

**SU/BOS/Science/481**

**Date: 01/07/2023**

**To,**

|  |   |
|--|---|
| The Principal,<br>All Concerned Affiliated Colleges/Institutions<br>Shivaji University, Kolhapur | The Head/Co-ordinator/Director<br>All Concerned Department (Science)<br>Shivaji University, Kolhapur. |
|--|---|

**Subject:** Regarding syllabi of B.Sc. Part-II (Sem. III & IV) as per NEP-2020 degree programme under the Faculty of Science and Technology.

**Sir/Madam,**

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the revised syllabi, nature of question paper and equivalence of B.Sc. Part-II (Sem. III & IV) as per NEP-2020 degree programme under the Faculty of Science and Technology.

| <b>B.Sc. Part-II (Sem III &amp; IV) as per NEP-2020</b> |                  |     |                           |
|---|------------------|-----|---------------------------|
| 1.  | Mathematics      | 8.  | Chemistry                 |
| 2.  | Statistics       | 9.  | Sugar Technology (Entire) |
| 3.  | Physics          | 10. | Microbiology              |
| 4.  | Astrophysics     | 11. | Industrial Microbiology   |
| 5.  | Zoology          | 12. | Electronics               |
| 6.  | Botany           | 13. | Geology                   |
| 7.  | Plant Protection |     |                           |

This syllabus, nature of question and equivalence shall be implemented from the academic year 2023-2024 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website [www.unishivaji.ac.in](http://www.unishivaji.ac.in))

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2023 & March/April 2024. These chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

  
**Dy Registrar**  
**Dr. S. M. Kubal**

**Copy to:**

|   |  |    |                                      |
|---|--|----|--------------------------------------|
| 1 | The Dean, Faculty of Science & Technology      | 8  | P.G. Admission/Seminar Section       |
| 2 | Director, Board of Examinations and Evaluation | 9  | Computer Centre/ Eligibility Section |
| 3 | The Chairman, Respective Board of Studies      | 10 | Affiliation Section (U.G.) (P.G.)    |
| 4 | B.Sc. Exam/ Appointment Section                | 11 | Centre for Distance Education        |

# **SHIVAJI UNIVERSITY, KOLHAPUR.**



**NATIONAL EDUCATION POLICY (NEP-2020)**

**Bachelor of Science in Geology**

**Part- II**

**SYLLABUS WITH EFFECT FROM AUGUST 2023**

**SHIVAJI UNIVERSITY, KOLHAPUR**  
**NATIONAL EDUCATION POLICY (NEP-2020)**  
**SYLLABUS WITH EFFECT FROM AUGUST 2023**  
**Bachelor of Science in Geology**

**A) BASIC INFORMATION**

**ORDINANCE AND REGULATIONS:-as applicable to Under-Graduate Degree / Program**

**1. TITLE :** Subject Geology

Optional under the Faculty of Science

**2. YEAR OF IMPLEMENTATION:** Revised Syllabus will be implemented from August 2023 onwards.

**3. PREAMBLE:-**

The revised syllabus includes the foundation, core and applied components of the course/paper. The student should get into the prime objectives and expected level of study with required outcome in terms of basic and advance knowledge at examination level.

**4. GENERAL OBJECTIVES OF THE COURSE/ PAPER/:**

The course is structured with a view to impart basic as well as advance knowledge of the subject to the students in the light of the present-day scenario in earth science.

**5. DURATION**

- The course shall be a full time course.

**6. PATTERN:-**

Pattern of Examination will be Semester pattern for Theory papers.. Practical Examination will be on yearly Pattern.

**7. ELIGIBILITY FOR ADMISSION :-**

As per eligibility criteria prescribed for each course and the merit list in the qualifying examination.

**8. MEDIUM OF INSTRUCTION:**

The medium of instruction shall be English.

