



Estd. 1962  
NAAC 'A' Grade

SHIVAJI UNIVERSITY, KOLHAPUR-416 004. MAHARASHTRA

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शिवाजी विद्यापीठ, कोल्हापूर – 416004.

दुरध्वनी (ईपीएबीएक्स) २६०९००० (अभ्यास मंडळे विभाग— २६०९०९४)

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SU/BOS/Science/8644

Date: 29/08/2019

To,

The Principal,  
College of Non-Conventional Vocational Courses for Woman,  
SIBER, Kolhapur.

**Subject:** Regarding syllabi and Structure of B.Sc. Part- I Environmental Science (Entire)  
CBCS (Sem.I & II) 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, Structure, Subject list, Nature of question paper of **B.Sc. Part- I Environmental Science (Entire) under the Faculty of Science and Technology.**

This syllabi, Structure, Subject list, Nature of question paper shall be implemented from the academic year 2019-2020 (i.e. from June 2019) 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) (Online Syllabus)

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

Thanking you,

Yours faithfully,

Dy Registrar

Copy to:

|   |                                                |    |                                 |
|---|------------------------------------------------|----|---------------------------------|
| 1 | The Dean, Faculty of Science & Technology      | 7  | Appointment Section             |
| 2 | Director, Board of Examinations and Evaluation | 8  | P.G.Seminar Section             |
| 3 | The Chairman, Respective Board of Studies      | 9  | Computer Centre/IT Cell         |
| 4 | B.Sc. Exam                                     | 10 | Affiliation Section (P.G./U.G.) |
| 5 | Eligibility Section                            | 11 | Affiliation Section (T-II)      |
| 6 | O.E. I Section                                 | 12 | P.G.Admission Section           |

# **SHIVAJI UNIVERSITY, KOLHAPUR.**



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Accredited By NAAC with 'A' Grade  
CHOICE BASED CREDIT SYSTEM

Syllabus For

**B.Sc. Part - I**

**Environment Science (Entire)**

**SEMESTER I AND II**

**(Syllabus to be implemented from June, 2019 onwards)**

**B.Sc. Part - I**  
**Environment Science (Entire)**

**SEMESTER I AND II**

**(Syllabus to be implemented from June, 2019 onwards.)**

- ❖ Guidelines shall be as per B. Sc. Regular Programme
- ❖ Rules and Regulations shall be as per B.Sc. Regular Programme except CBCS R.B.Sc.3 Structure of Programme and List of Courses.
- ❖ Preamble :

This syllabus is framed to give sound knowledge with understanding of Environment science to undergraduate students of

B.Sc. Environment Science (Entire) Programme. Students will learn Environment Science as a separate course (subject) from B. Sc. I.

The goal of the syllabus is to make the study of Environment Science popular, interesting and encouraging students for higher studies including research.

**Programme Outcome:**

1. This programme will lay strong foundation of environmental concepts for posts graduate education and research.
2. Helps students in capacity building, developing environmental programmes /projects based on sound technical, environmental and policy matters of Government of India.
3. Develop ability to carry out experiments and provide efficient conclusions.
4. Develop an approach to work for needs of society regarding environment, health, safety considerations.

**Programme Specific Outcome:**

1. This programme will make students to understand the concept of sustainable development.
2. This programme will provide in-depth knowledge to the students in respect of current environmental and safety problems faced by human society and to develop amongst students' scientific attitude based on interdisciplinary approach to enable them to take holistic view in decision taking.

