



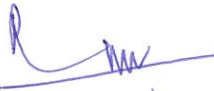
Government of Karnataka

NATIONAL EDUCATION POLICY 2020

**CURRICULUM CONTENTS
IN
EARTH SCIENCE
2021-22**

**Undergraduate Course
B.Sc., (Basic / Honours)**

**Davangere University
Shivagangothri
Davangere – 577 007**


DEAN


Registrar
Davangere University
Shivagangothri, Davangere.

CURRICULUM

Name of the Degree Program	:	BSc (Basic/Hons.)
Discipline Core	:	Earth Science
Total Credits for the Program	:	B.Sc. Basic - 136 and B.Sc. Hons. - 176
starting year of implementation	:	2021-22

Program Outcomes:

Competencies need to be acquired by the candidate securing B.Sc. (Basic) or B.Sc. (Hons)

By the end of the program the students will be able to:

1. Understanding concepts of Earth science and demonstrate interdisciplinary skills.
2. Demonstrating the laboratory skills In crystallography, mineralogy, petrology, water analysis.
3. The syllabus is based on an to provide learning through problem solving and hands on training techniques.
4. To provide adequate basic understanding of Earth science and its uses among students.
5. Program aims to develop intellectual ability and geological skills through an appropriate blending of theoretical subject education, practical exercises and field training.
6. To provide basic knowledge, training, skills related to mapping, survey and Geological field work.
7. To develop appropriate skills in the students to make them competent to take up self employment in innovative geology related fields.

Assessment:
Weightage for assessments (in percentage)

Type of Course	Formative Assessment / IA	Summative Assessment
Theory	40%	60%
Practical	40%	60%
Projects	40%	60%
Experiential Learning (Internships/MOOC/ Swayam etc.)	40%	60%


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Curriculum Structure for the Undergraduate Degree Program BSc (Basic / Hons.)

Total Credits for the Program : 176
Starting year of implementation : 2021-22
Name of the Degree Program : B.Sc. (Basic/Hons.)

Programme articulation matrix :

This matrix list only the core courses. Core courses are essential to earn the degree in the discipline/subject. They include courses such as theory, laboratory, project, field work, internship etc., Elective courses may be listed separately.

Semester	Title / Name of the course	Programme out comes that the course addresses (not more than three per course)	Pre requisite course (s)	Pedagogy	Assessments
1	DSC – 1T GEO 101 Earth System Science – Fundamentals 4 Credits 100 Marks	Understanding concept of the earth and its fundamental system.	PUC or + 2 (science)	The General pedagogy to be followed for theory and practical are as under. Lecturing, tutorials, group/individual. Discussions, seminars, assignments, counseling,	

				remedial coaching. Field work, hands on training, project demonstration, experimental documentation, and innovative methods.	
	DSC – 1P GEO 101 Earth System Science – Fundamentals 2 Credits 50 Marks				
2	DSC – 2T GEO 102 Basics of crystallography, mineralogy and petrology 4 Credits 100 Marks	Understanding concept of the Basics of Crystallography, Mineralogy and Petrology. Demonstrating the laboratory skills in basic of crystal system, silicate structures, minerals and petrology.			

	DSC – 2P GEO 102 Basics of crystallography, mineralogy and petrology 2 Credits 50 Marks				
3	DSC – 3T GEO 103 Principles of stratigraphy, paleontology and geology of India. 4 Credits 100 Marks				
	DSC – 3P GEO 103 Paleontology and stratigraphy 2 Credits 50 Marks				
4	DSC – 4T GEO 104 Structural Geology and hydrogeology 4 Credits 100 Marks				
	DSC – 4P GEO 104 Water analysis, Survey				

	and thin section making. 2 Credits 50Marks				
5	DSC – 5T GEO 105 Environmental Science, Geotectonics 3 Credits 100 Marks				
	DSC – 5P GEO 105 Structural geology, field visit 2 Credits 50Marks				
	DSC – 6T GEO 106 Geochemistry, and Mining Geology 3 Credits 100 Marks				
	DSC – 6P GEO 106 Ore geology 2 Credits 50Marks				
	DSC – 7T GEO 107 Applied Geophysics 3 Credits 100 Marks				