### Model Programme Structure for 3 yrs Bachelor of Science with MEME Options (160 Credits)

| Level   | SEM | Discipline Specific Core Courses (DSC) (L + P) (Credits) |           | Discipline Specific Elective Courses (DSE) (L+P) (Credits) |  | Ability Enhancement Compulsory Courses(AECC) (L+P) (Credits) | Skill Enhancement Courses (SEC) (L+P) | Total Credits |
|---|-----|--|-----------|--|--|--|---------------------------------------|---------------|
| 6   | III | C9 (DSC5+DSC6)   | 4 + 4 = 8 |  |  | AECC-3 Env. Studies (Theory + Project) (2)                   | SEC-3 Multidisciplinary (2)           | 28            |
|   |     | C10 (DSC5+DSC6)  | 4 + 4 = 8 |  |  |  |                                       |               |
|   |     | C11 (DSC5+DSC6)  | 4 + 4 = 8 |  |  |  |                                       |               |
|   |     | Total  | 24        |  |  |  |                                       |               |
|   | IV  | C12 (DSC7+DSC8)  | 4 + 4 = 8 |  |  | AECC-4 Env. Studies (Theory + Project) (2)                   | SEC-4 Multidisciplinary (2)           | 28            |
|   |     | C13 (DSC7+DSC8)  | 4 + 4 = 8 |  |  |  |                                       |               |
|   |     | C14 (DSC7+DSC8)  | 4 + 4 = 8 |  |  |  |                                       |               |
|   |     | Total  | 24        |  |  |  |                                       |               |
| Exit Option 2 (Level 6) : Exit with Diploma in Science (with the completion of courses equal to minimum of 116 credits) |     |  |           |  |  |  |                                       |               |

| Level  | SEM | Discipline Specific Core Courses (DSC) (L + P) (Credits) |  | Discipline Specific Elective Courses (DSE) (L+P) (Credits) |           | Ability Enhancement Compulsory Courses(AECC) (L+P) (Credits) | Skill Enhancement Courses (SEC) (L+P) | Total Credits |
|--|-----|--|--|--|-----------|--|---------------------------------------|---------------|
| 7  | V   |  |  | DSE 1  | 2 + 2 = 4 | AECC-1 English for Communication (4)                         | SEC-5 Multidisciplinary (2)           | 22            |
|  |     |  |  | DSE 2  | 2 + 2 = 4 |  |                                       |               |
|  |     |  |  | DSE 3  | 2 + 2 = 4 |  |                                       |               |
|  |     |  |  | DSE 4  | 2 + 2 = 4 |  |                                       |               |
|  |     |  |  | Total  | 16        |  |                                       |               |
|  | VI  |  |  | DSE 1  | 2 + 2 = 4 | AECC-2 English for Communication (4)                         | SEC-6 Multidisciplinary (2)           | 22            |
|  |     |  |  | DSE 2  | 2 + 2 = 4 |  |                                       |               |
|  |     |  |  | DSE 3  | 2 + 2 = 4 |  |                                       |               |
|  |     |  |  | DSE 4  | 2 + 2 = 4 |  |                                       |               |
|  |     |  |  | Total  | 16        |  |                                       |               |
| Exit Option 3 (Level 7) : Exit with three years Bachelor of Science (with the completion of courses equal to minimum of 160 credits)<br>OR<br>Continue studiesfor Bachelor of Science with (Honours / Research) four years Degree Programme) |     |  |  |  |           |  |                                       |               |

Fourth Year OR Level – 8

| Level   | SEM  | Discipline Specific Core Courses (DSC) (L + P) (Credits) |  | Discipline Specific Elective Courses (DSE) (L+P) (Credits) |  | Ability Enhancement Compulsory Courses(AECC) (L+P) (Credits) | Skill Enhancement Courses (SEC) (L+P) | Total Credits |
|---|------|--|--|--|--|--|---------------------------------------|---------------|
| 8   | VII  |  |  |  |  |  | SEC-7<br>Multidisciplinary (2)        | 20            |
|   |      |  |  |  |  |  |                                       |               |
|   |      |  |  |  |  |  |                                       |               |
|   |      |  |  |  |  |  |                                       |               |
|   |      |  |  |  |  |  |                                       |               |
|   | VIII |  |  |  |  |  | SEC-8<br>Multidisciplinary (2)        | 20            |
|   |      |  |  |  |  |  |                                       |               |
|   |      |  |  |  |  |  |                                       |               |
|   |      |  |  |  |  |  |                                       |               |
|   |      |  |  |  |  |  |                                       |               |
| Exit Option 4 (Level 8) : Exit with four years Bachelor of Science (Honors / Research) (With the completion of courses equal to minimum of 200 credits) |      |  |  |  |  |  |                                       |               |

Note:

1. For First Year Semester - I, students have to select any four DSC courses available at their respective colleges. Same four courses they have to continue for Semester - II.