## Structure of Program and List of Courses are as follows:

### Structure of B. Sc. Environment Science (Entire) Programme Semester I & II Structure-I

| S E M E S T E R – I (Duration – 6 Months)                                                                                     |                        |                 |                 |       |  |           |                 |                                                      |        |     |             |     |           |                                 |     |
|-------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------|-----------------|-------|--|-----------|-----------------|------------------------------------------------------|--------|-----|-------------|-----|-----------|---------------------------------|-----|
| Sr. No.                                                                                                                       | Course (Subject) Title | TEACHING SCHEME |                 |       |  |           |                 | EXAMINATION SCHEME                                   |        |     |             |     |           |                                 |     |
|                                                                                                                               |                        | THEORY          |                 |       |  | PRACTICAL |                 |                                                      | THEORY |     |             |     | PRACTICAL |                                 |     |
|                                                                                                                               |                        | Credits         | No. of lectures | Hours |  | Credits   | No. of lectures | Hours                                                | Hours  | Max | Total Marks | Min | Hours     | Max                             | Min |
| 1                                                                                                                             | DSC-A1                 | 2               | 5               | 4     |  | 2         | 4               | 3.2                                                  |        | 2   | 50          | 100 | 35        | PRACTICAL EXAMINATION IS ANNUAL |     |
| 2                                                                                                                             | DSC-A2                 | 2               |                 |       |  |           |                 |                                                      |        | 2   | 50          |     |           |                                 |     |
| 3                                                                                                                             | DSC-A3                 | 2               | 5               | 4     |  | 2         | 4               | 3.2                                                  |        | 2   | 50          | 100 | 35        |                                 |     |
| 4                                                                                                                             | DSC-A4                 | 2               |                 |       |  |           |                 |                                                      |        | 2   | 50          |     |           |                                 |     |
| 5                                                                                                                             | DSC-A5                 | 2               | 5               | 4     |  | 2         | 4               | 3.2                                                  |        | 2   | 50          | 100 | 35        |                                 |     |
| 6                                                                                                                             | DSC-A6                 | 2               |                 |       |  |           |                 |                                                      |        | 2   | 50          |     |           |                                 |     |
| 7                                                                                                                             | DSC-A7                 | 2               | 5               | 4     |  | 2         | 4               | 3.2                                                  |        | 2   | 50          | 100 | 35        |                                 |     |
| 8                                                                                                                             | DSC-A8                 | 2               |                 |       |  |           |                 |                                                      |        | 2   | 50          |     |           |                                 |     |
| 9                                                                                                                             | AECC-A                 | 2               | 4               | 3.2   |  | ----      | ----            | ----                                                 |        | 2   | 50          | 50  | 18        |                                 |     |
| Total                                                                                                                         |                        | 18              | 24              | 19.2  |  | 8         | 16              | 12.8                                                 |        | -   |             | 450 |           |                                 |     |
| S E M E S T E R – II (Duration – 6 Months)                                                                                    |                        |                 |                 |       |  |           |                 |                                                      |        |     |             |     |           |                                 |     |
| 1                                                                                                                             | DSC-B1                 | 2               | 5               | 4     |  | 2         | 4               | 3.2                                                  |        | 2   | 50          | 100 | 35        | As per BOS Guide-lines          |     |
| 2                                                                                                                             | DSC-B2                 | 2               |                 |       |  |           |                 |                                                      |        | 2   | 50          |     |           |                                 |     |
| 3                                                                                                                             | DSC-B3                 | 2               | 5               | 4     |  | 2         | 4               | 3.2                                                  |        | 2   | 50          | 100 | 35        |                                 |     |
| 4                                                                                                                             | DSC-B4                 | 2               |                 |       |  |           |                 |                                                      |        | 2   | 50          |     |           |                                 |     |
| 5                                                                                                                             | DSC-B5                 | 2               | 5               | 4     |  | 2         | 4               | 3.2                                                  |        | 2   | 50          | 100 | 35        |                                 |     |
| 6                                                                                                                             | DSC-B6                 | 2               |                 |       |  |           |                 |                                                      |        | 2   | 50          |     |           |                                 |     |
| 7                                                                                                                             | DSC-B7                 | 2               | 5               | 4     |  | 2         | 4               | 3.2                                                  |        | 2   | 50          | 100 | 35        |                                 |     |
| 8                                                                                                                             | DSC-B8                 | 2               |                 |       |  |           |                 |                                                      |        | 2   | 50          |     |           |                                 |     |
| 9                                                                                                                             | AECC-B                 | 2               | 4               | 3.2   |  | ----      | ----            | ----                                                 |        | 2   | 50          | 50  | 18        |                                 |     |
| Total                                                                                                                         |                        | 18              | 24              | 19.2  |  | 8         | 16              | 12.8                                                 |        | -   |             | 450 |           |                                 |     |
| Grand Total                                                                                                                   |                        | 36              | 48              | 38.4  |  | 16        | 32              | 25.6                                                 |        |     |             | 900 |           |                                 |     |
| • Student contact hours per week : 32 Hours (Min.)                                                                            |                        |                 |                 |       |  |           |                 | • Total Marks for B.Sc.-I (Including English) : 1100 |        |     |             |     |           |                                 |     |
| • Theory and Practical Lectures : 48 Minutes Each                                                                             |                        |                 |                 |       |  |           |                 | • Total Credits for B.Sc.-I (Semester I & II) : 52   |        |     |             |     |           |                                 |     |
| • DSC – Discipline Specific Core course: All papers are compulsory.                                                           |                        |                 |                 |       |  |           |                 |                                                      |        |     |             |     |           |                                 |     |
| • AECC – Ability Enhancement Compulsory Course (A & B)- English                                                               |                        |                 |                 |       |  |           |                 |                                                      |        |     |             |     |           |                                 |     |
| • Practical Examination will be conducted annually for 50 Marks per course (subject).                                         |                        |                 |                 |       |  |           |                 |                                                      |        |     |             |     |           |                                 |     |
| • There shall be separate passing for theory and practical courses.                                                           |                        |                 |                 |       |  |           |                 |                                                      |        |     |             |     |           |                                 |     |
| (A) Non-Credit Self Study Course : Compulsory Civic Courses (CCC)                                                             |                        |                 |                 |       |  |           |                 |                                                      |        |     |             |     |           |                                 |     |
| For Sem I: CCC – I : Democracy, Elections and Good Governance                                                                 |                        |                 |                 |       |  |           |                 |                                                      |        |     |             |     |           |                                 |     |
| (B) Non-Credit Self Study Course : Skill Development Courses (SDC)                                                            |                        |                 |                 |       |  |           |                 |                                                      |        |     |             |     |           |                                 |     |
| For Sem II: SDC – I : Any one from following (i) to (v)                                                                       |                        |                 |                 |       |  |           |                 |                                                      |        |     |             |     |           |                                 |     |
| i) Business Communication & Presentation ii) Event management iii) Personality Development, iv) Yoga & Physical Management v) |                        |                 |                 |       |  |           |                 |                                                      |        |     |             |     |           |                                 |     |
| Resume, Report & proposal writing                                                                                             |                        |                 |                 |       |  |           |                 |                                                      |        |     |             |     |           |                                 |     |

