Syllabus

B.Sc. Programme
(Subject – Geology)

Department of Applied Geology
Dr. Harisingh Gour Vishwavidyalaya
Sagar (M.P.)

Board of Studies Meeting 16th Aug., 2019

2019-20

Syllabus – B. Sc. (Geology) 2019-20

I Semester

Course no.	Course Name	MM	L	T	P	C
GEO-CC 111	General Geology, Geomorphology and Geodynamics	100	4	0	0	4
GEO-CC 112	Geology Lab & Field Work	100			2	2
			Total Credits			6

II Semester

Course no.	Course Name	MM	L	T	P	C
GEO-CC 211	Crystallography, Crystal Optics and Mineralogy	100	4	0	0	4
GEO-CC 212	Geology Lab & Field Work	100			2	2
			Total Credits			6

III Semester

Course no.	Course Name	MM	L	T	P	C
GEO-CC 311	Igneous, Sedimentary and Metamorphic Petrology	100	4	0	0	4
GEO-CC 312	Geology Lab & Field Work	100			2	2
GEO-SEC 311	Photo Geology and Remote Sensing	100	2	0	0	2
			Total Credits			8

IV Semester

Course no.	Course Name	MM	L	T	P	C
GEO-CC 411	Structural Geology and Tectonics	100	4	0	0	4
GEO-CC 412	Geology Lab & Field Work	100			2	2
GEO-SEC 411	Geomorphology and Geotectonics				2	2
			Total Credits			8

V Semester (Maximum Marks: 100)

Course no.	Course Name	MM	L	T	P	C
GEO-EC 511*	Indian Stratigraphy	100	3	0	0	3
GEO-EC 512*	Palaeontology	100	3	0	0	3
GEO-EC 513	Geology Lab & Field Work	100			2	2
GEO-SEC511	Environmental Geology	100			2	2
			Total Credits			10

VI Semester Syllabus (Maximum Marks: 100)

Course no.	Course Name	MM	L	T	P	C
GEO-EC611*	Earth Resources	100	3	0	0	3
GEO-EC 612	Geology Lab & Field Work	100			2	2
GEO-EC 613*	Applied Geology	100	3	0	0	3
GEO-SEC611	Geochemistry	100			2	2
	L= Lecture, T= Tutorial, P= Practical, C= Credits		Total Credits			10

Total Credits - 48

***Beacause GEO EC 511 & GEO EC 512 in 5th Semester & GEO EC 611 & GEO EC 613 are essential for B. Sc. Geology studentds , the these electives are kept mendatory.**

SEMESTER – I

Core Course: Geology I
Theory (Credits 4, Lectures: 60, M.M. 100= 60 end sem. + 40 sessional)

GEO-CC 111 General Geology, Geomorphology and Geodynamics

Unit 1

Introduction Geology and it's perspectives. Pure and applied branches of geology: scopes and applications. Earth- in the solar system. Size, shape, mass and density of the earth. Origin of the earth. Radioactivity. Age of the earth. Interior of the earth-crust, mantle and core. **(Lectures 12)**

Unit 2

Basic concepts of Geomorphology, Definition and scope, Geomorphic agents, processes and land forms, weathering - physical, chemical, biological. Soil- Formation, Types of soils. **(Lectures 12)**

Unit 3

Geological work of rivers and fluvial landforms, Geological work of wind and Aeolian landforms. Geological work of glaciers and Glacial landforms. Geological work of groundwater. Karst topography. Geological work of oceans and Coastal landforms. Representation of landforms by various methods, volcanic landforms.

(Lectures 12)

Unit 4

Earthquakes-distribution causes and effects, Volcanoes- types and distribution, Concept and theories of Isostasy, Origin of oceans, continents and mountains, Concept of plate tectonics. **(Lectures 12)**

Unit 5

Continental drift, Nature and types of plate margins, Evidences of sea floor spreading, Mid-oceanic ridges and trenches, Origin and distribution of Island arcs, Concept of palaeomagnetism, Application of palaeomagnetism. **(Lectures 12)**

GEO CC 112 Geology Lab & Field Work
(Credits 2; 30 Hrs Lab work + 30 Hrs Field work = 60 Hrs M.M. 100= 60 end sem. + 40 sessional)

Study of Physical models showing geomorphic features, (Configuration and Numbering of Topographic maps on various scales). Interpretation of various geomorphic landforms and drainage patterns map exercise; Plotting of major mountain ranges, lakes and rivers on the map of India. Plotting of seismic data on the map in India.

Field Work (3 to 4 days).

Essential Reading:

1- Thornbury W. D., (1958) **Principles of Geomorphology** John Wiley and Sons.
2- Mukherjee P. K., (1991) **A Text Book of Geology** CBS Publisher and Dist., New Delhi.
3- Homes A., (1993) Principle of **Physical Geology** 4th Ed., Chapman and Hall, London.
4- Datta A. K., An introduction to **Physical Geology** –Dastane Ramchandra and Co. Pune.

Suggested Reading:

1. Chiplonkar G.W. and Powar K.B. (1979) **Geological Maps**.
2. Lahee, (1961) **Field Geology** Frederic Henry, Mc-Graw Hill Book Comp., London, N. York.
3. E-content on the website:cec.gov.in

SEMESTER - II

Core Course: Geology II
Theory (Credits 04, Lectures: 60 M.M. 100 = 60 end sem. + 40 sessional)

GEO-CC 211 Crystallography, Crystal Optics and Mineralogy

Unit 1

Concept of Crystallography. Definition of crystal, Elementary ideas about crystal structure, Crystal faces, edges and interfacial angles, Solid angle, zone and crystal forms, Crystallographic axes and axial angles, Parameters and indices of crystal notations, Crystal symmetry elements, Twinning in crystals, Chemical bonding, Silicate structures, Isomorphism, Polymorphism, Pseudomorphism and Solid solution, Physical properties of minerals- form, colour, streak, lusture, cleavage, fracture, and hardness. Specific gravity, electrical, magnetic and radioactive properties of minerals. **(Lecture 15)**

Unit 2

Classification of crystals into seven systems, Study of symmetry of normal classes of crystal systems, Study of forms of normal classes, Silicate structures and classification.

(Lectures 15)

Unit 3

Wave Optics, Ordinary and polarized light, isotropic and anisotropic minerals, their wave surfaces and wave fronts, Reflection and refraction of light, Refractive index, critical angle, total internal reflection and Becke's effect, Double refraction, Nicol Prism its construction and working. Optical properties under microscope: Petrological microscope- its parts and functioning, Optical properties of minerals-twinkling, birefringence and pleochroism, Interference colours, Extinction angle and twinning.

(Lectures 10)

Unit 4

Definition of mineral. Classification of minerals, chemical composition, physical and optical properties of the following group of minerals: - Silica, Feldspar and Feldspathoid**,**

(Lectures 10)

Unit 5

Amphibole, Pyroxene and Olivine, Garnet and Mica, Tourmaline, Epidote, Zircon, Chlorite and Serpentine, Apatite, Sphene, Staurolite, Kyanite, Sillimanite and Zeolite. **(Lectures 10)**

GEO-CC 212 Geology Lab & Field work
(Credits 2; 30 Hrs Lab work + 30 Hrs Field work = 60 Hrs M.M. 100= 60 end sem. + 40 sessional)

Study of symmetry elements in crystal models, Study of Fundamental forms of normal classes of all crystal systems, Verification of Euler's theorem, Study of Physical properties of rock forming minerals, Study of the optical properties of important rock forming minerals using polarizing microscope.

Field Work (3 to 4 days)

Essential Reading:

1. Read, H.H. (1962) Rutley's **Elements of Mineralogy** Reprint CBS Pub. & Dist., New Delhi
2. Ford W. E., (2006) Dana's Text Book of **Mineralogy** CBS Pub. & Dist., New Delhi

Suggested Reading:

4. Alexander P. O. (2008), Handbook of **Minerals, Crystals, Rocks and Ores**, New Age India.
5. Thomas, H. (2018) MOOC on Crystallography & Mineralogy
6. E-content on the website:cec.gov.in

SEMESTER - III

Core Course: Geology III

Theory (Credits 04, Lectures: 60 M.M. 100= 60 end sem. + 40 sessional)

GEO-CC 311 Igneous, Sedimentary and Metamorphic Petrology

Unit I

Introduction: Scope of igneous petrology, Structures and textures of igneous rocks and their significance. Magma: Origin, composition and classification. Classification of igneous rocks; important IUGS classification, chemical and mineralogical classification. Bowen's reaction principles and its role in the crystallization of magma. **(Lectures12)**

Unit II

Factors causing diversity in igneous rocks, assimilation and differentiation. Crystallization of the basaltic magma in relation to the following systems: Albite-Anorthite (b) Diopside-Anorthite (c) Forsterite-Fayalite (d) Diopside-Albite-Anorthite. **(Lectures 12)**

Unit III

Introduction: Physical and chemical weathering processes, Sedimentary origin, transportation and deposition in marine environments and continental environments. Concept of lithification, diagenesis and basic concept of sedimentary. Structure and classification: Structures and textures of sedimentary rocks and their significance. Classification of sedimentary rocks. **(Lectures 12)**

Unit IV

Introduction: Definition, variables/agents and types/kinds of metamorphism. Metamorphic grade; Structure and classification of metamorphic rocks. Concept of classification of metamorphic facies and facies series. Facies: Description of facies; Facies of low pressure and medium to high pressure, with special reference to characteristic minerals; subdivision into Zones/Subfacies and mineral assemblages, Regional metamorphism of pelitic rocks and thermal metamorphism of calcareous rocks. **(Lectures 12)**

Unit V

Distribution of igneous rocks in India, megascopic and microscopic studies of following rocks, Granite, Granodiorite, Syenite, Diorite, Pegmatite, Gabbro, Dolerite, Pyroxenite, Peridotite, Dunite, Basalt, Rhyolite and Nepheline syenite.