2. For Second Year Semester - III, students have to select any three out of four DSC courses selected for first year. Same three courses they have to continue for Semester - IV.
3. For Third Year Semester– V, students have to select any one DSC course out of three DSC courses selected for second year. Same course they have to continue for Semester - VI.
4. For semesters V&VI there shall be Four DSE courses (papers) for each semester.
5. The DSC courses from C1 to C14 each have two papers of 50 marks each with combined passing i.e. minimum 35 marks are required to pass out of 100 marks.
  - a) Each DSC Course from C1 to C14 shall have two paper of 50 marks (40 marks semester end examination +10 marks internal assessment ) with separate passing
  - b) The examination of each AECC Course shall be of 50 marks (40 marks semester end examination +10 marks internal assessment)
  - c) Minimum marks for passing DSC and AECC Courses shall be as follows. 1. 14 Marks out of 40 Marks for semester end examination. 2. 4 marks out of 10 marks for internal assessment.
  - d) For SEC-1 and SEC-2 courses there shall be semester end examination of 50 marks whereas minimum marks required for passing these courses shall be 18. The question paper of these courses shall consist of 25 MCQs of 2 marks each.
6. For DSE courses (papers) of Semesters V & VI, there shall be separate passing.
7. Students can exit after Level 5 with Certificate Course in Science (with the completion of courses equal to minimum of 60 credits).
8. Students can exit after Level 6 with Diploma in Science (with the completion of courses equal to minimum of 116 credits).
9. Students can exit after Level 7 with Bachelor of Science (with the completion of courses equal to minimum of 160credits).
10. SEC: Skill Enhancement Courses (2 credits). Students have to select one SEC for each semester from the pool of courses available at their respective colleges
11. VBC: Value Based Courses (1 credit). Students have to study one VBC from Bahai Academy for first semester only.
12. Examination of AECC-3 (Env. Studies) (4 credits) will take place at the end of Semester-IV

### **FIRST YEAR Geology Semester I and II**

| Sr. No. | Subjects                    | Marks(Credits)          |
|---------|-----------------------------|-------------------------|
| 1.      | DSC 21A: Physical Geology   | Marks: 50 (Credits: 2)  |
| 2.      | DSC 22A: Structural Geology | Marks: 50 (Credits: 2)  |
| 3.      | DSC 21B: Crystallography    | Marks: 50 (Credits: 2)  |
| 4.      | DSC 22B: Mineralogy         | Marks: 50 (Credits: 2)  |
|         | DSC A and DSC B Lab Course  | Marks: 50 (Credits: 2)  |
|         | Total                       | Marks:250 (Credits: 10) |

### **SECOND YEAR Geology Semester III and IV**

| Sr. No. | Subjects                                       | Marks(Credits)         |
|---------|--|------------------------|
| 1.      | DSC 21C: Igneous Petrology                     | Marks: 50 (Credits: 2) |
| 2.      | DSC 22C: Sedimentary and Metamorphic Petrology | Marks: 50 (Credits: 2) |
| 3.      | DSC 21D: Stratigraphy                          | Marks: 50 (Credits: 2) |

|    |                            |                         |
|----|----------------------------|-------------------------|
| 4. | DSC 22D: Palaeontology     | Marks: 50 (Credits: 2)  |
|    | DSC C and DSC D Lab Course | Marks: 100 (Credits: 4) |
|    | Total                      | Marks:300 (Credits: 12) |

### **THIRD YEAR Geology Semester V and VI (NO.OF PAPERS- 8)**

#### **Semester V**

| Sr. No. | Subjects  | Marks(Credits)          |
|---------|---|-------------------------|
| 1.      | DSE 41E: Economic Geology                               | Marks: 50 (Credits: 2)  |
| 2.      | DSE 42E: Hydrogeology                                   | Marks: 50 (Credits: 2)  |
| 3.      | DSE 43E: Applied Geology-Engineering Geology            | Marks: 50 (Credits: 2)  |
| 4.      | DSE 44E: Applied Geology-Prospecting and Mining Geology | Marks: 50 (Credits: 2)  |
|         | DSE E Lab Course  | Marks: 100 (Credits: 4) |
|         | Total   | Marks:300 (Credits: 12) |

#### **Semester VI**

| Sr. No. | Subjects                                 | Marks(Credits)          |
|---------|--|-------------------------|
| 1.      | DSE 41F: Photogeology and Remote Sensing | Marks: 50 (Credits: 2)  |
| 2.      | DSE 42F: Geomorphology and Geotectonics  | Marks: 50 (Credits: 2)  |
| 3.      | DSE 43F: Environmental Geology           | Marks: 50 (Credits: 2)  |
| 4.      | DSE 44F: Geochemistry                    | Marks: 50 (Credits: 2)  |
|         | DSE F Lab Course                         | Marks: 100 (Credits: 4) |
|         | Total                                    | Marks:300 (Credits: 12) |

### **10. SCHEME OF EXAMINATION :-**

- Question Paper will be set in the view of the /in accordance with the entire Syllabus and preferably covering each unit of syllabi.