**Structure of B. Sc. Environment Science (Entire) Programme Sem III & IV**  
**Structure – II**

| S E M E S T E R – III (Duration – 6 Months)                                                                           |                         |                 |                 |            |  |           |                                                       |                    |        |     |             |     |           |                                 |                        |     |
|-----------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------|-----------------|------------|--|-----------|-------------------------------------------------------|--------------------|--------|-----|-------------|-----|-----------|---------------------------------|------------------------|-----|
| Sr. No.                                                                                                               | Course (Subject ) Title | TEACHING SCHEME |                 |            |  |           |                                                       | EXAMINATION SCHEME |        |     |             |     |           |                                 |                        |     |
|                                                                                                                       |                         | THEORY          |                 |            |  | PRACTICAL |                                                       |                    | THEORY |     |             |     | PRACTICAL |                                 |                        |     |
|                                                                                                                       |                         | Credits         | No. of lectures | Hours      |  | Credits   | No. of lectures                                       | Hours              | Hours  | Max | Total Marks | Min | Hours     | Max                             | Min                    |     |
| 1                                                                                                                     | DSC-C1                  | 2               | 3               | 2.4        |  | 4         | 8                                                     | 6.4                |        | 2   | 50          | 100 | 35        | PRACTICAL EXAMINATION IS ANNUAL |                        |     |
| 2                                                                                                                     | DSC-C2                  | 2               | 3               | 2.4        |  |           |                                                       |                    |        | 2   | 50          |     |           |                                 |                        |     |
| 3                                                                                                                     | DSC-C3                  | 2               | 3               | 2.4        |  | 4         | 8                                                     | 6.4                |        | 2   | 50          | 100 | 35        |                                 |                        |     |
| 4                                                                                                                     | DSC-C4                  | 2               | 3               | 2.4        |  |           |                                                       |                    |        | 2   | 50          |     |           |                                 |                        |     |
| 5                                                                                                                     | DSC-C5                  | 2               | 3               | 2.4        |  | 4         | 8                                                     | 6.4                |        | 2   | 50          | 100 | 35        |                                 |                        |     |
| 6                                                                                                                     | DSC-C6                  | 2               | 3               | 2.4        |  |           |                                                       |                    |        | 2   | 50          |     |           |                                 |                        |     |
| 7                                                                                                                     | AECC-C                  | 4               | 4               | 3.2        |  | ---       | ---                                                   | ---                |        |     | ---         | --- |           |                                 |                        |     |
|                                                                                                                       | TOTAL                   | 16              | 22              | 17.6       |  | 12        | 24                                                    | 19.2               |        |     | 300         | --- |           |                                 |                        |     |
| S E M E S T E R – IV (Duration – 6 Months)                                                                            |                         |                 |                 |            |  |           |                                                       |                    |        |     |             |     |           |                                 |                        |     |
| 1                                                                                                                     | DSC-D1                  | 2               | 3               | 2.4        |  | 4         | 8                                                     | 6.4                |        | 2   | 50          | 100 | 35        |                                 | As per BOS Guide-lines | 100 |
| 2                                                                                                                     | DSC-D2                  | 2               | 3               | 2.4        |  |           |                                                       |                    |        | 2   | 50          |     |           |                                 |                        |     |
| 3                                                                                                                     | DSC-D3                  | 2               | 3               | 2.4        |  | 4         | 8                                                     | 6.4                |        | 2   | 50          | 100 | 35        |                                 |                        |     |
| 4                                                                                                                     | DSC-D4                  | 2               | 3               | 2.4        |  |           |                                                       |                    |        | 2   | 50          |     |           |                                 |                        |     |
| 5                                                                                                                     | DSC-D5                  | 2               | 3               | 2.4        |  | 4         | 8                                                     | 6.4                |        | 2   | 50          | 100 | 35        |                                 |                        |     |
| 6                                                                                                                     | DSC-D6                  | 2               | 3               | 2.4        |  |           |                                                       |                    |        | 2   | 50          |     |           |                                 |                        |     |
| 7                                                                                                                     | AECC- C<br>AECC- D      | ---             | ---             | ---        |  | ---       | ---                                                   | ---                |        | 3   | 70<br>30    | 100 | 25<br>10  | ---                             | ---                    | --- |
|                                                                                                                       | TOTAL                   | 12<br>28        | 18<br>40        | 14.4<br>32 |  | 12<br>24  | 24<br>48                                              | 19.2<br>38.4       |        |     | 400<br>700  | --- | --        | ---                             | 300                    |     |
| • Student contact hours per week : 32 Hours (Min.)                                                                    |                         |                 |                 |            |  |           | • Total Marks for B.Sc.-II (Including EVS) : 1000     |                    |        |     |             |     |           |                                 |                        |     |
| • Theory and Practical Lectures : 48 Minutes Each                                                                     |                         |                 |                 |            |  |           | • Total Credits for B.Sc.-II (Semester III & IV) : 52 |                    |        |     |             |     |           |                                 |                        |     |
| • DSC : - Discipline Specific Core Course : All papers are compulsory.                                                |                         |                 |                 |            |  |           |                                                       |                    |        |     |             |     |           |                                 |                        |     |
| • AECC- Ability Enhancement Compulsory Course (C) :<br>Environmental Studies: EVS ( Theory – 70 & Project – 30 Marks) |                         |                 |                 |            |  |           |                                                       |                    |        |     |             |     |           |                                 |                        |     |
| • Practical Examination will be conducted annually for100 Marks per course (subject).                                 |                         |                 |                 |            |  |           |                                                       |                    |        |     |             |     |           |                                 |                        |     |
| • There shall be separate passing for theory and practical courses also for Environmental Studies.                    |                         |                 |                 |            |  |           |                                                       |                    |        |     |             |     |           |                                 |                        |     |

**Structure of B. Sc. Environment science (Entire) Programme Sem V & VI**  
**Structure – III**

| S E M E S T E R – V (Duration – 6 Months)                                                                                                                                                                                                                                                                                                                                                                                                       |               |                 |                 |       |  |           |                 |     |                    |        |       |        |          |                                 |       |           |           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------|-----------------|-------|--|-----------|-----------------|-----|--------------------|--------|-------|--------|----------|---------------------------------|-------|-----------|-----------|
| Sr. No.                                                                                                                                                                                                                                                                                                                                                                                                                                         | Subject Title | TEACHING SCHEME |                 |       |  |           |                 |     | EXAMINATION SCHEME |        |       |        |          |                                 |       |           |           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               | THEORY          |                 |       |  | PRACTICAL |                 |     |                    | THEORY |       |        |          | PRACTICAL                       |       |           |           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               | Credits         | No. of lectures | Hours |  | Credits   | No. of lectures |     |                    | Hours  | Hours | Theory | Internal | Min Marks                       | Hours | Max Marks | Min Marks |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                               | DSE-E1        | 2               | 3               | 2.4   |  | 2         | 5               | 4   |                    | 2      | 40    | 10     | 14+4=18  | PRACTICAL EXAMINATION IS ANNUAL |       |           |           |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                               | DSE-E2        | 2               | 3               | 2.4   |  | 2         | 5               | 4   |                    | 2      | 40    | 10     | 14+4=18  |                                 |       |           |           |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                               | DSE-E3        | 2               | 3               | 2.4   |  | 2         | 5               | 4   |                    | 2      | 40    | 10     | 14+4=18  |                                 |       |           |           |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                               | DSE-E4        | 2               | 3               | 2.4   |  | 2         | 5               | 4   |                    | 2      | 40    | 10     | 14+4=18  |                                 |       |           |           |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                               | AECC-E        | 2               | 4               | 3.2   |  | ---       | ---             | --- |                    | 2      | 40    | 10     | 14+4=18  |                                 |       |           |           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                 | TOTAL         | 10              | 16              | 12.8  |  | 8         | 20              | 16  |                    |        | 200   | 50     | ---      |                                 |       |           |           |
| S E M E S T E R – VI (Duration – 6 Months)                                                                                                                                                                                                                                                                                                                                                                                                      |               |                 |                 |       |  |           |                 |     |                    |        |       |        |          |                                 |       |           |           |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                               | DSE-F1        | 2               | 3               | 2.4   |  | 2         | 5               | 4   |                    | 2      | 40    | 10     | 14+4=18  | As per BOS Guidelines           | 50    | 18        |           |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                               | DSE-F2        | 2               | 3               | 2.4   |  | 2         | 5               | 4   |                    | 2      | 40    | 10     | 14+4=18  |                                 | 50    | 18        |           |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                               | DSE-F3        | 2               | 3               | 2.4   |  | 2         | 5               | 4   |                    | 2      | 40    | 10     | 14+4=18  |                                 | 50    | 18        |           |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                               | DSE-F4        | 2               | 3               | 2.4   |  | 2         | 5               | 4   |                    | 2      | 40    | 10     | 14+4=18  |                                 | 50    | 18        |           |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                               | AECC-F        | 2               | 4               | 3.2   |  | ---       | ---             | --- |                    | 2      | 40    | 10     | 14+4=18  |                                 | ---   | ---       | ---       |
| TOTAL                                                                                                                                                                                                                                                                                                                                                                                                                                           |               | 10              | 16              | 12.8  |  | 8         | 20              | 16  |                    |        | 200   | 50     | ---      |                                 |       |           |           |
| GRAND TOTAL                                                                                                                                                                                                                                                                                                                                                                                                                                     |               | 20              | 32              | 25.6  |  | 16        | 40              | 32  |                    |        | 400   | 100    | --       | ---                             | 200   |           |           |
| <div>• Student contact hours per week : 32 Hours (Min)</div> <div>• Theory and Practical Lectures : 48 Min. Each</div> <div>• DSE- Discipline Specific Elective : All papers are compulsory.</div> <div>• AECC- Ability Enhancement Compulsory Course (E &amp; F) : English</div> <div>• Practical Examination will be conducted annually for 200 Marks.</div> <div>• There shall be separate passing for theory, internal and practical.</div> |               |                 |                 |       |  |           |                 |     |                    |        |       |        |          |                                 |       |           |           |
| <b>(A) Non-Credit Self Study Course : Compulsory Civic Courses (CCC)</b><br><b>For Sem V: CCC – II : Constitution of India and Local Self Government</b>                                                                                                                                                                                                                                                                                        |               |                 |                 |       |  |           |                 |     |                    |        |       |        |          |                                 |       |           |           |
| <b>(B) Non-Credit Self Study Course : Skill Development Courses (SDC)</b><br><b>For Sem VI: SDC – II:</b> Any one from following (vi) to (x)<br>vi) Interview & Personal Presentation Skill, vii) Entrepreneurship Development Skill, viii) Travel & Tourism, ix) E-Banking & Financial Services, x) RTI & Human Right Education (HRE), IPR & Patents                                                                                           |               |                 |                 |       |  |           |                 |     |                    |        |       |        |          |                                 |       |           |           |