6					
	DSC – 7P GEO 107 Applied Geophysics 2 Credits 50Marks				
	DSC – 8T GEO 108 Mineral Processing including Marine Mineral Resources 3 Credits 100 Marks				
	DSC – 8P GEO 108 Economic Geology 2 Credits 50Marks				
7	DSC – 9T GEO 109 Advanced earth systems 3 Credits 100 Marks				
	DSC – 9P GEO 109 GIS and field visit 2 Credits 50Marks				

	DSC – 10T GEO 110 Oceanography and Atmospheric Sciences 3 Credits 100 Marks				
	DSC – 10P GEO 110 Image Analysis and Geostatistics 2 Credits 50Marks				
	DSC – 11T GEO 111 Advanced Petrology Sciences 3 Credits 100 Marks				
	DSC – 11P GEO 111 Thin Section Petrology and petrochemistry 2 Credits 50Marks				
8	DSC – 12T GEO 112 Advanced Paleontology 3 Credits 100 Marks				

	DSC – 12P GEO 112 Advanced Paleontology 2 Credits 50Marks				
	DSC – 13T GEO 113 Analytical Techniques in Earth Science 3 Credits 100 Marks				
	DSC – 13P GEO 113 FTIR and Spectroscopic Techniques 2 Credits 50Marks				
	DSC – 14T GEO 114 Evaluation and Management of Mineral Deposits OR Nanogeoscience 3 Credits 100 Marks				


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BSc Earth Science (Basic Hons.) Semester 1

Course Title: DSC- 1T, Earth System Science-Fundamentals	
Total Contact Hours: 56	Course Credits: 4+2
Formative Assessment Marks: 40%	Duration of ESA/Exam: 3 Hrs
Model Syllabus Authors: Curriculum Committee	Summative Assessment Marks: 60%

Course Pre-requisite(s): *Mention only course titles from the curriculum that are needed to be taken by the students before registering for this course.*

Course Outcomes (COs):

At the end of the course the student should be able to:

(Write 3-7 course outcomes. Course outcomes are statements of observable student actions that serve as evidence of knowledge, skills and values acquired in this course)

1. Thorough knowledge and understanding of concepts of Earth science.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12
1. Thorough knowledge and understanding of concepts of Earth science	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>								
2. Learning and practicing professional skills .		<input type="checkbox"/>		<input type="checkbox"/>			<input type="checkbox"/>					
3. Thorough knowledge and application of good laboratory and good field knowledge.		<input type="checkbox"/>		<input type="checkbox"/>			<input type="checkbox"/>					

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.


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BSc Earth Science (Basic Hons.) Semester 1

Title of the Courses:

Course 1 : DSC- Earth system sciences

Course 2 : OE- Basics of Earth System Sciences

Course 1: DSC-2T, Basics of Crystallography, Mineralogy and Petrology		Course 2 : OE- Basics of Earth System Sciences	
Number of Theory Credits	Number of lecture hours/semester	Number of Theory Credits	Number of lecture hours/semester
4	56	3	42

Content of Course 1 : Theory: DSC-1T 101 Earth system sciences

UNIT 1: INTRODUCTION TO EARTH SYSTEM SCIENCES

14 hrs

Definition and scope of earth system sciences. Branches of Earth Sciences. Systems concepts for earth system science - fundamental concepts of the five spheres (lithosphere, hydrosphere, atmosphere, biosphere and cryosphere). Energy balance. Interactions between the five spheres; hydrologic cycle; Biogeochemical cycles - carbon cycle; Hydrosphere-atmosphere: Oceanic current system and effect of Coriolis force. Concepts of eustasy. Atmospheric circulation. Weather and climatic changes.

The universe and solar system: Origin of the universe - Big bang theory. Solar system. Members of solar system – planets (Terrestrial and gaseous planets), satellite, comets, asteroids, meteorite.

Earth in the solar system. Size, shape, mass and density of the earth.

Origin of the Earth – Gaseous hypothesis, Nebular hypothesis, Planetesimal hypothesis, Tidal hypothesis, Supernova hypothesis, Interstellar or dust or meteoric hypothesis. Evolution of earth.

Age of the Earth: Geochronology; Absolute and relative methods; (a) Relative Methods - Sedimentation, Salinity method, varve chronology, Rate of cooling of earth. (a) Radiometric dating, atomic energy, decay scheme, half life, method - K-Ar; Rb-Sr; U-Pb, Pb-Pb.