### **11. STANDARD OF PASSING:-**

As Prescribed under rules & regulation for each degree/programme of Shivaji University, Kolhapur.

### **12. EXAMINATION SCHEME**

**Theory:** Theory examination will be conducted at the end of each semester.

**Paper:** Duration: 2 Hrs. Marks: 50. Minimum for passing: 35%.

**Practical:** Practical Examination will be conducted annually towards the end of Second Term of every Academic year.

Duration: 1 Day (6 Hours approx.). Marks: 50. Minimum for passing: 35%.

**B.Sc. Part II**  
**SUBJECT : GEOLOGY**

**Semester – III**

**DSC-C Theory Course**

**DSC 21C: IGNEOUS PETROLOGY**

**Marks 50(02 Credits)**

**Unit-I: ( 15 Hours) ( 18-19 lectures )**

Magma: definition, composition, types and origin; Forms of igneous rocks - Concordant and Discordant forms; textures of igneous rocks – Porphyritic, Poikilitic, Ophitic, Graphic, Trachytic, Xenolithic, Spherulitic, Perthitic and Reaction rims ( 9 hours )

**Differentiation** – Liquid Immiscibility, Gravitational Differentiation, Filtration

Differentiation; Role of volatiles in Differentiation ( 3 hours )

**Assimilation** – Reactions between Basaltic magma and acidic igneous rocks; Basaltic magma and Sedimentary rocks; Reactions with Granitic magma and basic igneous rocks; Granitic magma and Sedimentary rocks; Bowen's Reaction Series ( 3 hours )

**Unit-II: ( 15 Hours) ( 18-19 lectures )**

Classification of igneous rocks based on i. Mode of Occurrence, ii. Silica Percentage, iii. Colour Index iv. Feldspar Content v. Silica Saturation vi. Alumina Saturation ( 2 hours )

Crystallization of unicomponent magma – Augite ( 2 hours )

Crystallisation of Bicomponent magma ( two independent components ) –

Diopside – Anorthite system ( 3 hours )

Crystallisation of Bicomponent magma ( mixed crystals ) – Albite-Anorthite system ( 4 hours )

Crystallisation of Ternary magma – Diopside – Albite – Anorthite system ( 4 hours )

**DSC 22C: SEDIMENTARY AND METAMORPHIC PETROLOGY**

**Marks 50(02 Credits)**

**Unit-I: ( 15 Hours) ( 18-19 lectures )**

Processes of formation of sedimentary rocks- Residual deposits, Sedimentary Deposits, Chemical deposits, Organic deposits; ( 6 hours )



Textures based on grain size, sorting, shape and roundness; ( 3 hours )  
Structures of sedimentary rocks – Primary and secondary; ( 3 hours )  
Depositional Environments – Continental, Transitional, Marine; Provenance ( 3 hours )

**Unit-II: ( 15 Hours) ( 18-19 lectures )**

Definition of metamorphism; Agents of metamorphism; ( 1 hour )  
Types of metamorphism – Thermal, Cataclastic, Dynamothermal and Plutonic  
Metamorphism; ( 9 hours )  
Zones and grades of metamorphism; Outline of Facies of Metamorphism ( 2 hours )  
Textures and structures of metamorphic rocks. ( 3 hours )

**DSC C- LAB COURSE**

Teaching : 15 Practical turns – each of 3,2 hours ( 4 lectures of 48 minutes )

**Marks 50 (02 Credits)**

**IGNEOUS, SEDIMENTARY AND METAMORPHIC PETROLOGY**

**Section I**

**• Igneous Petrology:**

- Identification of rocks: On the basis of their physical properties in hand specimen; and optical properties in thin sections.
- Textures and Structures of igneous rocks : Megascopic and Microscopic

**Section II**

**• Sedimentary and metamorphic Petrology:**

- Identification of sedimentary and metamorphic rocks both in hand specimen and optical properties in thin sections.
- Textures and Structures of sedimentary and metamorphic rocks : Megascopic and Microscopic