**CBCS B. Sc.: Environment Science (Entire): List of courses:**

**i) B. Sc Environment Science: Part 1 (Sem I & II)**

| Course code     | Name of Course                                   | Course code     | Name of Course                                          |
|-----------------|--------------------------------------------------|-----------------|---------------------------------------------------------|
| <b>Sem I</b>    |                                                  | <b>Sem II</b>   |                                                         |
| <b>DSC-A1</b>   | Ecology & Ecosystem                              | <b>DSC-B1</b>   | Fundamental of Environmental Pollution -2 (air & noise) |
| <b>DSC-A2</b>   | Natural Resources                                | <b>DSC-B2</b>   | Biological Diversity and Conservation                   |
| <b>DSC-A3</b>   | Fundamentals of Geosciences                      | <b>DSC-B3</b>   | Climate Change and Sustainable Development              |
| <b>DSC-A4</b>   | Fundamentals of Environmental pollution-1[Water] | <b>DSC-B4</b>   | Forest Management                                       |
| <b>DSC-A5</b>   | Fundamentals of environmental Science            | <b>DSC-B5</b>   | Solid and Hazardous Waste management                    |
| <b>DSC-A6</b>   | Soil Science                                     | <b>DSC-B6</b>   | Occupational Health & Safety                            |
| <b>DSC-A7</b>   | Fundamentals of Environmental Chemisrty          | <b>DSC-B7</b>   | Remote sensing & GIS                                    |
| <b>DSC-A8</b>   | Fundamentals of Environmental Biology            | <b>DSC-B8</b>   | Computer Applications                                   |
| <b>AECC – A</b> | English – I                                      | <b>AECC – B</b> | English – II                                            |

**Practical**

|               |                                                            |               |                                                             |
|---------------|------------------------------------------------------------|---------------|-------------------------------------------------------------|
| <b>DSC-P1</b> | Lab Course I<br>(Based on DSC-A1, DSC-A2, DSC-A3, DSC-A4 ) | <b>DSC-P3</b> | Lab Course III<br>(Based on DSC-B1, DSC-B2, DSC-B3, DSC-B4) |
| <b>DSC-P2</b> | Lab Course II<br>(Based on DSC-A5, DSC-A6, DSC-A7, DSC-A8) | <b>DSC-P4</b> | Lab Course IV<br>(Based on DSC-B5, DSC-B6, DSC-B7, DSC-B8)  |

DSC EVS: - Discipline Specific Core Course B.Sc. (Environment Science)

AECC: - Ability Enhancement Compulsory Course: Compulsory English

ii) **B.Sc. Environment Science:Part 2 (Sem III & IV)**

| Course code     | Name of Course                                   | Course code     | Name of Course                                |
|-----------------|--------------------------------------------------|-----------------|-----------------------------------------------|
| <b>Sem III</b>  |                                                  | <b>Sem IV</b>   |                                               |
| <b>DSC-C1</b>   | Disaster Management-1<br>(Natural)               | <b>DSC-D1</b>   | Environmental Microbiology                    |
| <b>DSC-C2</b>   | Biostatistics                                    | <b>DSC-D2</b>   | Environmental Management<br>System & Audit    |
| <b>DSC-C3</b>   | Environmental Ethics and<br>Environmental Issues | <b>DSC-D3</b>   | Environmental Engineering -<br>2[waste water] |
| <b>DSC-C4</b>   | Environmental Engineering -<br>1[water]          | <b>DSC-D4</b>   | Environmental Education &<br>policy           |
| <b>DSC-C5</b>   | Environmental impact<br>Assessment               | <b>DSC-D5</b>   | Environmental Economics                       |
| <b>DSC-C6</b>   | Environmental Biotechnology                      | <b>DSC-D6</b>   | Disaster Management–II(Man<br>made)           |
| <b>AECC – C</b> | Environmental Studies<br>(Theory)                | <b>AECC – D</b> | Environmental Studies<br>(Project)            |