Study of different types of metamorphic rocks: slate, talc, phyllite, schist, gneiss, amphibolites, charnockite and granulite.

Study of different types of sedimentary rocks: Sandstone, Conglomerate, Shale, Clay and Breccia. **(Lectures 12)**

GEO-CC 312 Geology Lab & Field work

(Credits 2: 30 Hrs Lab work + 30 Hrs Field work = 60 Hrs M.M. 100= 60 end sem. + 40 sessional)

Megascopic study of igneous, metamorphic and sedimentary lithotypes: Granite, Granodiorite, Syenite, Diorite, Pegmatite, Rhyolite. Gabbro, Dolerite, Basalt, Pyroxenite, Dunite and Peridotite Sandstone, Conglomerate, limestone, Shale, Clay, Breccia, and Slate, Phyllites, Schist, Gneiss, Marble, Amphibolite, Charnockite and Granulites. Identification of

texture of igneous rocks: intergrowth, porphyritic, reaction rims, perthitic and their petrogenetic significance. Identification of textures in sedimentary rocks and their petrological significance and Identification of microstructure, textures in metamorphic rocks and their petrological significance. Microscopic study of igneous, metamorphic and sedimentary lithotypes: Granite, Granodiorite, Syenite, Diorite, Pegmatite, Gabbro, Dolerite, Pyroxenite, Dunite, Basalt, Rhyolite Sandstone, Conglomerate, Shale, Clay, Limestone, Breccia and Slate, Phyllites, Schist, Gneiss, Amphibolite, Charnockite and Marble.
Field Work (3 to 4 days)

Essential Reading:

1. Mason, R., (1978) **Petrology of Metamorphic Rocks** CBS Pub. & Dist., New Delhi
2. Blatt H., Middleton G. and Murray R. (1972), Origin of **Sedimentary rocks** Prentice Hall
3. Best M.G. (2002), **Igneous and Metamorphic Petrology** Wiley-Blackwell Science.
4. Bose, Mihir K., (1997), **Igneous Petrology** World Press Pvt. Ltd., Calcutta, p.568.
5. Winter John D (2012), **Principles of Igneous and Metamorphic Petrology** 2nd Edition, PHI Learning Private Limited New Delhi
6. Pettijohn, F. J. (1957.), **Sedimentary rocks** 3rd Ed *Oxford* and IBH *Publishing Company, New Delhi*
7. *T*homas, H. (2016) MOOC on Petrology, SWAYAM.GOV.IN
8. E-content on the website:cec.gov.in

Suggested Reading:

9. Carmichael, I. S. E., Turner, F. J. and Verhoogen, J (1971): **Igneous Petrology** Mc Graw Hill
10. Winkler, H. G.F. (1967) **Pathogenesis of Metamorphic Rocks** Springer–Verlag. /Narosa publication, New Delhi
11. Tyrell, G. W., (1963) Principles **of Petrology**, Methuen.
12. Blatt, H. and Tracy, R.J. W.H. (1996), **Petrology (Igneous, Sedimentary and, Metamorphic** Freeman and Co., New York.
13. Mason, R., (1978) **Petrology of Metamorphic Rocks** CBS Pub. & Dist., New Delhi
14. V.K. Verma and Prasad C (1981). A text book of **Sedimentary Petrology** Inter. Book Dist. New Delhi
15. Ehlers, E.G. and Blatt, (1982), **Igneous, Sedimentary and Metamorphic Petrology** CBS Pub. & Dist., New Delhi
16. Alexander, P.O., (2008) Handbook of **Minerals, Crystals, Rocks and Ores**. New Delhi.
17. E-content: Available at http://cec.nic.in/e-content/Pages/default.aspx

GEOC SEC-311 Photo Geology and Remote Sensing

(Credits 2: 30 Hrs M.M. 100= 60 end sem. + 40 sessional)

Unit-I: Elementary idea about photogeology: electro-magnetic spectrum, types & geometry of aerial photographs; factors affecting aerial photography; types of camera, film and filters; factors affecting scale;

Unit-II: Fundamentals of remote sensing; remote sensing systems; remote sensing sensors; signatures of rocks, minerals and soils.

Unit-III: Application of remote sensing in geosciences and geomorphological studies.

Unit-IV: Types of Indian and Foreign Remote Sensing Satellites, Digital image processing; fundamental steps in image processing; elements of pattern recognition and image classification.

Unit-V: Introduction to Geographic Information System (GIS); components of GIS; product generation in GIS; tools for map analysis; integration of GIS with remote sensing.

Books Recommended:

1. Bhatta, B., 2008. Remote Sensing and GIS. Oxford, New Delhi.
2. Gupta, R.P., 1990. Remote Sensing Geology. Springer Verlag.
3. Lilleasand, T.M. and Kiffer, R.W., 1987. Remote Sensing and Image Interpretation. John Wiley.
4. Pandey, S.N., 1987. Principles and Application of Photogeology. Wiley Eastern, New Delhi.
5. Sabbins, F.F., 1985. Remote Sensing – Principles and Applications. Freeman.
6. Siegal, B.S. and Gillespie, A.R., 1980. Remote Sensing in Geology. John Wiley.
7. Rampal K.K. 1999. Hand book of aerial photography and interpretation. Concept publication.

SEMESTER – IV

Core Course: Geology IV
Theory Credit 4, Lectures: 60 M.M. 100= 60 end sem. + 40 sessional)

GEO-CC 411 - Structural Geology and Tectonics

Unit I

Introduction to Structural Geology, classification, Primary and Secondary structures of igneous, sedimentary and metamorphic rocks, Unconformity, classification and Recognition Joint morphology, geometric and genetic classification of joints. **(Lectures 12)**

Unit II

Elements of Fold, Classification. Effect on the various rock type and Criteria for recognition in map and in field. **(Lectures 12)**

Unit III

Elements of Fault, Classification, effect of fault on various strata and criteria for Recognition of fault. **(Lectures 12)**

Unit IV

Foliation and Lineation- descriptive terminology, kinds, origin and relation of foliation and lineation to major structures. Concept of rock deformation, Concept of stress and strain ellipsoids, Plastic deformation. **(Lectures 12)**

Unit V

Concept of tectonics, Elementary idea of mechanics of folding. Elementary idea of mechanics of faulting, Tectonic framework of Peninsular India, Tectonic framework of Extra-peninsular India, Tectonic framework of Indo-Gangetic plain. **(Lectures 12)**

GEO-CC 412 Geology Lab & Field work

(Credits 2; 30 Hrs Lab work + 30 Hrs Field work = 60 Hrs M.M. 100= 60 end sem. + 40 sessional)

Study of geological maps and symbols Measurement of dip and strike using clinometer compass. Measurement of dip and strike using Brunton compass,Interpretation and drawing of sections of simple geological maps. Three point exercise and completion of outcrops, Study of primary sedimentary and igneous structures. Geological cross sections, and identification of structures, fault, dyke, unconformity etc. Structural in Hand specimen.

Field Work (3 to 4 days)

Essential Reading:

1. Ghose S. K. (1985) **Structural Geology** (1985)
2. J. G. Ramsay, (1967) **Folding and Fracturing of Rocks**. (1967)Academic Press.
3. A.K. Jain, 2014, **An Introduction to structural Geology Geol**. Soc. of India, Bangalore.(2014

4. K.S.Valding (1980) **Geology of Kumaun Himalaya** Himachal Times Press, Dehradun.(1980)
5. Billing,M.P. (1974) **Structural Geology** (3rd Ed.) Pranctice Hall

Suggested Reading

6. Ramsay J.G. and Hubg, M. (1983) **Modern Techniques of Structural Geology**, Academic Press London, New York.
7. **Sturctural Geology**, by D.Sitter (1950)
8. E-content on the website:cec.gov.in

GEOC SEC-411: Geomorphology and Geotectonics

(Credits 2; 30 Hrs M.M. 100= 60 end sem. + 40 sessional)

Unit-I: Basic principles of Geomorphology, geomorphological cycles, weathering and erosion; geomorphic mapping- tools and techniques.

Unit-II: Epigene/exogenic processes: degradation and aggradation. Hypogene/endogenic processes; Extraterrestrial processes; Diastrophism and volcanism.

Unit-III: Geological work of wind, glacier, river, underground water and ocean.

Unit-IV: Plate Tectonics: the concept, plate margins, orogeny, deep sea trenches, island arcs and volcanic arcs.

Unit-V: Earth as a dynamic system. Elementary idea of continental drift, sea-floor spreading and mid-oceanic ridges. Paleomagnetism and its application.