Age of the earth.

Earth's internal structures and its composition. Evidence for the Earth's composition and mineralogy – 1. Seismic data, 2. Density studies, 3. Meteorites. Earth's internal layers - Crust, mantle and core. Lithosphere, asthenosphere, mesosphere and barysphere.

2: GEOMORPHOLOGY - I

14 hrs

Introduction:- Basic concepts of Geomorphology, Definition and scope, Geomorphic agents, Geomorphic processes; endogenetic (epigene) and exogenetic (hypogene). Land forms. Weathering - physical, chemical, biological.

Soil - Definition, Formation, Types of soils. Soil Profile.

Rivers and fluvial landforms:- Introduction, Development of rivers - Drainage system and patterns. Stages of rivers – Davi's concept; youth, mature, old. Geological actions: Erosion - hydraulic action, abrasion, attrition, solution. Erosional landforms – Pot holes, V shaped valleys, gorges and canyons, waterfalls and types, river meanders, ox-bow lakes, river terraces, structural benches. Transportation - suspension, solution. Deposition and depositional landforms - alluvial fans and cones, flood plains, natural levees, deltas, channel deposits.

Wind and Aeolian landforms: Types of wind – Breeze, Gale, Tempest, Cyclone. Geological action of wind: Wind erosion - Deflation, abrasion, attrition. Erosional features - mushroom rocks, yardangs, Hamda, ventifacts, pedestal rocks, zeugen, milletseed sands. Transportation - suspension, saltation, traction. Deposition and depositional landforms - Sand dunes and types, Loess.

UNIT 3. GEOMORPHOLOGY - II

14hrs

Glaciers and glacial landforms. Growth and movement of glaciers. Types of glaciers – Mountain or valley glaciers, Piedmont glaciers, continental ice-sheets or ice caps. Glacier imprints. Geological action of glaciers; Erosional work by glaciers – Plucking/ Excavation, Frost wedging, Abrasion. Erosional landforms - Whaleback forms. Glacial valley - U shaped valley and V- shaped valley, Crag and Tail, Hanging valley, Cirques, Fiords, Arete, Cols, Horns, Roches Moutonnes. Transportation - glacial drift. Deposition and depositional landforms - Glacial Moraines and types, Drumlins, Kames, Eskers, Outwash plains, Kettles.

Groundwater:- Meaning and components of groundwater. Geological action of groundwater: Erosion and erosional landforms (lapis, solution holes and associated features, poljes, caves and caverns: valleys of karst topography, natural bridges). Transportation; solution. Depositional work; concretions, stalactites and stalagmites,

Oceans and Coastal landforms:- Topography of ocean floor – continental slope, shelf, abyssal zone, mid-oceanic ridges. Geological action of oceans: Agents of coastal erosion; Waves, Tides, Currents and circulation of water. Process of marine erosion, erosional landforms (Headlands and Bays, Sea Cliffs, Wave-cut Terraces, Sea caves, stacks). Transportation. Depositional landforms (Beaches and barriers, wave built terraces, Spits and bars, Tombola). Corals - its types and origin.

UNIT 4 : GEODYNAMICS

14 hrs

Introduction to Geodynamics. Origin of oceans, continents and mountains. Concepts and theories of isostasy. Concept of palaeomagnetism, application of palaeomagnetism. Continental drift. Sea floor spreading. Concept of plate tectonics. Nature and types of plate margins, Midoceanic ridges and trenches. Origin and distribution of Island arcs.

Earthquakes:- definition, Elements of an earthquake, types of earthquake waves, intensity and magnitude, seismographs and seismometers, causes and prediction of earthquake, Effects of earthquake, Seismic zones of India.

Volcanoes:- A typical volcano parts, volcanic activity, types of volcanoes, composition of lava, distribution of volcanoes. Volcanic landforms; depressed landforms: Volcanic cone (Cinder Cone), Volcanic craters, Calderas (Caldera Lake). Landforms due to the accumulation of lava: Volcanic mountains, Volcanic plateaus, Volcanic plains, Volcanic necks.

SUGGESTED READINGS:

1. Duff, P. M. D., & Duff, D. (Eds.). (1993). Holmes' principles of physical geology. Taylor & Francis.
2. Emiliani, C. (1992). Planet earth: cosmology, geology, and the evolution of life and environment. Cambridge University Press.
3. Gross, M. G. (1977). Oceanography: A view of the earth.