**AECC-C: - Ability Enhancement Compulsory Course: Environmental Studies**

**Practical**

|                |                                                       |               |                                                         |
|----------------|-------------------------------------------------------|---------------|---------------------------------------------------------|
| <b>DSC-P5</b>  | Lab Course V<br>(Based on DSC-C1, DSC-C2,<br>DSC-C3)  | <b>DSC-P7</b> | Lab Course VII<br>(Based on DSC-D1, DSC-D2,<br>DSC-D3)  |
| <b>DSC -P6</b> | Lab Course VI<br>(Based on DSC-C4, DSC-C5,<br>DSC-C6) | <b>DSC-P8</b> | Lab Course VIII<br>(Based on DSC-D4, DSC-D5,<br>DSC-D6) |

iii) **B. Sc. Environment Science:Part 3 (Sem V & VI)**

| Course code     | Name of Course                               | Course code     | Name of Course                     |
|-----------------|----------------------------------------------|-----------------|------------------------------------|
| <b>Sem V</b>    |                                              | <b>Sem VI</b>   |                                    |
| <b>DSE-E1</b>   | Land and water management                    | <b>DSE-F1</b>   | Environmental Toxicology           |
| <b>DSE-E2</b>   | Environmental Legislation                    | <b>DSE-F2</b>   | Ecorestoration                     |
| <b>DSE-E3</b>   | Carbon Sequestration & Ecological Footprints | <b>DSE-F3</b>   | Sustainable Agricultural Practices |
| <b>DSE-E4</b>   | Wildlife Management                          | <b>DSE-F4</b>   | Ecotourism                         |
| <b>AECC – E</b> | English – III                                | <b>AECC – F</b> | English – IV                       |

**Practical**

|                 |                                            |                |                                               |
|-----------------|--------------------------------------------|----------------|-----------------------------------------------|
| <b>DSC-P9</b>   | Lab Course IX<br>(Based on DSC-E1, DSC-E2) | <b>DSC-P11</b> | Lab Course XI<br>(Based on DSC-F1, DSC- F2 )  |
| <b>DSC -P10</b> | Lab Course X<br>(Based on DSC-E3, DSC-E4 ) | <b>DSC-P12</b> | Lab Course XII<br>(Based on DSC-F3, DSC- F4 ) |

**Semester I**  
**Ecology and Ecosystem – Paper I**  
**(DSC-A1 – Ecology and Ecosystem)**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

**Course Outcome:**

1. Understand the basic concepts regarding ecology and ecosystem.
2. Get acquainted with biogeochemical cycles and succession.

| Unit                                                                                                                                                                                                                                                                                                                                                                                                                                     | Lecture Hours |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Unit I</b>                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>15</b>     |
| <b>A: Ecology</b><br>Definition, Scope and basic principles of ecology and environment.<br>Biological levels of organization, population, community, ecosystem and biosphere.<br>Climatic factors - Light, temperature, water and precipitation.<br>Population: Basic concepts, population characteristics – density, natality, mortality, immigration, emigration<br>Age-structure, population growth.<br>Ecological niche and habitat. | <b>8</b>      |
| <b>B: Ecosystems</b><br>Ecosystem: Basic concepts, components of ecosystem.<br>Trophic levels, food chains and food webs.<br>Ecological pyramids, ecosystem functions.<br>Energy flow in ecological systems, energy efficiencies<br>Positive and negative interactions among populations – competition, predation, parasitism, mutualism.                                                                                                | <b>7</b>      |
| <b>Unit II</b>                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>15</b>     |
| <b>A: Biogeochemical Cycles</b><br>Biogeochemical Cycles: Importance, gaseous and sedimentary cycles.<br>Carbon, Nitrogen, Phosphorus and Sulphur Cycles.<br>Global Oxygen Cycles.<br>Hydrological cycles.                                                                                                                                                                                                                               | <b>8</b>      |
| <b>B: Succession</b><br>Succession: Concepts of succession, Types of Succession.<br>Trends in succession.<br>Climax and stability.<br>Major biomes of the world.<br>Characteristics of terrestrial fresh water and marine ecosystems.<br>Forests, grasslands, lake, river and marine ecosystems of India.                                                                                                                                | <b>7</b>      |

**SUGGESTED BOOKS:**

1. Muller-Dombois, D. and Ellenberg, H. (1974). Aims and Methods of Vegetation Ecology, Wiley, New York.
2. Odum, E.P. (1983), Basic Ecology, Sanders, Philadelphia.
3. Robert Ricklefs (2001). The Ecology of Nature. Fifth Edition. W.H. Freeman and Company.
4. Singh K.P. and J.S. Singh (1992). Tropical Ecosystems: Ecology and Management. Wiley Eastern Limited, Lucknow, India.
5. Singh, J.S. (ed.) 1993. Restoration of Degraded Land: Concepts and Strategies. Rastogi Publications, Meerut.
6. Smith, R.L. (1996). Ecology and Field Biology, Harper Collins, New York

**Semester I**  
**Natural Resources – Paper II**  
**(DSC-A2 – Natural Resources)**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

**Course Outcome:**

1. Introduction to the concept of natural resources and its classification.
2. Understanding natural resources of India.

| Unit                                                                                                                                                                                                                                                                                                                                                                 | Lecture Hours |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Unit I</b>                                                                                                                                                                                                                                                                                                                                                        | <b>15</b>     |
| <b>A: Classification of Natural Resources</b><br>Definition, Concept of natural resources and classification of resources-Renewable and non-renewable resources, Advantages and disadvantages of Renewable and non-renewable resources. Energy use pattern in world.<br>Energy scenario at national level and its impacts on environment                             | <b>7</b>      |
| <b>B: Natural Resources of India</b><br>Natural resources of India with Reference to : occurrence, distribution and utilization with special reference to<br>i)Land resources ii)Soil resources iii)Mineral resources<br>Mineral Resources: Utilization of metallic minerals (Iron, Aluminum and Manganese) and non-metallic minerals (Mica, Asbestos, Common Salt). | <b>8</b>      |
| <b>Unit II</b>                                                                                                                                                                                                                                                                                                                                                       | <b>15</b>     |
| <b>A:Forest and Wildlife Resources</b><br>Forest and wildlife resources: Concepts, Forest resources: Forest vegetation, status and distribution of forest and wildlife resources, contribution as resource. forest cover and types, Major and minor forest products                                                                                                  | <b>7</b>      |
| <b>B:Conventional and Non-conventional Resources</b><br>Eenergy demand analysis<br>Fundamental of Energy: Energy; work and power; different forms of energy.Conventional Energy Sources and Technology: Coal, petroleum; natural gas, nuclear energy, Non conventional resources; solar, water, wind, tidal, geothermal resources, biomass energy                    | <b>8</b>      |