Books Recommended:

1. Allen, P., 1997. Earth Surface Processes. Blackwell
2. Bloom, A.L., 1998. Geomorphology: A systematic Analysis of Late Cenozoic Landforms (3rd Edition). Pearson Education, Inc.
3. Keary, P. and Vine, F.J., 1997. Global Tectonics. Blackwell and crustal evolution. Butterworth-Heinemann.
4. Kale, V.S. and Gupta, A., 2001. Introduction to Geomorphology. Orient Longman Ltd.
5. Moores, E and Twiss. R.J., 1995. Tectonics. Freeman.
6. Patwardhan, A. M., 1999. The Dynamic Earth System. Prentice Hall.
7. Summerfied, M.A., 2000. Geomorphology and Global tectonic. Springer Verlag.
8. Valdia, K.S., 1988. Dynamic Himalaya. Universities Press, Hyderabad.
9. WD Thornbury, 2002. Principles of Geomorphology. CBS Publ. New Delhi.
10. E-content on the website:cec.gov.in

SEMESTER – V

Discipline Specific Elective Course

Theory (Credits 3, Lectures: 45 M.M. 100= 60 end sem. + 40 sessional)

GEO-EC 511 Indian Stratigraphy

Unit - I

Laws of Stratigraphy; concept of uniformitarianism, law of order of superposition, law of faunal succession, law of original horizontality, law of cross-cutting relationship, physical and biological criteria of correlation and homotaxis. Study of facies and Walther's law of facies succession. **(Lectures 09**)

Unit - II

Time scale; standard stratigraphic time scale. Indian geological time scale, imperfections in geological records- breaks in stratigraphic records, unconformity, diastems. Stratigraphic classification: Biostratigraphy, lithostratigraphy, chronostratigraphy. Physiographic divisions of India-major Stratigraphic divisions of India. Sargur supracrustals, Granulite succession of south India, Bundelkhand Granites and Supra-crustal sequence. Eastern Ghat Group. Bhilwara Super group. **(Lectures 09)**

Unit -III

Brief study of Singhbhum craton, Bastar Craton, Central India Craton, Sausar, Sakoli,Chilpi Groups. Dharwar Supergroup- Aravalli Supergroup. Late Precambrian Stratigraphy: Delhi Supergroup, Mahakoshal Supergroup Cudappah Supergroup,Bijawar, Gwalior, Kaladgi, Bhima, Kurnool, Indravati, Kolhan, Vindhyan Super group. Chattisgarh supergroup, Purana rocks of Pranhita -Godavari valley, and Marwar Supergroup of Rajasthan. **(Lectures 09)**

Unit - IV

Distribution of Paleozoic rocks in India, Cambrian of Salt Range, Age of Saline Series, Upper Carboniferous and Permian rocks of Salt Range, Paleozoic rocks of Kashmir Valley, Paleozoic rocks of Spiti Valley, Paleozoic rocks of Peninsular India, Mesozoic Stratigraphy: The Depositional Environment-distribution-life-classification and economic importance of Gondwana formations of India, Coastal Gondwana of India,Triassic of Spiti – The Lilang System. **(Lectures 09)**

Unit - V

Jurassic of Kutch, Cretaceous of Tiruchirapalli – Pondicherry – Bagh Beds, Deccan traps: distribution, structure, Lameta beds Infratrapean and Intertrappean beds, age of the Deccan Traps. Cenozoic Stratigraphy: Comprehensive account of the geological events took place during Cenozoic Era in India, rise of Himalaya, Stratigraphy of Siwalik system, fauna and flora of Siwaliks, Tertiary rocks of Assam, Karewa Formation, and Tertiary rocks of the East coast of India. Tertiary rocks of West coast of India Pleistocene Glaciation – Cenozoic oil bearing formations of India. **(Lectures 09)**

SEMESTER – V

Discipline Specific Elective Course
Theory (Credits 3, Lectures: 45)

GEO-EC 512 Palaeontology

Unit - I

Introduction to Palaeontology, Elementary ideas about origin of life and fossil record, Modes of fossilization, Types and uses of fossils. **(Lectures 09)**

Unit - II

Morphology, classification and geological distribution of Graptolites, Lamellibranchia and Gastropoda. **(Lectures 09)**

Unit - III

Morphology, classification and geological distribution of Cephalopoda, and Trilobites. **(Lectures 09)**

Unit - IV

Morphology, classification and geological distribution of Brachiopoda and Rugose Corals. **(Lectures 09)**

Unit - V

A brief outline of Vertebrate Palaeontology. Micropalaeontology and Palaeobotany. Basic ideas about micropalaeontology and microfossils. Uses of Microfossils. Foraminifera, their wall composition, morphology. **(Lectures 09)**

GEO-EC 513 Geology Lab & Field Work
(Credits 2; 30 Hrs Lab work + 30 Hrs Field work = 60 Hrs M.M. 100= 60 end sem. + 40 sessional)

Detailed study of the following fossils in hand specimens:

- Foraminifera : *Nummulites.*
- Coral : *Calceola, Zaphrentis*
- Lamellibranchia : *Gryphea, Pecten, Venus, Cardita, Arca, Trigonia, Cyprea, Ostrea.*
- Gastropoda : *Conus, Physa, Murex, Natica, Cyprea, Trochus, Turritella, Cerithium.*
- Cephalopoda : *Orthoceras, Nautilus, Perisphinctes, Goniatites, Ceratites*, *Belemnites, Hoplites, Hildoceras.*
- Brachiopoda : *Lingula, Rafinesquina, Chonetes, Productus, Spirifer, Terebratula, Rhynchonella, Rhynchotrema, Syringothyris*,
- Triobita : *Calymene, Paradoxides, Phacops, Trinucleus, Olenellus*
- Graptolites : *Monograptus, Diplograptus, Cyclograptus, Phyllograptus.*

Field Work (3 to 4 days)

Essential Reading:

1. Woods, H. (1963) **Palaeontology Invertebrate** CBS Pub. & Dist., (Low Price Edition) New Delhi. P.
2. Black, Rhona M. (1989) **Elements of paleontology** 2nd Ed. Cambridge University Press.
3. Kathal, P K (2012) **Applied Geological Micropaleontology** Scientific Publ., New Delhi, 203p.
4. Kathal, P. K. (1998) **Applications of Microfossils** CBS Publishers & Distributors, New Delhi, 198p.

Suggested Reading:

5. P.C. Jain and M.S. Anant Raman (2000). **An introduction to Invertebrate Palaeontology**, Vishal Pub.Jalandhar, 346P.

GEO-SEC 511 Environmental Geology
(Credits 2; 30 Hrs M.M. 100= 60 end sem. + 40 sessional)

Unit-I: Earth and its spheres: atmosphere, hydrosphere, lithosphere, biosphere and Man; Earth Material.

Unit-II: Energy budget: Solar radiation; Global environments: coastal, riverine, desertic, tropical, cold, polar; Concept of global warming and climate change.

Unit-III: Geoloigcal hazards: Earthquakes, volcanism, landslides, avalanches, floods, droughts; Hazard mitigation.

Unit IV: Resource Management: Energy resources (Conventional and non-conventional)

Unit V: Wwatershed management, landuse planning, management of water resources, land reclamation.

Books Recommended:

1.Verma, V.K., 1986. Geomorphology Earth surface processes and form. McGraw Hill.

2.Chorley, R. J., 1984. Geomorphology. Methuen.

3.Selby, M.J., 1996. Earths Changing Surface. Oxford University Press UK.

4.Thornbury W. D., 1997. Principles of Geomorphology Wiley Eastern Ltd., New Delhi.

5. Valdiya, K. S., 1987. Environmental Geology - Indian Context. Tata McGraw Hill New Delhi. 6. Keller, E. A., 2000. Environmental Geology. Shales E. Merril Publishing Co., Columbus, Ohio.

7. Montgomery, C., 1984. Environmental Geology. John Wiley and Sons, London.

8. Bird, Eric, 2000. Coastal Geomorphology: An Introduction. John Wiley & Sons, Ltd. Singapore.

9.Liu, B.C., 1981. Earthquake Risk and Damage, Westview.

SEMESTER – VI

Discipline Specific Elective Course:

Theory (Credits 3, Lectures: 45 M.M. 100= 60 end sem. + 40 sessional)

GEO-EC- 611 - Earth Resources

Unit 1

Historical development of economic Geology. Geochemical distribution of elements. Materials of mineral deposits. ore minerals, gangue minerals, tenor & grade of ores, ore shoots & bonanzas. Classification of mineral deposits. Outline of Lindgren's & Bateman's classification. Syngenetic & epigenetic deposits. structural, stratigraphic, physical & chemical controls on ore localization: Metallogenic epochs & provinces. Geologic thermometers. **(Lectures 09)**

Unit 2

Mode of Formation of Mineral Deposits Magmatic processes: Mode of formation; Early magmatic processes & deposits, dissemina-tions, segregations and injections; Late magmatic processes & deposits; Residual liquid segregation & injection; immiscible liquid segregation & injection; sublimation. Contact Metasomatic processes; process & effects; resulting mineral deposits. Hydrothermal proce-sses; principles; Factors affecting deposition; wall rock alteration; minerals sequence; cavity filling deposits Fissure veins, shear; zone, stock work, saddle reef, ladder vein, fold cracks, breccia filling, solution cavities, pore space & vesicular filling; replacement deposits; process & deposits; criteria of replacement. **(Lectures 09)**