4. Brian, J. S., Barbara, W.M., 2010. The Blue Planet: An Introduction to Earth System Science, 3rd Edition, Wiley.
5. Ernst, W.G., 2000. Earth Systems: Processes and Issues, Cambridge University Press.
6. Sarah, E., Cornell, I., Prentice, C., Joanna, I.H., Catherine, J.D., 2012. Understanding the Earth System Global Change Science for Application, Academic Press.
7. Jacobson, M., Charlson, R., Rodhe, H., Orians, G., 2000. Earth System Science: From Biogeochemical Cycles to Global Changes, Elsevier.
8. Ehlers, E., Krafft, T., 2006. Earth System Science in the Anthropocene, Springer.
9. *Jacobson, M. C., Charlson, R. J., Rodhe, H., and Orians, G. H., 2000, Earth System Science: San Diego, CA, Academic Press, 523 p., ISBN 0-12-379370-X*
10. The Earth System, Lee R. Kump, James F. Kasting, and Robert G Crane; Prentice Hall, 2nd Ed., 2004.
11. Principles of Geology – Arthur Holmes
12. Physical Geology – Longwell & Flint
13. General Geology – Radhakrishnan. Y
14. The Dynamic Earth – Wyllie. P.J
15. The way earth works - Wyllie. P.J
16. Physical Geology – Springfield
17. Geomorphology – Thornbury
18. Geomorphology – Davies
19. Physical Geography Today – Muller & Oberlander

I SEMESTER B.Sc. /B.Sc., Hon. DEGREE PROGRAMME EARTH SCIENCE

DSC/P-1: PRACTICAL-1

Total Teaching Hours: 56

LTP/Credits: /2

Teaching Hours/Week: 4

Exam. Duration: 4 Hrs.

- | | |
|--|--------------|
| 1. Introduction to maps. Study of maps. Types of maps. Types of scale. | 1 Practical |
| 2. Reading topographical maps of the Survey of India; Detailed study of topographic sheets | 2Practicals |
| 3. Preparation of topographical map | 1Practicals |
| 4. Identification of drainage patterns | 2 practical |
| 5. Preparation of LU/LC maps. | 2Practicals |
| 6. Study of soil profile and determination of soil texture | 2Practicals |
| 7. Study of major geomorphic features and their relationships with outcrops through physiographic models and also using lens stereoscope and mirror stereoscope. | 3 Practicals |
| 8. Field visit to a place of geological/geomorphological interest and report | |
| Submission at the time of practical examination | 1 Practical |

OPEN ELECTIVE PAPER O.E. – 1 (3 Credits)

Basics of Earth System Sciences

Unit 1:

14 Hours

Introduction to Earth Sciences with a special focus to Geology, scope, sub-disciplines and relationship with other branches of sciences

Unit 2:

14 Hours

Earth in the solar system, origin Earth's size, shape, mass, density, rotational and evolutionary parameters Solar System- Introduction to Various planets - Terrestrial Planets Solar System- Introduction to Various planets - Jovian Planets Internal constitution of the earth - core, mantle and crust

Unit 3:

14 Hours

Convections in the earth's core and production of magnetic field Composition of earth in comparison to other bodies in the solar system. Origin and composition of hydrosphere and atmosphere Origin of biosphere Origin of oceans, continents and mountains.

Age of the earth; Radioactivity and its application in determining the age of the Earth, rocks, minerals and fossils

SUGGESTED READINGS:

1. Arthur Holmes, Principles of Physical Geology. 1992. Chapman & Hall.
2. Emiliani, C, 1992. Planet Earth, Cosmology, Geology and the Evolution of Life and Environment. Cambridge University Press.
3. Gross, M.G., 1977. *Oceanography: A view of the Earth*, Prentice Hall.
4. The Dynamic Earth – Wyllie. P.J
5. The way earth works - Wyllie. P.J
6. D.R. Johnson, M. Ruzek, M. Kalb, What is Earth System Science? Proceedings of the 1997 International Geoscience and Remote Sensing Symposium Singapore, August 4-8, 1997, pp 688-69

Formative Assessment : 40%	
Assessment Occasion/ type	Weightage in Marks
IA (2 Tests)	20% : 20 Marks
Assignments	10% : 10 Marks
Seminars / Group Discussion	10% : 10 Marks
Total	40% : 40 Marks