**SUGGESTED BOOKS:**

1. Cubbage, Frederick, Jay O’Laughlin, and Nils Peterson. 2015 (in preparation). Natural Resource Policy. Waveland Press. Chapters available on-line at NC State University electronic reserves.
2. Chaudhuri AB and Sarkar DD (2003) Megadiversity Conservation, Flora, Fauna and Medicinal Plants of India’s Hotspots. Daya Publishing House, New Delhi.
3. Environmental Resources by Mathur
4. Singh MP, Singh BS and Soma S. Dey (2004) Conservation of Biodiversity and Natural Resources. Daya Publishing House, New Delhi.
5. Singh, B. K. 2004: Biodiversity Conservation and Management, Mangaldeep Publications, Jaipur
6. Mital, K. M. 1997: Non-conventional Energy System, Wheeler Publishers, New Delhi

7. Singh, A. K. 1987: Forest Resources, Ecology and Environment, Concept Publishing Co., New Delhi
8. Sarma, P. K.: Forest Resources and their Utilization in India, Mittal Publishers, New Delhi
9. Agrawal, V. P.: Forestsin India, Oxford & IBH, New Delhi
10. Tyner, W.E.: Energy Resources and Economic Development in India, Allied Pub. Pvt. Ltd.
11. Mital, K.M. 1997: Non-conventional Energy System, Wheeler Publishers, New Delhi
12. Pachauri, R. K.: Energy, Environment and Development, Vol. I & II, HarAnand Pub. Pvt. Ltd

**Semester I**  
**Fundamentals of Geoscience – Paper III**  
**(DSC-A3 – Fundamentals of Geoscience)**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

**Course Outcome:**

1. Understand origin of earth and different theories of evolution.
2. Awareness about various phenomena taking place in atmosphere.

| <b>Unit</b>                                                                                                                                                                                                                                                                                                             | <b>Lecture Hours</b> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| <b>Unit I</b>                                                                                                                                                                                                                                                                                                           | <b>15</b>            |
| <b>A: Origin of Earth and Theories of Evolution</b><br>Origin of Earth, Primary geochemical differentiation, Different types Rocks and Minerals, Control on formation of landforms-tectonic including plate tectonics and climatic<br>Theories of Evolution- Wagoner's Continental drift Theory, Plate tectonic Theory  | <b>8</b>             |
| <b>B: Hydrosphere and Trace Elements</b><br>Water Resources and Environment: Global Water Balance. Origin and composition of sea water.<br>Introduction to trace elements, Classification of trace elements, trace elements and health, possible effects of trace elements, biochemical factors in environmental health | <b>7</b>             |
| <b>Unit II</b>                                                                                                                                                                                                                                                                                                          | <b>15</b>            |
| <b>A: Weather and Atmospheric Phenomenon</b><br>Concept of weather, climate, meteorology,<br>Earth's thermal environment & seasons, Coriolis force,<br>Indian monsoon, Droughts,<br>El Nino phenomenon, La Nina phenomenon, its effects on rainfall pattern                                                             | <b>8</b>             |
| <b>B: Energy Budget and Temperature Inversion</b><br>Energy budget of earth, Albedo, Heat island<br>Lapse rate, Types-ELR, DALR & WALR<br>Temperature inversion; Types-radiation, advection, frontal, subsidence, turbulence<br>Types of interaction of solar rays with atmosphere                                      | <b>7</b>             |

**SUGGESTED BOOKS:**

1. Valdiya K.S., Environmental Geology: Indian Context, Tata McGraw Hill
2. D.S. Lal(1989), Essentials of Climatology, Chitanya Publishing House, Allahabad
3. T.D. Biswas, & S. K. Mukharjee, Tata McGraw-Hill Education
4. Dilip Kumar das(2<sup>nd</sup> Edition) Dilip Kumar Das, Kalyani Publishers
5. Environmental Geology(9<sup>th</sup> edition) Kellar E.A., Prentice Hall
6. Environmental Science by S. C. Santra
7. Soil Geology by A. K. Koley
8. Concepts in Geology by A. K. Koley
9. Foundation of Earth science by F. K. Lutgens and E. J. Turback

**Semester I**  
**Fundamentals of Environmental Pollution I (Water) – Paper IV**  
**(DSC-A4 – Fundamentals of Environmental Pollution I (Water))**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

**Course Outcome:**

1. Explain water pollution, its types and effects on living organisms and environment.
2. Analyse physico-chemical parameters in relation to water.

| Unit                                                                                                                                                                                                                                                                                                                                                          | Lecture Hours |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Unit I</b>                                                                                                                                                                                                                                                                                                                                                 | <b>15</b>     |
| <b>A: Water Pollution, Classification and Impacts</b><br>Definition, classification of water pollution-groundwater pollution, surface water pollution, marine pollution<br>Sources of water pollution-point and non point sources,<br>Impacts of water pollution on human, plants & animals                                                                   | <b>8</b>      |
| <b>B: Water Quality Parameters</b><br>Introduction to various water quality parameters and their measurement i.e. pH, EC, Turbidity, TDS, hardness, chloride, Salinity, DO, BOD, COD and contaminants<br>Sampling methods: Purpose of sampling, different types of samples, collection methods.                                                               | <b>7</b>      |
| <b>Unit II</b>                                                                                                                                                                                                                                                                                                                                                | <b>15</b>     |
| <b>A: Eutrophication and Heavy Metal Pollution</b><br>Eutrophication, Types of Eutrophication, Causes of Eutrophication, it's effects on water quality and aquatic animals, Preventive measures of eutrophication<br>Heavy metal pollution (Pb, Hg, Cd, Ar) & effect, bioaccumulation, bio magnification, pesticide, case studies – Itai-Itai, Minamata etc.) | <b>7</b>      |
| <b>B: Treatments Provided to Water</b><br>Drinking water standards, effluent standards,<br>Characteristics of domestic waste, characteristics of agricultural waste, Characteristics of industrial waste<br>Water and waste water treatments i.e. Primary Treatment to waste water, Secondary Treatment, Tertiary / advanced treatment                        | <b>8</b>      |