Unit 3

Sedimentary processes & cycles; principles involved in sedimentation; cycles of Iron & manganese, weathering processes; principles; Residual concentration process & deposits; mechanical concentration principles; eluvial, alluvial, beach & eolian placers. Oxidation & supergene sulphide enrichment; solution and deposition in zone of oxidation; secondary sulphide enrichments; Gossans & capping. Metamorphic processes; Formation of Graphite, Asbestos, Talc, Soapstone & Sillimanite group of minerals. **(Lectures 09)**

Unit 4

Metallic Mineral Deposits of India with reference to thin mode of occurrence, Diagnostic physical properties, chemical composition, uses, modes of occurrence & distribution in India of following: 1) Economic Minerals: Gold, Silver, Copper, Lead, Zinc, Iron, Manganese, Chromium, Tin, Aluminium; 2) Radioactive metals: Thorium, Uranium, Titanium; 3) Industrial Minerals: Asbestos, Barite, Graphite, Gypsum and Mica; 4) Abrasives: Diamond, Corundum, Emery garnet, Abrasive sand, Tripoli, Pumice, Sand feldspar, Limestone, Clay, Talc; 5) Refractories: fireclay, graphite, Dolomite & sillimanite group of minerals, diaspore, pyrophillite, zircon; 6) Ceramic minerals: Clay, Feldspar, Wollastonite; 7) Gemstones;
(Lectures 09)

Unit 5

Fossil fuels: coal and lignite, uses, classification, constitution, origin and distribution in India. Petroleum- composition, uses, theories of origin, oil traps, & important oil fields of India. A brief account of mineral deposits in Beacs Sand of Kerala. Significance of minerals in National Economy. Strategic, critical & essential minerals. Mineral wealth of Madhya Pradesh Environmental impact of mineral exploration. **(Lectures 09)**

Essential Reading:

1. Gokhale and Rao **Ore deposits of India**.
2. Jensen and Bateman A.M. – **Economic Mineral Deposits**,
3. Krishnaswamy, S. **Indian Mineral Resources**

Suggested Reading:

4. Park and Macdiarmid -**Ore Deposits**
5. Umeshwer Prasad- **Economic geology**

GEO-EC 612 Geology Lab & Field work

(Credits 2: 30 Hrs Lab work + 30 Hrs Field work = 60 Hrs M.M. 100= 60 end sem. + 40 sessional)

Megascopic identification and description of Indian occurrences and uses of the ore and industrial Minerals: Sulphides: Realgar, Orpiment, Stibnite, Molybdenite, Galena, Sphalerite, Chalcophyrite, Pyrite, Arsenopyrite, Marcasite. Sulphates: Barite, Celestite, Gypsum, Oxides: Cuprite, Corundum, Hematite, Ilmenite, Magnetite, Chromite, Cassiterite, Rutile, Pyrolusite, Psilomelane, Goethite, Limonite, Bauxite, Carbonates: Calcite, Dolomite, Magnesite, Siderite, Aragonite, Witherite, Strontianite, Cerussite, Azurite, Malachite, Industrial Minerals: Halite, Fluorite, Phosphatic Nodule, Monazite, Graphite, Coal and its varities, Asbestos.

(Field work 3-4 days)

SEMESTER – VI

Discipline Specific Elective Course
Theory (Credits 3, Lectures: 45 M.M. 100= 60 end sem. + 40 sessional)

GEO-EC 613 - Applied Geology

Unit 1

Engineering Geology and its importance, Elementary ideas about engineering properties of soils and rocks, Geological conditions for constructions of dams, tunnel, canals, highways, buildings and bridges. **(Lectures 09)**

Unit 2

Geohydrologic cycle and occurrence of groundwater, geohydrological properties of rocks, Classification of aquifers, Types of wells, Quality of groundwater. **(Lectures 09)**

Unit 3

Introduction to mineral exploration, Surface and sub-surface exploration methods. Elementary ideas about gravity, electrical and magnetic, methods of exploration.
(Lectures09)

Unit 4

Elementary ideas of methods of drilling, Elementary ideas of mining, Surface mining methods, Under-ground mining methods, Environmental impact of mining. **(Lectures 09)**

Unit 5

Introduction to Aerial Photography, Types of aerial photographs, Basic elements of aerial photo interpretation, Basics of Remote sensing. Elementary idea of Geographical Information System (GIS) and Global Positioning System (GPS). **(Lectures 09)**

Essential Reading:

1. Krynine and Judd Principles of **Engineering geology and geotechniques**. CBS, Publisher and distributer, Pvt. Ltd., N. Delhi.
2. Todd D.K. **Groundwater hydrology**
3. N.C. Kesavulu Textbook of **Engineering Geology**, Maemillan India Ltd.,
4. Arogyaswami R.N.P. **Conrse in mining geology**
5. Pandey, S.N. **Principles and Applications of Photogeology**, John Wiley and Sons.
6. R.M. Raghunath Groundwate

Suggested Reading:

7. Jenson M and Bateman A M ‘Economic Mineral Deposits. John Wiley and Sons, New York.
8. Gokhle KV and GK Rao ‘Ore Deposits of India,. Thomson Press

9. Lillesand Thomas M. and Kiefer Ralph., 3rd Ed. John Wiley and Sons. Remote Sensing and Image interpretation

GEO-SEC 611 Geochemistry

(Credits 2; 30 Hrs M.M. 100= 60 end sem. + 40 sessional)

Unit-I: Introduction to geochemistry: basic knowledge about crystal chemistry. Types of chemical bonds, coordination number; Elementary idea of Periodic Table.

Unit-II: Cosmic abundance of elements; Composition of the planets and meteorites; Geochemical evolution of the earth.

Unit-III: Gold Schmidt's geochemical classification of elements; Distribution of major, minor and trace elements in igneous, metamorphic and sedimentary rocks.

Unit-IV: Elements of geochemical thermodynamics; Isomorphism and polymorphism; Isotope geochemistry.

Unit-V: Colloids in geological systems, ion exchanges and geological evidence for earlier colloids. geochemical cycles;

Books Recommended:

1. Hoefs, J., 1980. Stable Isotope Geochemistry. Springer-Verlag.

2. Klein, C. and Hurlbut, C.S., 1993. Manual of Mineralogy. John Viley and Sons, New York.

3. Krauskopf, K.B., 1967. Introduction to Geochemistry. McGraw Hill.

4. Mason, B. and Moore, C.B., 1991. Introduction to Geochemistry. Wiley Eastern.

5. Rollinson, H.R., 1993. Using geochemical data: Evaluation, Presentation, and Interpretatio

6. Thomas, H. (2019) MOOC on Geochemistry. SWAYAM.GOV.IN

OPEN ELECTIVE COURSE
(Credit 2, Lectures: 30)

GEO OE 1 Mineral Resources.

Unit 1

Definition of mineral, Classification of minerals, Ore Mineral forming processes, Chemical composition, physical and optical properties of minerals, Composition of Mamga. **(Lecture 6)**

Unit 2

Metallic Mineral Deposits of India with reference to thin mode of occurrence. Diagnostic physical properties, chemical composition, uses, modes of occurrence & distribution in India of following: 1) Economic Minerals: Gold, Silver, Copper, Lead, Zinc, Iron, Manganese, Chromium, Tin,Aluminium; 2) Industrial Minerals: Asbestos, Barite, Graphite, Gypsum and Mica; 3) Abrasives: Diamond, Corundum, Emery garnet, Abrasive sand, Tripoli, Pumice, Sand feldspar, Limestone, Clay, Talc; 4) Refractories: fireclay, graphite, Dolomite & sillimanite group of minerals, diaspore, pyrophillite, zircon; 5) Ceramic minerals: Clay, Feldspar, Wollastonite. **(Lecture 6)**

Unit 3

Abrasives: Diamond, Corundum, Emery garnet, Abrasive sand, Tripoli, Pumice, Sand feldspar, Limestone, Clay, Talc; Refractories: fireclay, graphite, Dolomite & sillimanite group of minerals, diaspore, pyrophillite, zircon; Ceramic minerals: Clay and gem minerals. **(Lectrure 6)**

Unit 4

Fossil fuels: coal and lignite, uses, classification, constitution, origin and distribution in India. Petroleum- composition, uses, theories of origin, oil traps, & important oil fields of India. A brief account of mineral deposits in Beacs Sand of Kerala. Significance of minerals in National Economy. Strategic, critical & essential minerals. Mineral wealth of Madhya Pradesh Environmental impact of mineral exploration.

