical Magnetic, Luminescence, Thermal and Radioactive Properties of Mineral. 1.4. Structure of Silicates.	11
II	**Mineralogy:** 2.1 Ionic Radius, Coordination Principles, Close Packing, Pauling's Rules. 2.2 Unit Cell, Bonding Forces in crystals Ionic Bond, Covalent Bond, Van Der Waal's Bond, Metallic Bond. 2.3 Solid solution - Substitution, Interstitial and Omission solid solution. Ex-solution. 2.4 Polymorphism, polytypism, pseudomorphism.	11
III	**Classification of Minerals** Systematic Mineralogy of common rock forming silicate groups. 3.1 Nesosilicates – a) Olivine Group b) Garnet Group c) Al2SiO5 Group 3.2 a) Zircon, b) Topaz c) Staurolite d) Sphene. 3.2 Sorosilicate - Epidote 3.3 Cyclosilicates - a) Cordierite b) Tourmaline c) Beryl	11
IV	**Systematic Mineralogy of common rock forming silicate groups.** 4.1 Inosilicates - a) Pyroxene Group Inosilicates b) Amphibole Group 4.2 Phyllosilicates - a) Serpentine Group b) Mica Group c) Chlorite Group d) Clay Mineral Group – Kaolin and Talc, 4.3 Tectosilicates- a) SiO2 Group b) Zeolite Group c) Feldspar Group d) Feldspathoid Group 4.4 Gem and Semi-precious minerals.	12

M.Sc. GEOLOGY NEP PROGRAM
DEPARTMENT OF GEOLOGY
COURSE CURRICULUM

PART-A: Introduction			
Program: Masters in Geology		**Semester: I**	**Session:2024-2025**
1	Course Code		
2	Course Title	**LAB. COURSE**	
3	Course Type	Discipline Specific Course (practical)	
4	Pre-requisite (if any)	As per Government norms	
5	Course Learning Outcomes (CLO)	1. Understand the megascopic properties of Quartz and Feldspar group of minerals 2. Understand the megascopic properties of pyroxene group of minerals 3. Understand megascopic properties of Amphibole group of minerals 4. Describe the megascopic properties of olivine and Mica group of Minerals. 5. Describe microscopic identification of minerals. 6) Understand various crystal Systems and Symmetry through crystal models 7. Assess the miller Indices of the crystal models 8. Identify Twining in crystals 9. Understand crystal optics 10.Understand earthquake and volcano zones	
6	Credit Value	1-Credit	(Credit=30 hours Laboratory or Field learning/ Training)
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20

Part B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
Lab./Field Training/ Experiment Contents of Course,	1) Study of physical properties of minerals. 2) Study of optical properties of important rock forming minerals using polarizing microscope. 3. Morphological study of crystal models and twins. 4.Verification of Euler's theorem 5. Stereographic projection of crystals. 6. Optical determination methods of Refractive Index. 7. Order of Interference colour and birefringence. 8. Interference figure and optic sign. 9. Scheme of pleochroism. 10. Determination of 2V. 11.Seismic zone of India 12.Distribution of volcano and earthquake	30

Part - C

Learning Resource: Text Books, Reference Books, Others

Text Books Recommended-

-Berry, L.G., Mason, B. and Dietrich, R.V. (1982): Mineralogy, CBS Publ.
– Dana, E.S. and Ford, W.E. (2002): A textbook of Mineralogy (Reprint).
– Kerr, P.F. (1977): Optical Mineralogy, McGraw Hill.
– Moorhouse, W.W. (1951): Optical Mineralogy, Harper and row Publ.
– Nesse, D.W. (1986): Optical Mineralogy, McGraw Hill.
– Perkins, D. (1998): Mineralogy, Prentice Hall.
– Winchell, E.N. (1951): Elements of Optical Mineralogy, Wiley Eastern.

PART -D:Assessment and Evaluation -Theory		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Marks Continuous Internal Assessment(CIA): 30 Marks End Semester Exam (ESE): 70 Marks		
Continuous InternalAssessment (CIA): **(By CourseTeacher)**	Internal Test / Quiz-(2): 20 +20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

PART -D:Assessment andEvaluation -Practical		
Suggested Continuous Evaluation Methods: Maximum Marks: 50 Marks Continuous Internal Assessment(CIA):15 Marks End Semester Exam (ESE): 35 Marks		
Continuous InternalAssessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks -**15**	Better marks out of the two Test / Quiz +obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** A. Performed the Task based on lab. work - 20 Marks B. Spotting based on tools & technology (written) – 10 Marks **C.** Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

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M.Sc. GEOLOGY NEP PROGRAM
DEPARTMENT OF GEOLOGY
COURSE CURRICULUM

PART-A: Introduction			
Program: Masters in Geology		**Semester: I**	**Session:2024-2025**
1	Course Code		
2	Course Title	**GEOCHEMISTRY & GEODYNAMICS**	
3	Course Type	Discipline Specific Course (Theory)	
4	Pre-requisite (if any)	As per Government norms	
5	Course Learning Outcomes (CLO)	After successfully completing this course, the students will be able to: 1) Understand Cosmic Abundance of the Elements and Moon. 2) Composition and Classification of Meteorites 3) Geochemical classifications of elements. 4) Understand Trace elements 5) Understand isotopes 6). Understand geochemistry of crust mantle core 7) Understand basics of Geology, Solar system and internal structure of the Earth, origin and age of the Earth 8) Understand the theories of continental drift and plate tectonics 9) Understand causes and effects of earthquakes and explain weathering and its products	
6	Credit Value	4-Credits	(Credit=15 hours-learning & observation)
7	Total Marks	Max. Marks: 100(70+30)	Min Passing Marks: 40