**SUGGESTED BOOKS:**

1. Environmental Pollution of Cadmium by Rohatgi
2. Chemical and Biological Methods for Water Pollution Studies by Trivedy and Goel
3. Water Pollution and Management by C.K. Vershney
4. Responses to Oil and Chemical Marine Pollution by Cormack D. (1993), Applied Science Publishers, New York
5. Soil and Water Conservation Engineering by Schwab, SD, Frevert, RK, Edminster, TW and Barns, KK, John Wiley and Sons.
6. Water Pollution – Causes, Effects & Control by : P.K.Goel-1997
7. Elements of Environmental science and Engineering by Meenakshi P.
8. Manual of Environmental Analysis by Aery NC
9. Fundamentals of water Pollution by De Arnab Kumar

**Semester I**  
**Fundamentals of Environmental Science– Paper V**  
**(DSC-A5 – Fundamentals of Environmental Science)**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

**Course Outcome:**

1. Get acquainted with interaction between man and environment.
2. Awareness about various environmental issues such as global warming, ozone depletion, deforestation etc.

| Unit                                                                                                                                                                                                                                                                                                              | Lecture Hours |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Unit I</b>                                                                                                                                                                                                                                                                                                     | <b>15</b>     |
| <b>A: Concept of Environmental Science</b><br>Definition, Principles & Scope of environmental science.<br>Interactions between earth, man & environment, concept of sustainable development.<br>Laws of thermodynamics, heat transfer process, mass energy transfer across various interfaces, materials balance. | <b>7</b>      |
| <b>B: Atmosphere, Hydrosphere, Lithosphere</b><br>Structure & Composition of atmosphere, its layers- troposphere, stratosphere, mesosphere, thermosphere<br>hydrosphere, lithosphere- crust, mantle and core,<br>Biosphere meaning and its limits                                                                 | <b>8</b>      |
| <b>Unit II</b>                                                                                                                                                                                                                                                                                                    | <b>15</b>     |
| <b>C: Meteorological Parameters</b><br>Meteorological Parameters i.e. pressure, temperature, precipitation, humidity and its types, radiation & wind velocity and their units, instruments used for measurement                                                                                                   | <b>7</b>      |
| <b>D: Biogeographic Provinces and Environmental Issues</b><br>Biogeographic provinces of world<br>Agroclimatic zones of India<br>Major Environmental Issues in India- green house gas emission, ozone depletion, deforestation, depletion of fossil fuels and its impacts on mankind and animals                  | <b>8</b>      |

**SUGGESTED BOOKS:**

1. Environmental Chemistry – II Edition by A.K. De
2. Principles of Environmental Science by Watt, K.E.F. (1973), McGraw-Hill Book Company
3. Environmental Science by Nobel, B.J. and Kormandy, E.J. (1981), The Way the World Works, Prentice-Hall Inc., N.J.
4. Environmental Science by Turk A., Turk, J. Wittes J.T. and Wittes, R.E. (1978)
5. Ecology & Environment by P.D.Sharma
6. Environmental Science : An Introduction by G. T. Miller-1991
7. Environmental Science by S.C. Santra
8. Basic Concepts in Environmental Management by Mackenthun and Kenneth M.
9. Environmental studies by Joseph, Benny
10. Perspectives in Environmental studies by Kaushik, Anubha
11. Introduction to Environmental Management by Bal, Anand S.
12. Environmental studies by Uberoi N. K.

**Semester I**  
**Soil Science– Paper VI**  
**(DSC-A6– Soil Science)**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

**Course Outcome:**

1. Understand the process of soil formation with respect to soil properties, soil chemistry.
2. Inculcation of various soil conservation practices and understanding other aspects such as bioremediation and biofertilizers.

| Unit                                                                                                                                                                                                                                                                                                                 | Lecture Hours |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Unit I</b>                                                                                                                                                                                                                                                                                                        | <b>15</b>     |
| <b>A: Soil Formation and Soil Profile</b><br>Definition of soil, Classification, Types, Soil formation, Physical, chemical & biological weathering<br>Soil Profile – Horizon A, B, C & D<br>Soil Types in India                                                                                                      | 7             |
| <b>B: Soil Properties and Pollution</b><br>Physical properties of soil – Texture, Structure & other chemical, Physical & biological properties<br>Soil Microbes, Types & their role in soil fertility<br>Soil pollution, types, sources & effects on plants and animals                                              | 8             |
| <b>Unit II</b>                                                                                                                                                                                                                                                                                                       | <b>15</b>     |
| <b>A: Soil Chemistry and Bioremediation</b><br>Soil Chemistry – Acidic & alkaline soils, organic manures & green manures, bio fertilizers its types and advantages<br>Effects of fertilizers on soil properties<br>Bioremediation, soil erosion, types of agents & effects                                           | 7             |
| <b>B: Soil Conservation</b><br>Soil conservation : methods, practices, land treatment<br>Need & practices for agricultural lands, physical, mechanical & biological practices<br>Points to be considered for choice of conservation practice<br>Bunding, terracing, plantations and other practices, it's advantages | 8             |

**SUGGESTED BOOKS:**

1. Land Pollution, Causes and Control by Harrusson and Laxon
2. Soil and Water Conservation Engineering by Schwab, SD, Frevert, RK, Edminster, TW and Barns, KK, John Wiley and Sons.
3. Manual of Soil & water Conservation Practices by Carmel singh, C. Venkataramamnan, G. sastry, B.p. Joshi
4. Principle of Soil Science by Rai M. M.
5. Basic Concepts in Soil Science by Kolay A. K.
6. Watershed Management by Murty J. V. S.

**Semester I**  
**Fundamentals of Environmental Chemistry– Paper VII**  
**(DSC-A7 – Fundamentals of Environmental Chemistry)**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

**Course Outcome:**

1. Understand the basic concepts and scope of environmental chemistry.
2. Study the mechanism of various equipments utilized for environmental analysis..