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BSc Earth Science (Basic / Hons.) Semester 2

Title of the Courses:

Course 1 : DSC-Basics of Crystallography, Mineralogy and Petrology

Course 2 : OE-Gems and Ornamental stones

Course 1: DSC-2T Basics of Crystallography, Mineralogy and Petrology		Course 2 : OE- 2 Gems and Ornamental stones	
Number of Theory Credits	Number of lecture hours/semester	Number of Theory Credits	Number of lecture hours/semester
4	56	3	42

Content of the course : DSC 2T

Basics of Crystallography, Mineralogy and Petrology

Sl. No.	Contents	Hours of teaching
	Pedagogy: Classroom teaching for Earth Science Major students	
	<i>Course outcome with skills, employability and entrepreneurship</i>	
	This paper is the most important and fundamental in Earth Science to understand the basics of Crystallography, Mineralogy and Petrology. The candidate will be exposed to the common crystals and their forms, minerals and their basic properties especially physical and optical. Also it deals with the most common resources viz. rocks which find tremendous applications potential especially in dimensional rock structures. Every student of Earth Science should know the common variety of rocks and minerals occurring and also their economic potential	
1	Unit 1. Introduction to Crystallography. elementary ideas about crystal structure (crystalline, cryptocrystalline and amorphous) crystal parameter and indices. Crystal symmetry and classification of crystals into six systems. Study of forms of normal clases(holohedral). Elements of crystal symmetry. Chemical bonds. Silicate structures. Introduction to analytical techniques like XRD (X-ray diffraction), SEM (secondary electron microscopy).	14
2	Unit 2 Mineral's definition and classification, physical and chemical composition of common rock forming minerals. Nature of light and principles of optical mineralogy. Isotropic and non-isotropic substance. Uniaxial and biaxial minerals. Introduction to the Petrological microscope. Optical accessories. Micheal levy's chart. Extinction and its types.	14
3	Unit 3 Rock cycle. Rock association in time and space. Physical aspects of magma. Generation of magma in crust and mantle. Physical properties of magma. Mode of occurrence-concordant and discordant forms. Strctures and textures of igneous rocks. Petrogenesis.	14

4	Unit 4 Origin, classification and occurrence of sedimentary rocks. Sedimentary Rocks: Sedimentary textures and structures. Studies on common sedimentary rocks such as Conglomerates, breccias, Sandstones, shales, Mudstones and limestone. Metamorphic rocks- introduction , agents of Metamorphism, types of metamorphism, textures and Structures of metamorphic rocks, classification of metamorphic rocks. Index minerals, geothermometry, geobarometry.	14
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References for further reading:

1. James D Dana. A Textbook of mineralogy, John Wiley and Sons
2. Verma, P K (2010), Optical mineralogy. Ane books Pvt. Ltd
3. Philips, RC, An Introduction to crystallography,
4. Buerger, Elementary crystallography
5. JAK Tareen and TRN Kutty,(1989) Elemental crystallography
6. Tyrrel, T.W Principles of Petrology, Chapman and Hall, UK
7. Turner and Verhoogen (1962), Igneous and metamorphic petrology, Allied publisher, Bombay
8. Prasad C (1980), A Textbook of sedimentology

II SEMESTER P2. B.Sc. DEGREE PROGRAMME EARTH SCIENCE

Teaching Hours/Week: 4 Exam. Duration: 4 Hrs

P- 2: PRACTICALS

Total Teaching Hours:

1. Study of crystals based of geometrical constants. - 1 Practical
2. Measurement of interfacial angle using contact Goniometer and Verification of Euler's theorem 1 Practical
3. Study of holohedral forms of six crystal system. 4 Practicals
4. Study of Physical properties of rock forming minerals (list-given below) - 3 Practicals
5. Study of the optical properties of important rock forming minerals using polarizing microscope: Quartz,
 - a. Plagioclase, Orthoclase, Microcline, Biotite, Hornblende, Augite, Hypersthene, Olivine, Garnet, Calcite. 1 Practical
6. Megascopic studies of common igneous, sedimentary and metamorphic rocks. 3 Practicals
7. Visit to field to study the mode of occurrence of minerals. – 1 Practical