Unit 5

Radioactive Mineral, Composition, type, Radioactive metals: Thorium, Uranium, Titanium;
Disctribution of radioactive minerals. **(Lectrure 6)**

Essential Reading:

1. Gokhale and Rao Ore deposits of India.
2. Jensen and Bateman A.M. – Economic Mineral Deposits, Year
3. Krishnaswamy, S. Indian Mineral Resources
4. Park and Macdiarmid -Ore Deposits
5. Umeshwer Prasad- Economic geology

Board of Studies Meeting held on 16th August, 2019

(Prof. P.K. Kathal) **Member**	**(Prof. R.K.Trivedi)** **Member**	**(Prof. R.K. Rawat)** **Member**	**(Prof. S. H. Adil)** **Member**
(Prof. H. Thomas) **Member**	**(Dr. G.C. Gautam)** **Member**	**(Prof. A.P. Mishra)** **External Member**	**(Prof. Ranveer Kumar)** **External member**
(Prof. C.S . Dubey) **External member**	**(Prof. P.K. Verma)** **External Member**		

prqFkZ & lsesLVj] eq[; fo"k; & HkwfoKku prqFkZ

lkS)kafrd ¼5 ;wfuV] 60 ysDpj @ O;k[;ku½
lh-lh-&lajpukRed HkwfoKku ,oa VsDVksfuDy
[k.M & v & lajpuk HkwfoKku

1- lapjuk HkwfoKku dh Hkwfedk] oxhZdj.k @ vkXus;] ty ,oa ifjofrZr pV~Vkuksa ds izkFkfed ,oa f}rh;d lajpukA
fo"ke foU;kl & ifjHkk"kk izdkj ,oa igpku

2- oyu ds rRo] oxhZdj.k HkwT;;kfefr oxhZdj.k mRifÙk oxhZdj.kA oyu dh igpku ds y{k.kA

3- HkzU'k ds rRo] T;kferh ,oa mRifÙk oxhZdj.k] HkzU'k ds pV~Vkuksa ij izHkko] HkzU'k dh igpku ds y{k.kA

4- js[kkadu ds rRo] izdkj ,oa mRifÙk] eq[; lajpuk ls laca/kA Qksfy,s'ku ds rRo] ifjHkk"kk ,oa izdkj] mRifÙk eq[; lajpuk ls laca/k njkj @ tk;UV dh vkd`fr] js[kk xf.krh; ,oa mRifÙk vkX;kfjr oxhZdj.kA pV~Vku fo:iu ds fl)kar] LVsªl&LVªsu v.Md`fr] lykLfVd fo:i.k
5- foorfZu ds fl)kar] oyu dh mRifÙk] HkzU'k dh mRifRr] Hkkjr isfuulqyk] ,DlVªk isfuulqyk] bUMks& xaxk ds eSnku dh fooZruhd lajpukA

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(Credit 2, Lectures: 30)
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4. Park and Macdiarmid -Ore Deposits
5. Umeshwer Prasad- Economic geology

prqFkZ & lsesLVj] eq[; fo"k; & HkwfoKku prqFkZ

lkS)kafrd ¼5 ;wfuV] 60 ysDpj @ O;k[;ku½
lh-lh-&lajpukRed HkwfoKku ,oa VsDVksfuDy
[k.M & v & lajpuk HkwfoKku

1- lapjuk HkwfoKku dh Hkwfedk] oxhZdj.k @ vkXus;] ty ,oa ifjofrZr pV~Vkuksa ds izkFkfed ,oa f}rh;d lajpukA
fo"ke foU;kl & ifjHkk"kk izdkj ,oa igpku

2- oyu ds rRo] oxhZdj.k HkwT;;kfefr oxhZdj.k mRifÙk oxhZdj.kA oyu dh igpku ds y{k.kA

3- HkzU'k ds rRo] T;kferh ,oa mRifÙk oxhZdj.k] HkzU'k ds pV~Vkuksa ij izHkko] HkzU'k dh igpku ds y{k.kA

4- js[kkadu ds rRo] izdkj ,oa mRifÙk] eq[; lajpuk ls laca/kA Qksfy,s'ku ds rRo] ifjHkk"kk ,oa izdkj] mRifÙk eq[; lajpuk ls laca/k njkj @ tk;UV dh vkd`fr] js[kk xf.krh; ,oa mRifÙk vkX;kfjr oxhZdj.kA pV~Vku fo:iu ds fl)kar] LVsªl&LVªsu v.Md`fr] lykLfVd fo:i.k

5- foorfZu ds fl)kar] oyu dh mRifÙk] HkzU'k dh mRifRr] Hkkjr isfuulqyk] ,DlVªk isfuulqyk] bUMks& xaxk ds eSnku dh fooZruhd lajpukA

prqFkZ & lsesLVj] eq[; fo"k; & HkwfoKku prqFkZ lsesLVj

lkS)kafrd ¼4 ;wfuV] 60 ysDpj@O;k[;ku½

thok'e foKku

;wfuV & 1

thok'e foKku dk ifjp;] thou dh mRifÙk] izkjafHkd Kku] thok'e&vfHkys[k] thok'eu] ds :i ,oa izdkj ,oa thok'eksa ds mi;ksxA

O;k[;ku &10

;wfuV & 2

xzsiVksykbV~l] yseyhczsfØ;k o xSLVªksiksMk dh vkdkjdh] oxhZdj.k ,oa Hkw&foKkfud forj.kA

O;k[;ku &15

;wfuV & 3

flQsyksikMk o Vªk;yksokbV~ dh vkdkjdh] oxhZdj.k ,oa Hkw&foKkfud forj.kA

O;k[;ku &10

;wfuV & 4

czsfd;ksikMk] fjxksl&ewaxk dh vkdkjdh] oxhZdj.k ,oa Hkw&foKkfud forj.kA

O;k[;ku &15

;wfuV & 5

d'ka:dh; thok’; foKku dh :i &js[kk] lw{e thok'e foKku dk vk/kkj&Hkwr Kku] QksjkfeuhQsjk ,oa mudh lajpuk ,oa vdkjdhA iqjk okfufLrdhA

O;k[;ku &10

Hkw&foKku izk;ksf;d ,oa HkwfoKkfud Hkze.k ¼ØSfMV 2] 30 ySc odZ o 30 ?kaVs dk QhYM odZ½

fuEufyf[kr tok'eksa dk foLr`r v/;;u

QksjkfeuhQsjk uqewykbfV~l
dksjy dsyflvksyk] tSQjsafV~l
ysesyhczsfUpk xzsfQ;k] iSDVu] ohul] dkfMZVk] vkdkZ] V³kbZxksfu;k] lkbZfiz;k] vksfLV³;k]
xzsLV³ksiksMk dksul] Qk;lk] ewjsDl] usfVdk lkbfiz;k] V³ksdl] VfjVsYyk] flfjfFk;e
flQsyksikMk vkFkksZfljkl] ukfV~yl] isfjlfQUdfV~l] xksfu;kVkbfV~l] csfyfeukbfV~l
gksiyksbfV~l
cszfd;ksiksMk fyaxqyk] fjadksusYyk] fjadksfV³ek] lkbZfjaxksFkk;fjl
V³k;yksckbVk dsfyehu] isjkMksDlkbfMl] QsdksIl] V³kbU;wfDy;l] vksysusyl]
xzsIVksykbV~l % eksuksxzsiV~l] fMiyksxzsiV~l lkbDyksxzsiV~l
xksaMokuk ¶yksjk % XykslkiVsfjl] xsaxeksiVsfjl ojVsczkfj;k lkbTkksU;wjk fVYyksfQYye

HkwfoKkfud Hkze.k A ¼rhu ls pkj fnu½

lsesLVj & 3

dksj dkslZ % HkwfoKku fFk;ksjh

ØsfMV 04

Lh-lh-&311 vkXus;] volknh ,oa dk;karfjr ‘’kSyfoKku

[k.M ¼v½

bdkbZ 1

le; & 20 ?kaVs

izLrkouk & vkXus; 'kSy foKku dk dk;Z{ks=] lajpuk] laxBu ,oa egRoA

eSXek % mRifÙk] laxBu ,oa oxhZdj.k

vkXus; pV~Vkuksa dk oxhZdj.k] vkbZ-;w-th-,l- oxhZdj.k] jklk;fud ,oa [kfutdh; oxhZdj.kA cksfou fj,D’ku fljht] fj,D’ku ds fl)kar vkSj eSXuk ds fØLVyhdj.k esa budh HkwfedkA

bdkbZ 2

vkXus; pV~Vkuksa esa fofo/kr ds dkjd ,flfeys’ku ,oa fMQjsfU’k,’ku

fuEukafdr ra=ksa ds varxZr oslkfyVd eSXek dk fØLVyhdj.k

¼v½ ,YokbZV & ,ukFkkZbV ¼c½ Mk;ksIlkbM & ,uksFkkZbV

¼l½ QkjsLVsjkkbV & Qk;ykbV ¼n½ Mk;ksIlkbM & ,yokbV

[k.M ¼c½

le; & 20 ?kaVs

bdkbZ 3

izLrkouk % vi{k; dh HkkSfrd ,oa jklk;fud fof/k] volkn dh mRifÙk] LFkkukarj.k ,oa egkf}ih; ,oa egklkxjh; okrkoj.k esa budk tekoA

fyfFkfQds’ku Mk;tSuhfll ,oa volknh pV~Vkuksa dh cqfu;knh ladYiukA

lajpuk ,oa oxhZdj.k %

volknh pV~Vkuksa dh lajpuk] laxBu ,oa mudk egRoA volknh pV~Vkuksa dk oxhZdj.kA

[k.M ¼l½

le; & 20 ?kaVs

bdkbZ 4

izLrkouk % dk;kraj.k dh ifjHkk"kk] dkjd ,oa vfHkdrkZA esVkekfQZd xzsM] dk;karfjr pV~Vkuksa dh lajpuk ,oa oxhZdj.kA

esVkekfQZd Qslhl ,oa Qslhl lhjht ds oxhZdj.k dh ladYiukA

Qslhl % Qslhl dk fooj.k] fuEu nkc] e/;e nkc ,oa mPp nkc Qslhl ,oa muds fo’ks"k egRo [kfut] esVkekfQZd Qslhl dk xzsM] tksu vkSj lcQslhl esa mifoHkktu ,oa feujy vlsECystA