**Books Recommended:**

1. Turner, F.J. & Verhoogen, J., , Igneous & Metamorphic petrology. McGraw Hill Co.
2. Bose, M.K., . Igneous petrology. World press
3. Tyrell, G. W.,. Principles of Petrology. Methuren and Co (Students ed.).
4. Ehlers, WG, and Blatt, H.,. Petrology, Igneous, Sedimentary and Metamorphic rocks, CBS Publishers

5. Moorhouse, WW., The study of rocks in thin sections. Harper and sons.
6. Friedman & Sanders,. Principles of Sedimentology. John Wiley and sons.
7. Pettijohn, F.J., Sedimentary rocks, Harper & Bros. 3rd Ed.
8. Prasad, C., A text book of sedimentology.
9. Sengupta. S., Introduction to sedimentology. Oxford-IBH.
10. Turner, F.J., Metamorphic petrology. McGraw Hill.
11. Mason, R., Petrology of Metamorphic Rocks. CBS Publ.
12. Winkler, H.G.C., Petrogenesis of Metamorphic Rocks. Narosa Publ.

**SHIVAJI UNIVERSITY, KOLHAPUR**

**NATIONAL EDUCATION POLICY (NEP-2020)**

**SYLLABUS WITH EFFECT FROM AUGUST 2023**

**B.Sc. Part II**

**SUBJECT : GEOLOGY**

**Semester – IV**

**DSC-D Theory Course**

**DSC 21D: STRATIGRAPHY**

**Marks 50(02 Credits)**

**Unit I: ( 15 Hours) ( 18-19 lectures )**

Definition, Principle of stratigraphy- stratigraphic correlation, Concepts of Uniformitarianism and catastrophism; ( 3 hours )

Geological Time Scale and stratigraphic classification; Physiographic division of India. ( 3 hours )

Study of following Precambrian succession: Dharwar, Cuddapah, Vindhyan and Delhi Supergroups; ( 9 hours )

**Unit II : ( 15 Hours) ( 18-19 lectures )**

Brief idea of Palaeozoic succession of northwestern Himalaya; ( 5 hours )

Brief idea of Mesozoic succession : Triassic of Spiti; Jurassic of Kutch; Cretaceous of Tiruchirapalli; ( 5 hours )

Study of following type localities: Gondwana with flora and fauna ; Deccan Volcanic Province

( 5 hours )

## **DSC 22D: PALAEONTOLOGY**

**Marks 50(02 Credits)**

### **Unit-I: ( 15 Hours ) ( 18-19 lectures )**

Palaeontology: Definition, Fossils: definition, characters, binomial nomenclature in taxonomy, mode of preservation, condition of fossilization and significance of fossils; ( 5 hours )

Morphology, geological distribution and age of brachiopods, pelecypods, cephalopods. ( 10 hours )

### **Unit II: ( 15 Hours ) ( 18-19 lectures )**

Morphology, geological distribution and age of Trilobite, Echinoidea. ( 4 hours )

Microfossils – Introduction; Foraminifera and its significance ( 3 hours )

Vertebrate Palaeontology – Introduction; Evolution of Horse, Elephant and Man. ( 5 hours )

Plant Fossils – Morphology, Distribution and age of Ptilophyllum, Glossopteris and Gangmopteris ( 3 hours )

## **DSC D- LAB COURSE**

Teaching : 15 Practical turns – each of 3,2 hours ( 4 lectures of 48 minutes )

**Marks 50 (02 Credits)**

## **STRATIGRAPHY AND PALAEONTOLOGY**

I. Morphological characters, systematic position and age of fossil genera pertaining to brachiopods, pelecypods, cephalopods, trilobite and Echinoidea.

II. Preparation of lithostratigraphic maps of India showing distribution of important geological formations.

### **Books Recommended:**

1. Wadia, D.,. Geology of India. Mc Graw Hill Book co.
2. Krishnan, M.S.,. Geology of India and Burma, 6th Edition. CBS Publ.
3. Ravindra Kumar,. Fundamentals of Historical Geology & Stratigraphy of India. Wiley Eastern.
4. Shrock, R.R. & Twenhoffel, W.H.,. Principles of Invertebrate Paleontology. CBS Publ.
5. Swinerton, HH.,. Outlines of Paleontology. Edward Arnold Publishers
6. Jain, P.C. & Anantharaman, M.S.,. Paleontology: Evolution & Animal Distribution. Vishal Publ.
7. Lehmann, U.,. Fossil Invertebrate. Cambridge Univ. Press.
8. Rastogi,. Organic evolution. Kedrnath and Ramnath Publ.