*Silicates			Group	Mineral Name
Nesosilicates			Olivine Group	Olivine
			Garnet Group	Garnet
			Al ₂ SiO ₅ Group	Andalusite, Sillimanite, Kyanite, Staurolite
			Zircon Group	Zircon
Sorosilicates			Epidote Group	-
Cyclosilicates			Beryl Group	Beryl
			Tourmaline	Tourmaline
Inosilicates	Single Chain Silicates	Pyroxene Group	Augite, Hypersthene	
	Double Chain Silicates	Amphibole Group	Actinolite, Hornblende	
Phyllosilicates			Serpentine Group	Serpentine, Asbestos
			Clay Minerals Group	Talc, Kaolin
			Mica Group	Muscovite, Biotite, Phlogopite, Vemiculite
Tectosilicates			Quartz Group	Quartz
			Feldspar Group	Orthoclase, Plagioclase, Microcline
			Feldspathoid Group	Nepheline, Sodalite
			Zeolite Group	Zeolite

OE-2 GEMS AND ORNAMENTAL STONES

OE-2 (3Credits)

Sl. No.	Contents	Hours of teaching
	Pedagogy: Classroom teaching for Open Elective students	
	<i>Course outcome with skills, employability and entrepreneurship</i>	
	Very important as gemstones have attracted mankind ever since it came into existence, because of their beauty and rarity. The gemstones market is ever expanding and also leading to the artificial growth of these stones and imitations.	
1	Unit-1: Introduction to Gemology, classification of gemstones, detailed study of different physical characters and Optical properties of minerals with special reference of to gem minerals. Physico-optical effects in gem stones. Colour and cause of color in gems.	14
2	Unit-2: Cutting and polishing of gemstones. A detailed study of important precious and semi precious gem minerals- their characters and occurrences- world occurrences in general and Indian occurrences in particular. Precious Varieties: 1. Diamond, 2. Ruby, 3. Sapphire, 4. Topaz, 5. Emerald ii) Semi-Precious varieties: Garnets, Quartz, Lapis lazuli, Turquoise and Organic gems.	14
3	Unit-3: Ornamental stones :Introduction to petrology, Classification of rocks, Properties of Igneous, Sedimentary and Metamorphic rocks. Suitability of rocks for ornamental purposes. Occurrence and distribution rocks in Indian sub continent with particular reference to Karnataka. Evaluation, Quarrying, cutting and polishing of rocks.	14

Internet references/reference books:

1. Gems and Gem industry in India-GSI Memoir 45- R.V Karanth.
2. Gem and Gem Minerals – EH Kvens and CB Slawsan
3. Encyclopedia of Minerals and Gem stones - Edited by Michael O'Don Oghal.
4. Precious stones - by Max-Bauer Vol. I and II. Publisher Dover publications Ink. New York.
5. Rutley's Elements of Mineralogy- by H.H. Read, CBS publication
6. Dana's Manual of Mineralogy
7. GEMS by R. Webster - Batter work and co. ltd., London
8. Gemstones - Herbert Smith - Published by Methuen co. Ltd., London
9. Introduction to Rock forming minerals-Deer, Howie and Zussman.
10. Physical Geology-P.K.Mukherjee
11. Geology of India-R.Vaidyanathan and M.Ramakrishnan
12. Geology of Karnataka-B.P.Radhakrishna
13. Mineral Resources of Karnataka-B.P Radhakrishna
- 14.

Formative Assessment : 40%	
Assessment Occasion/ type	Weightage in Marks
IA (2 Tests)	20% : 20 Marks
Assignments / Visits	10% : 10 Marks
Seminars / Group Discussion	10% : 10 Marks
Total	40% : 40 Marks


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Shivagangotri, Davangere.

QUESTION PAPER PATTERN
Semester B.Sc Degree examination
(CBCS Scheme – NEP syllabus)
EARTH SCIENCE

Paper:.....

Paper Code:.....

Time: 3Hours

Max. marks: 60

Note: All parts are compulsory

SECTION – A

2 x 5 = 10

I Answer any five of the following

- a.
- b.
- c.
- d.
- e.
- f.
- g.
- h.

SECTION – B

4 x 5 = 20

II Write short notes on any five of the following

- 2.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.

SECTION – C

10 x 3 = 30

II Answer any three of the following

- 10.
- 11.
- 12.
- 13.
- 14.


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