isfyfVd pV~Vkuksa dk O;kid :ikarj.k ,oa dydsfjDl pV~Vkuksa dk rki :ikarj.kA

bdkbZ 5

vkXus; pV~Vkuksa dk esxkLdksfid v/;;u ,oa mudk Hkkjr esa forj.kA

xzsukbV] xzsuksMk;ksjkbV] lk;ukbV] Mk;ksjkbV] isxesVkbV] xscjks] Mksysjkbv] ik;jksDthukbV] isjhMksVkbV] M~;wukbV] cslkYV] jk;ksykbV ,.M usQyhu lk;ukbVA

fofHkUu izdkj dh voklnh pV~Vkuksa dk v/;;u %

lsUMLVksu] dksXyksesjsV] lsy] Dys] czsfl;kA

fofHkUu izdkj dh dk;karfjr pV~Vkuksa dk v/;;u %

LysV] fQykbV] flLV] uhl] ,EQhcksykbV~l] pkjuksdkbV ,.M xzsuqykbVA

HkwfoKku ySo vkSj QhYM dk;Z

¼ØsfMV 2] 30 ?kaV ySc dk;Z vkSj 30 ?kaVs QhYM dk;Z = 60 ?kaVs½

& vkXus;] volknh vkSj :ikUrfjr fyFkksVkbi dk esxkLdksfid v/;;u %

xzsukbV] xzsuksMk;ksjkbV] lk;ukbV] isxekVkbV] jk;ksykbV] xscjks] Mksysjkb V] cslkYV] ik;jkWDlhukbV] cyqvk iRFkj] laxqVhdk'e] pwukiRFkj] lSy] Dys] dksf.kdk'e vkSj LysV] fQykbV~l] f'kLV] uhl] laxejej] ,EQhcksykbV] pkjuksdkbV vkSj xzsuqykbV~lA

& vkXus; pV~Vkuksa ds laxBu dh igpku % baVjxzksFk] iksQZjkfVd] izfrfØ;k fjEl] ifFkZfVd vkSj muds isVªkstsusfVd egRoA

& volknh pV~Vkuksa esa laxBu dh igpku vkSj muds isVªksykWftd egRo vkSj :ikUrfjr pV~Vkuksa esa lw{e lajpuk ,oa laxBu vkSj muds isVªksykWftd egRoA

vkXus;] :ikUrfjr vkSj volknh fyFkksVkbi dk ekbØksLdksfid v/;;u %

xzsukbV] xzsuksMk;ksjkbV] lk;ukbV] Mk;ksjkbV cyqvk iRFkj] laxqVhdk'e] lSy] Dys] pwuk iRFkj] dksf.kdk'e vkSj LysV] fQykbV~l] f'kLV] uhl] ,EQhcksykbV] pkjuksdkbV vkSj laxejejA

QhYM dk;Z ¼3 ls 4 fnu½

egRoiw.kZ iqLrdsa

vko';d v/;;u gsrq

& bfXu;l ,.M esVkekWfQd isVªkykWth ¼2002½]

& csLV] ek;jksu th- foyh CysDosy lkbUl

& bfXu;l isVªksykth ¼1997½] cksl] fefgj ds-] n oYMZ izsl izk- fyV-] dydRrk] ist 568A

& fizfUliYl vkWQ bfUu;l ,.M esVkekfQZd isVªksykth ¼2012½ tkWu Mh- foUVj 2 ,Mh'ku] ih-,p-vkbZ- yfuZUx izkbosV fyfeVsM U;w nsYghA

& vksfjftu vkQ lsfMesUVjh jkWDl ¼1972½] CykV ,p- feMysVu th- ,.M ejsZ vkj- izsfUVl gky

& lsfMesUVjh jkWDl ¼1937 & 3 ,fM'ku½] isVhtkWu] ,Q- ts- vkDlQksMZ ,.M vkbZ oh ,p ifCyf'kax dEiuh] U;w nsYghA

& vVsDLVcqd vkWQ lsfMesUVjh isVªksykth ¼1981½ oh- ds- oekZ ,.M lh- izlknA bUVj cqd fMfLVªDV U;w nsYghA

& isVªksykth vkWQ esVkekfdZd jkWDl ¼1978½ eslu] vkj-] lhuh,l ifCy- ,.M fMl- U;w nsYghA

& eSflo vksiu vkWuykbu dkslZ vosfyoy ,V Lo;e osclkbVA

vfrfjDr v/;;u gsrq

& bfXujkl isVªksykWth ¼1971½] dkjekbdy] vkb-,l-bZ-] Vjuj] ,Q- ts- ,.M ojgqxu] ts- iofyLM okb esd xzk fgyA

& isVªkstsfufll vkWQ esVkekWjfQd jkWDl ¼1967½ fodyj] ,p- th- ,Q- fLizutj&ojysx- @ujkslk ifCydslu] U;w nsYghA

& fizalhiYl vkWQ isVªksykWth ¼1963½ Vsfjy] th- MCY;w-] esFkq,uA

& isVªksykWth ¼bfXu;l] lsMhesaVªh] ,.M esVkekWfQd½ ¼1996½] CysV] ,p- ,.M Vsªlh] vkj-ts- MCY;w- ,p- Ýhesu ,.M dks-] U;wkdZ-A

& bfXu;l] lsMhesaVªh] ,.M esVkekWfQd isVªksykWth ¼1982½] vgylZ] bZ-th-,.M CysV] lhch,l ifCy- ,.M fMLVªh-] U;w nsYghA

& gs.Mcqd vkWQ fefujYl] fØLVYl] jkWDl ,.M vksj~l ¼2008½ vysDlts.Mj] ih-vks-] U;w nsYghA

& bZ- daVsaV % vokysoy ,V ,pVhVhih%@@lhbZlh-fud-bu@ bZ-daVsaV@istsl@fMQkYV-,,lih,DlA

Izks- ,p- FkkWel

vuqHkkx % ch Hkwty ty&foKku

Hkw&tyh; pØ vkSj Hkwty dh miyC/krk% pV~Vkuksa ds Hkw&tyh; xq.k] tylzks= dh miyC/krk dk oxhZdj.k] dqvksa ds izdkj] Hkw&ty dh xq.koÙkkA

¼O;[;ku 15½

vuqHkkx % lh [kfut vUos"k.k vkSj [kuu

[kfut vUos"k.k] lrg vkSj milrg vUos"k.k fof/k;ka xq:Rokd"kZ.k] fo|qr vkSj pqEcdh; rjaxksa ds ckjs esa izkFkfed fopkjksa] fMªfyax ds rjhdksa ds izkjafHkd fopkj] lrg [kuu fof/k;ksa ds izkFkfed fopkj] Hkwfexr [kuu ds rjhds] [kuu ds i;kZo.kh; izHkko ds ckjs esa ifjp;A

¼O;[;ku 15½

Jh vkj- [kydks

HkwfoKku iz;ksx'kkyk ,oa {ks=h; dk;Z ¼ØsfMV 2] 30 ?kaVs iz;ksx'kkyk dk;Z ,oa 30 ?kaVs {ks=h; dk;Z dqy 60 ?kaVs½

Hkwvkd`frd Lo:iksa dk HkkSfrd ekMyksa }kjk v/;;u] fofHkUu izdkj dh LFkkykfd`r;ksa ,oa viokg raU=ksa dh O;k[;k] uD'ks ls lacaf/kr izk;ksfxd iz'u] fjDr ekufp=ksa ij Hkjr o"kZ ds eq[; ioZrksa] >hyksa ,oa ufn;ksa dks vafdr djukA Hkkjr ds fjDr ekufp=ksa ij HkwdEih; {ks=ksa dh tkudkjh dks vafdr djukA LFkykd`frd uD'kksa dk vadu ,oa fofHkUu iSekuksa ij foU;klA

[kaM n % gokbZ fp= HkwfoKku] lqnwj laosnu ,oa HkkSxksfyd lwpuk iz.kkyh

gokbZ fp= HkwfoKku dk ifjp;] gokbZ fp=ksa ds izdkj] gokbZ rLohjksa dh O;k[;k ds cqfu;knh rRo] lqnwj laosnu ds ewyHkwr rRoksa dk Kku] HkkSxkfyd lwpuk iz.kkyh vkSj oSf'od fLFkfr fu/kkZj.k iz.kkyh dk izkFkfed KkuA

lsesLVj & 4

lS)kafrd ¼ØsfMV & 4 O;k[;ku % 60½

lh-lh 612 & vuqiz;qDr HkwfoKku

vfHk;kaf=dh Hkw&foKku vkSj bldk egRoA pV~Vkuksa ,oa fefV~V;ksa dk izkjafHkd KkuA cka/kksa] ugjksa] jk"Vªh; jktekxk]sZ Hkouksa ,oa lsrq ds fuekZ.k gsr]q ewyHkwr HkwxfHkZd ifjfLFkfr;ksa dk KkuA