PART- B: CONTENT OF THE COURSE

Total No. of Teaching-learning Periods (01 hour per period)- 45 Periods (45 Hours)

Unit	Topics (Course Contents)	No. of Period
I	**GEOCHEMISTRY** 1.Cosmic Abundance of the Elements and Nucleosynthesis. Geology and Chemistry of Moon. 2. Composition and Classification of Meteorites, Chondrules, Chondrites and Achondrites. 3. Geochemical classifications of elements. 4 Trace, Volatile, Semi volatile, Alkali and Alkaline earth elements. REE and Y, HFSE elements. Transition & Noble elements.	15
II	**GEOCHEMISTRY** 1. Basics of radiogenic isotope geochemistry. Scope of stable isotope geochemistry. 2. Fundamental Thermodynamic Equations. Free energy. Phase equilibrium and Gibb's Phase Rule. Thermodynamics of magmatic Crystallization. 3. Geochemistry of continental and Oceanic Crust. 4. Composition of Mantle. Phase transition in the Mantle. Primitive mantle and mantle differentiation. Mantle Plume. Formation of Core. Eutrophication	15
III	**GEODYNAMICS** 4.1 Origin of Solar System and Theories & Hypothesis related to them 4.2 Interior of the Earth, Age of the Earth 4.3 Continental Drift, Plate Tectonics 4.4 Mid Oceanic ridges, Island Arc, Sea floor spreading	15
IV	**GEODYNAMICS** 1. Isostasy 2. Earthquake – origin, intensity & magnitude, scale, theories related to earthquake generation, distribution of earthquake with special reference to India 3. Volcano – products, types and their distribution in world with special reference to India 4. Orogeny, Epeirogeny	15

Part - C

Learning Resource: Text Books, Reference Books, Others

Text Books Recommended-

- Drever, J. I., 1988. The Geochemistry of Natural Waters, Prentice Hall, Englewood Cliffs, 437 p.
- Garrels, R. M. and C. L. Christ. 1965. Solutions, Minerals and Equilibria. New York: Harper and Row.
- Burns, R. G. 1970. Mineralogical Applications of Crystal Field Theory. Cambridge: Cambridge Univ. Press.
- Henderson, P. 1986. Inorganic geochemistry. Oxford: Pergamon Press.
- Brownlow, A. H. 1996. Geochemistry. New York: Prentice Hall.
- Krauskopf, K. B. and D. K. Bird. 1995. Introduction to Geochemistry. New York: McGraw-Hill.
- Bowen, R. 1988. Isotopes in the Earth Sciences, Barking (Essex): Elsevier Applied Science Publishers.
- Condie, K. C. 1989. Plate Tectonics and Crustal Evolution. Oxford: Pergamon.
- Faure, G., 1986. Principles of Isotope Geology, 2nd ed., Wiley & Sons, New York, 589p.
- Drever, J. I., 1988. The Geochemistry of Natural Waters, Prentice Hall, Englewood Cliffs, 437 p.
- Garrels, R. M. and C. L. Christ. 1965. Solutions, Minerals and Equilibria. New York: Harper and Row.
- White, W. M. Geochemistry (Online)

-Holmes, A. Doris L Holmes Edit., Principles of Physical Geology, Van Nostrand Reinhold, 1978.

- Mahapatra, G.B., Text book of Physical Geology, CBS, India, 2018
- Mathur, S.M., Physical Geology of India, NBT India, 1991
- Miller, William J., Physical Geology: An Introduction. D Van Nostrand Co., 5th Ed., 1949
- Mukerjee, P.K., Text Book of Geology. World Press Private Ltd, 2013.

-Thornbury, W.D., Principles of Geomorphology. New Age International, 2nd Edition, 196

- Principles of Geomorphology: A.F. Ahmad

PART -D:Assessment and Evaluation -Theory

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks
Continuous Internal Assessment(CIA): 30 Marks
End Semester Exam (ESE): 70 Marks

Continuous InternalAssessment (CIA): (By CourseTeacher)	Internal Test / Quiz-(2): 20 +20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

PART -D:Assessment andEvaluation -Practical

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks
Continuous Internal Assessment (CIA):15 Marks
End Semester Exam (ESE): 35 Marks

Continuous InternalAssessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks -**15**	Better marks out of the two Test / Quiz +obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** A. Performed the Task based on lab. work - 20 Marks B. Spotting based on tools & technology (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:

Signature of Convener & Members (CBoS) :

Prof. A.S. Jha -Chairman

Dr Rajiv Guhe – Member

Dr Prashant Shirvastav- Member

Prof. P.S. Gaur – Member

Dr. K.R. Hari – Member

Dr Ninand Bodhankar - Member

Miss. Priyank Kashyap - Member