¼O;k[;ku % 15½

lsesLVj & 1

ewy ikB~;Øe & HkwfoKku & 1

lS)kafrd ¼ØsfMV & 4 O;k[;ku % v-v-60½

lh-lh 111 & lkekU; HkwfoKku % Hkw&vkd`fr foKku ,oa Hkw&xfrdh

[kaM & v % lkekU; HkwfoKku

izLrkouk

Hkw&foKku ,oa blds n`f"Vdks.kA HkwfoKku dh ewy ,oa O;ogkfjd 'kk[kk,¡A blds dk;Z{ks= ,oa vuqiz;ksxA **i`Foh**&lkSj e.My esa i`Foh dk LFkkuA i`Foh dk vkdkj] :i] Hkkj ,oa ?kuRoA i`Foh dh mRifÙkA jsfM;ks/kfeZrkA i`Foh dh vk;qA i`Foh dh vkarfjd lajpuk&Hkw&iiZVh] izokj ,oa ØksMA

[kaM &c % Hkw&vkd`fr foKku

Hkw&vkd`fr foKku dh vk/kkjHkwr vo/kkj.kk;sa] ifjHkk"kk ,oa dk;Z{ks=] Hkw&vkd`frd dkjd] izfØ;k,sa ,oa LFkykd`fr;k¡] vi{k; & HkkSfrd] jklk;fud ,oa tSfod vi{k;A e`nk;sa&fuekZ.k] ,oa e`nkvksa ds izdkjA

ufn;ksa ds Hkw&oSKkfud dk;Z ,oa tyh; LFkykd`fr;k]¡ iou ds Hkw&oSKkfud dk;Z ,oa orks<+h; LFkykd`fr;k] fgeun ds Hkw&oSKkfud dk;Z ,oa fgeunh; LFkykd`fr;k¡] Hkwfexr ty ds Hkw&oSKkfud dk;Z ,oa dkLVZ LFkyvkd`fr;k¡] egklkxjksa ds Hkw&oSKkfud dk;Z ,oa rVh; LFkykd`fr;k¡A

izks- vkj-ds- jkor

lsesLVj & ikap

fMlhIyhu Lisf'kfQd bysDVho dks"kZ & lS)kafrd

¼ØsfMV & 4] 60 O;k[;ku % ½

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?kaVs&60

Hkkjr dk Lrj foKku

1- Lrj foKku ds lkekU; fl)kar] dkUlsIV] Lrj foKku ds fu;e] ,dRekrk dk fl)kar] ykW vkWQ lqij iksthlu] thok"eksa ds Lrj dk lDls'ku dk fu;e] yk vkQ vksfjtu gkjhtsUVyhVh] Økl dfVax ds fu;e] lEcU/k] lerqY;rk ds fy, HkSfrd ,oa okvksykftdy ØkVsfj;k gkseks Vsooht] Qsfll ,oa psat&fyFkks ,d ok;ks QsfllA

2- le; ekiu] LMsUMMZ LVªsjh xzsQh dk Vkbe Ldsy] Hkkjrh; HkwfoKku le; ekiu] bEijQs'ku bu ft;kyksthdy fjdkMZ] cszd bu LVªVh xzsQhd fjdkMZ] cszd bu LVVhxzsQhd fjdkMZ] fo"ke foU;kl] uku fldksUl] vifjte] Lrj foKku dk oxhZdj.k] ok;ksa LVªsVhxzsQh] fyFks LVªsVhxzsQh] dksuksLVªsVh& xzsQh] fQftdy fMohtu vkQ bafM;k] estj LVªsVhxzsQhd fMohtu vkQ bafM;kA

ljxqj lqizkØLVy] xzsuqykbV lDls'ku vkQ lkmFk bafM;k] cqansy [k.M xzsukbV ,oa lqizkØLVy flD;sa'k] iwohZ ?kkV lewg] HkhyokMk lqij xzqi] flaxHkwe] ØsVku oLrkj] ØsVku] lsUVªy bafM;k ØsVku] lkSlj] ldksyh] fpYih lewgA /kkjokj lqij xzqi ,oa vjkoyh lqij xzqiA

3- ysV fizdsEoz;u LVªsVh xzsQh % fnYyh] egkdkS'ky] dMIik] lqij xzqi] fctkoj] Xokfy;j] dykMxh ,oa chek] djuwy] bUnzorh] dksYgu] fo/;;u lqij xzqi] NÙkhlx<+] iqjkuk pV~Vkus izkughurk & xksnkojh ?kkVh esa ,oa ekjokj lqij xzqi vkQ jktLFkku
4- Hkkjr esa isfyvksMksbd pV~Vkuksa dk forj.k] lkYVdsU= vkQ dsfEoz;u] lsykbu Ja[kyk dh mez vij dkcksZfuQsjl ,oa ijfHk;u pV~Vku]s lkYV just esa d'ehj esa isfyvkstksbd pV~Vkus] ehlkstksbd LVªsVh xzsQh % fMifM'uy ,uok;ksUesaV] fooj.k] thou dk oxhZdj.k ,oa xks.Moku pV~Vkuksa dk Hkkjr esa vkfFkZd egRo] Hkkjr esa dksLVy xksaMokuk] Vªk;fld vkQ fLiVh] fyyau flLVeA
5- dPN dh tqjSfld] f=pukiYyh dh fØVsf'k;l] pV~Vkus] ok?k csMl] Msdu Vªsi forj.k lajpuk] yesVk osM bUÝkVªsih;u ,d bUVªkVsih;u o ml csMl Vªsi dh vk;q flukstksbd LVªsVhxzsQh % HkwoSKkfud xfrfo/kh dk lEiw.kZ ys[k&tks[kk] flukstksbd ifjf;M esaA fgeky; dh mRifÙk] LVsªVhxszQh vkQ f'kokfyd Qkfly] ¶yksjk] f'kofyd le; esa Vf'Zk;jh vkQ vle] djsok QkesZ'ku] Vf'Zk;jh vkQ Hkkjr ds bLV dksLV] Vf'Zk;jh vkQ

if’pe ?kkV] IyhLVkslhu Xysf’k;’ku] flukstksbd vk;y ch;fjax QkesZ’ku vkQ bafM;kA

QhYModZ & 3&4 fnuA

vko';d ikBu &

1- d`".ku ,e- ,u- ¼2003½ % Hkkjr ,oa oekZ dk HkwfoKku 6 okj ,fM’ku] lh- oh- ,l- izdk’ku ubZ fnYyhA
2- okfM;k Mh- ,u- ¼1953½ Hkkjr dk HkwfoKku] VkVkesxzkA
3- dqekj jfoUnj ¼1955½ Hkkjr dk ,frgkfld HkwfoKku ,d lLrj foKku] ok;ys bLVuZ fy- fnYyhA
4- yseu vk- ok;Z- ¼1990½ & laLÙkj foKku ds fl)kar] esfjy ifCyds’ku dsA

lq>ko ikBu

5- ikLdks b- ,p-] ¼1968½ , esU;woy vkQ ft;ksykth vkQ bafM;k ,oa oekZ] Hkkjr ljdkj izdk’kuA
6- ok;ys MUoj] lh-vks- fo jkstj ts- 1961 lLarj foKku ds fl)karA
7- ØEohu MCY;w lh ,oa Lyk’k ,yMh] ¼1963½ lLrj foKku ,oa lsMhesUVs’ku & Ýhesu iCyh’klZA

lsesLVj & 2

dksj dklZ HkwfoKku & 2

ØLVy foKku ØLVy izdk’kdh; ,oa [kfut foKku

ØsfMV & 04 60 O;k[;ku

GEO CC – II Theory **?kaVs 60**

1- ØLVy foKku ds fl)kar] ifjHkk"kk] ØLVy ds izkjafHkd fopkj] ØLVy ry] ,oa vr% Qydh; dks.k] Bksl dks.k] tksu rFkk ØLVy QkeZl ØLVy v{k] v{kh; dks.k] isjkehVj] ØLVy uksVs'ku dh b.Mhfll] ØLVy lefirh rRo] ØLVy esa ;eyu dsfedy okWUMhax] vkblksekQhfte] iksyh ekQhZt+e] L;wMks ekQhZte] Bksl foy;u] [kfuMj dh HkkSfrd xq.k] QkeZ] jax] LVªhd yLpj] Dyhost] ÝsDpj] gkMusl] vkisf{kr ?kuRo vkdk'kh; fo|qrh;] pqEcdh;] jsfM;ks ,DVho xq.kA

2- ØLVy dk oxhZdj.k lkr lewgksa esa] ØLVy flLVeA lewg ds lkekU; ds lefefr] lkekU; d{kk ds QkeZl] flfydsV LVªDpj ,oa oxhZdj.kA

3- jax vkifVDl] lkekU; ,oa iksysjkbtM izdk'k] vkblksVªkfQd ,oa ,u vkblksVªkfid [kfut] mudh rj.k lrg ,oa rja.k ÝUV] izdk'k dk ijkorZu ,d ifjorZu] ijkorZu lwpdkad] fØVhdy ,axy] lEiw.kZ vkarfjd ifjorZu ,oa osdsl~ izHkko] Mcy ifjorZu fudky fizTe ds fuekZ.k ,oa dk;Z 'kSyh isVªksykftdy ekbØksLdksi ds vax ,oa fØ;k fof/k izdk'kdh; xq.k] [kfutks ds izdk'kdh; xq.k] Vohadfyax] okbZfjQsUtsU'k] lyhvks Øksbfte] bUVj fQ'kjsUl jax] ,DlfVd'ku dks.k] Vohfuax ;eyu

4- [kfut dh ifjHkk"kk] oxhZdj.k] jlk;fud laxBu] HkkSfrd ,aM izdk'kdh; xq.k] fuEu lewgksa ds &flfydka] QsYMLikj QsYlisFkk;M

5- ,EQhcksy] ik;jksDlhu] vyhf[ku] xkjusV] ekbdk V~;wjesfyu] bihMksV] ftjdku] DyksjkbV] ljisUVhu] ,siVkbV] LVsjkSykbV] dk;ukbV] flfyesukbV] ftvksykbV lewg

HkwfoKku ysc ,oa QhYM odZ ¼ØsfMV 02½] 30 ?kaVs yso odZ

30 ?akVs QhYM odZ dqy 60 ?kaVs

ØLVy ekMy esa lizfefr rRo dk v/;;u] ØLVy lewg ds ukekZy Dykl ds lS)kafrd QkeZl] b;wyj fl)kar dh foospuk jkd QkfeZx [kfutksa ds HkkSfrd xq.kksa dk v/;;uA

izdk'kdh; xq.k dk v/;;u] iksysjkbZftax ekbØksLdksi }kjkA

fQYM odZ & ¼3&4 fnu½

iqLrdsa &

1- jhM ,p-,p- ¼1962½ jVyst [kfut foKku ds rRo lh-oh-,l- icfy’k ,oa forj.kA
2- QksMZ&MOY;w bZ ¼2006½ [kfut foKku ds rRo] iqu% fiUV] lh-ch-,l-iCyh’kj
3- vdsDts.Mj ih- vks- 2008 &[kfutksa] ØLVy] pV~Vkuksa ,oa vksj dh gLr iqLrd] U;w ,st bafM;kA

3- [kfut [k.kos’ku dh izLrkouk] lrgh ,oa xgjs x.kos’k fof/k;ka] ?kuRo] fo|qrh;] pqEcdh;] jsfM;ks/keh dk lkekU; KkuA
4- Hksnu dh fof/k;ksa dk izkjafHkd Kku] lrgh [kuu dh x<jh [kuu dh fof/k;ka ,oa [kuu dk i;kZoj.k ij izHkkoA

lsesLVj & 6

fMLiyhu Lisf’kfid bysDVho dkslZ

Hkkjr ds lalk/ku

th-bZ-vks-(GEO – DSE) & Mh-,l-bZ- & 3] lS)kafrd ¼4 ØsfMV½ 60 ?kaVs

i`Foh ds lalk/ku le; 60 ?kaVs

ØsfMV & 04

1- vkfFkZd HkwfoKku dk ,sfrgklfd fodkl] rRoksa dk Hkwjlk;fud forj.k] [kfut fu{ksi ds ijkFkZ] v;Ld [kfut] xsax [fut] Vsuksj] vk;Ld dk xzsM v;Ld] v;LdlwV] ,oa oksukUTkl~A [kfut fu{ksi dk oxhZdj.k] fy.Mxzsu ,oa oksVesu ds oxhZdj.k] izkFkfed ,oa f}rh; fu{ksi v;Ld ds fu{ksi.k esa lajpuk] LVªsVhxzsQh] HkkSfrd ,oa jlk;u dUVªky] esVsykstsfud bikd ,oa izkfoUl] HkwoSKkfud rki ekid ¼FkeksZEkhVj½
2- [kfut fu{ksi.k ds izdkj] vkXus; fof/k] ouks ds izdkj] vyhZ esXusVhd fof/k;ka] ysV esXesVhd fof/k;ka] fMLlhfeus'ku] lsxzhxs'ku ,oa bUtsD'ku bfEelhfoy nzo lsxzhxs'ku] bUtsd'ku] loyhes'ku dkUVsDV esVklksesfVd fof/k;ka ,oa [kfut fu{ksi.k dk izHkko m"etyh; fof/k;ka] fl)kar] fu{ksi.k esa izHkko'kkyh dkjd layXu nhokyksa dh pV~Vkuksa dk ifjorZu] [kfut Øe] dsfoVh fQfyax fu{ksi] fQ'kj osUl] 'kh;j tksUl] LVkd odZ] lsbyjhQ] ysMj oSu] oyu njkj] ozsfl;k Hkjko lkyw'ku dsfoVh] iksj Lis'k] ,oa fNnz Hkjko] fjkIys'kesaV fu{ksi] fof/k;ka ,oa fu{ksiA f'kIys'kesaV fl)kar] ds dkjdA
3- lsMhesUVjh @tyt fof/k;ka ,oa pØ] lsMhesUV'kuds fl)kar] yksgs ,oa esXuht ds pØ] vi{k; fof/k;ka fl)kar] jslhM~;wy lkanz.k fof/k;ka ,oa fu{ksi.k] fl)kar jslhM~;wy lkanz.k fof/k;ka ,oa fu{ksi.k] esdsfudy lkanz.k ds fl)kar] byqfo;y] chp ,oa vksfy;u lyslj] vkDlhMs'ku ,oa lqijftu lYQkbM bu fjpesUV] foy;u] tksu vkQ vkDlhMslu esa fu{ksi.k] lsd.Mjh lYQkbM

bu fjpesaV] xkslku] ,oa dsfiax] dk;karfjr fof/k;ka] xszQkbV] ,losLVkl] VsYQ lksiLVksu ,oa flfyesukbV lewg ds [kfutA

4- izeq[k HkkSfrd xq.k] jlk;fud l?kBu] mi;ksx feyus ds izdkj ,oa Hkkjr esa fuEu dk forj.k&

¼v½ vkS|ksfxd [kfut & ,LosLVkl] osjkbV] xsQkbV] ftIle] ,oa vHkzdA

¼c½ ,ozsflo [kfut & ghjk] dksj.Me] ,ejh] xksxsj] ,ozsflo jsr] f=iksyh] I;wfel] jsr] QssYMLikj] pwuk iRFkj] DysA

¼l½ fjÝssDVjh % Qk;jDys] xzsQkbV] MksyksekbV] Mk;fLQsj] ik;jksfQykbV] ft+jduA

¼n½ fljkfed [kfut & Dys] QsYMLij] okykLVksukbVA

¼/k½ tse [kfut] iq[kjkt] uhye] xksesn] yglqfu;k] ghjs vkfnA ¼12 ?kaVs½

5- thok"e ÅtkZ % dks;yk] fyxukbV] mi;ksx oxhZdj.k laxBu mRifÙk] Hkkjr esa foLrkjA isVªksfy;e dk laxBu] mi;ksx mRifÙk ds fl)kar] vk;y Vsªi] ,oa Hkkjr ds egRoiw.kZ rsy {ks=A

dsjy ds chp ls.M [kfutksa dk laf{kIr v/;;u] jk"Vªh; vFkZO;oLFkk esa [kfutksa dk egRo] LVsªVftd] fØVksdy] vko’d; [kfut] e-iz- dh [kfut laink] [kfut mR[kuu ds i;kZoj.k ij izHkkoA

¼15 ?kaVs dk O;k[;ku½

vko';d fdrkcsa &

1- xks[kys ,oa jko& vksj fMikftV vkWQ bafM;kA

2- osVesu & vkfFkZd [kfut fu{ksi

3- d`".kkLokeh & Hkkjr ds [kfut laink

4- ikdZ ,oa esDMsehZM & vksj fMikftV

5- mes’oj izlkn & vkfFkZd HkwfoKku

6- d`".k xksiky O;kl & vkfFkZd HkwfoKku& e-iz- vdkneh

vkfFkZd HkwfoKku yso ,oa QhYM odZ

¼ØsfMV 02½ 30 ?kaVs O;[;ku vkSj 30 ?kaVs QhYM odZ dqy 60 ?kaVs

[kfutksa dk esxkLdkihd igpku] Hkkjr ds /kkrq vk;Ldksa dk forj.k ,oa mi;ksx vkS|ksfxd [kfutksa] lYQkbM jh;y;j] vksjihesaV] LVhoukbV] ekfyoMsukbV] xsysuk LQsysjkbV] psYdksik;jkbV] ik;jkbV] vklsZuksQk;jkbV] ekdkZlkbV] lsYQsV ft"le] osjkbV] lsysjkbV] vkDlkbM& D;wijkbV] Fkksj.Me] gsesVkbV] esXusVkbV] bYesukbV] Øksekbv] dslsVhjkbV] :Vkby] ik;Vksyqlkbv] flyksesyhu] xksjsFkkbV fyeksukbV] okDlkbV] dkoksZusV & dsylkbV Mksyksekbv] esXuslkbV] flMsjkbV] ,jsxksukbV] foFksjkbV] LVªkfU’kpsukbV] ls:lkbV] ,twjkbV esykFkbV] vkS|ksxksfxd [kfut ued gsykbV] ¶yqjkbV] QkLQsVhd uMwy eksx&tkbV xzsQkbV] dks;yk ,oa izokj ,LosLVkl

QhYM odZ & 3 & 4 fnuA

3- [kfut [k.kos’ku dh izLrkouk] lrgh ,oa xgjs x.kos’k% fof/kek] ?kuRo] fo|qrh;] pqEcdh;] jsM;ks/kefu;ksa dk lkekU; Kku

4- Hksnu dh fof/k;ksa dk izkjafHkd Kku] lrgh [kuu dh fof/k] xgjh [kuu dh fof/k;ka] i;kZoj.k ij izHkkoA

O;ogkfjd HkwfoKku isij ¼DSE – 2 ØsfMV & 04½ 60 ?kaVs

izks- ,-ds- 'kkafMY;

Board of Studies Meeting held on 6th October, 2017

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