| Unit                                                                                                                                                                                                                                                                                                                                                                                      | Lecture Hours |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Unit I</b>                                                                                                                                                                                                                                                                                                                                                                             | <b>15</b>     |
| <b>A: Concept and Scope of Environmental Chemistry</b><br>Introduction –<br>Concept and Scope of environmental chemistry.<br>Segments of environmental and various interactive reaction occurring between these segments.<br>Green Chemistry.                                                                                                                                             | 7             |
| <b>B: Pesticides and Problems Related to It</b><br>Pesticides: Classification, degradation, analysis, pollution due to pesticides and DDT problems<br>Stoichiometry, Gibb's energy, Chemical potential, chemical equilibria, acid base reactions, solubility product, solubility of gases in water, the carbonate system, radionuclides.                                                  | 8             |
| <b>Unit II</b>                                                                                                                                                                                                                                                                                                                                                                            | <b>15</b>     |
| <b>A: Heavy Metals and Their Impacts</b><br>Thermo chemical and photochemical reactions in the atmosphere.<br>Chemistry of water –<br>Chemical & Physical properties, Hydrogen bonding, Interaction with gases & earth minerals<br>Carcinogenic compounds and their effects.<br>Aflatoxin occurrence, chemical composition and properties<br>metabolism, acute toxicity, carcinogenicity. | 8             |
| <b>B: Environmental Analysis and Instrumentation</b><br>Environmental Analysis –<br>Solution Concentration, (Normality, Molarity, ppm, equivalent weight etc.)<br>Titrimetric methods.<br>Instrumentation Principle & working pH meter, conductivity meter, spectrophotometer, flame photometer                                                                                           | 7             |

**SUGGESTED BOOKS:**

- 1 Vogel's Textbook of quantitative Chemical Analysis, 5<sup>th</sup> edition by J H Basett, J. Nendham and Denny, R.C.
- 2 Handbook of Analytical Instruments by Khandpur R.S.
- 3 Environmental Pollution Analysis by Khopkar S.M.
- 4 Instrumental methods of chemical analysis by BK Sharma
- 5 Instrumental methods of analysis by Willard, Meritt, Dean and Settle
- 6 S Watts and L. Halliwell; Essential Environmental Science and Techniques, Routledge (1996)
- 7 Elements of Environmental Chemistry by H. V. Jadhav
- 8 Environmental Chemistry by De Anil K.

- 9 Instrumental Methods of Analysis by Chatwal and Anand
- 10 Manual of Environmental Analysis by Aery N. C.

**Semester I**  
**Fundamentals of Environmental Biology– Paper VIII**  
**(DSC-A8 – Fundamentals of Environmental Biology)**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

**Course Outcome:**

1. Identify the scope and importance of environmental biology.
2. Awareness about ecological adaptations and marine biology.

| Unit                                                                                                                                                                                                                                                                                                                                                                                                 | Lecture Hours |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Unit I</b>                                                                                                                                                                                                                                                                                                                                                                                        | <b>15</b>     |
| <b>A: Introduction to Biology</b><br>Introduction to biology, branches, scope & importance<br>Origin of life, evolution – eras, periods, epochs, events<br>Explosions & mass extinctions & Paleontological evidences for these<br>Biogeography – meaning, biogeographical profile of world, physical, microbial, floral & faunal characteristics of each biogeographic zone<br>ecotone, edge effects | <b>8</b>      |
| <b>B: Biodiversity of India</b><br>Biological diversity of India: Major genera, species, subspecies<br>Definition and nature, India's biogeographical history, physiography, climate and its impact on biodiversity. Indian forest and vegetation types                                                                                                                                              | <b>7</b>      |
| <b>Unit II</b>                                                                                                                                                                                                                                                                                                                                                                                       | <b>15</b>     |
| <b>A: Marine Biology and Species in Red List</b><br>Endangered, Endemic and Extinct Species of India: Threatened species categories of IUCN, threatened species of plants and animals in India and their reasons, Red data books<br>Marine Biology: biology of coastal and open sea environment, their distribution, adaptation and productivity                                                     | <b>8</b>      |
| <b>B: Ecological adaptations and Bioresources</b><br>Ecological adaptations under various environmental conditions.<br>Bio-resources – Forest, Agricultural crops, livestock, fisheries.<br>Use of bio-resources, threats – over exploitation, habitat loss, invasive spp. etc.                                                                                                                      | <b>7</b>      |

**SUGGESTED BOOKS:**

1. Environmental Biology by P.S. Verma and V.K. Agrawal
2. Environmental Biology by Reiss and Michael
3. Environmental Microbiology by Buckley R. G.
4. Principles of Ecology By R.J. Rutman and S.D. Wratten
5. Ecology by Mohan P. Arora
6. Environmental Microbiology by K. Vijaya Ramesh
7. Animal Ecology and Environmental Biology by H. R. Singh

**Semester II**  
**Fundamentals of Environmental pollution II (Air & Noise) – Paper I**  
**(DSC-B1 – Fundamentals of Environmental pollution II (Air & Noise))**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

**Course Outcome:**

1. Study the sources and effects of air and noise pollution.
2. Explain the working of air pollution controlling devices and institutions working for the cause of environment.

| Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Lecture Hours |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Unit I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>15</b>     |
| <b>A: Properties of Atmosphere</b><br>Physical and chemical properties of atmosphere,<br>Solar radiation – Solar spectrum Insolation, Factors affecting insolation<br>Atmospheric stability: concept and types, Pasquill stability classification<br>Mixing heights, plume behavior, Dispersion of pollutants in atmosphere                                                                                                                                                               | <b>8</b>      |
| <b>B: Air Pollution and Sources</b><br>Air Pollution, Definition, terminology,<br>Sources of air pollution,<br>Classification of air pollutants, National Ambient Air Quality Monitoring Standards<br>Aerosols: Sources, classification, size, adverse effects, cloud seeding                                                                                                                                                                                                             | <b>7</b>      |
| <b>Unit II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>15</b>     |
| <b>A: Pollution Controlling Devices and Institutions</b><br>Air pollution control: stationary sources – settling chamber, cyclone, Wet collector,<br>Fabric filter and Electro Static Precipitators<br>Green house effect (Global Warming), Ozone layer depletion<br>Acid Rain, Effect of air pollution and acid rain on plants, animals and property<br>IPCC (Intergovernmental Panel on Climate Change), UNFCCC (United Nations Framework Convention on Climate Change), Kyoto Protocol | <b>8</b>      |
| <b>B: Noise Pollution</b><br>Noise pollution, definition, sources<br>Effects of noise pollution on human beings and animals<br>Noise control measures<br>Characteristics of sound waves- Sound Level, Frequency, Wavelength, Sound pressure                                                                                                                                                                                                                                               | <b>7</b>      |

**SUGGESTED BOOKS:**

1. Air Pollution By: Arthur C Stern. 3rd Edn. Vol. I, II, VI, VII, Academic Press (1986)
2. Air Quality By: Thad Godish, 3rd Edition, Lewis Publishers, New York (1997)
3. Understanding Environmental Pollution By: Marquita K Hill. Cambridge University Press (1997)

4. Pollution: Causes, Effects & Control Edited By: Roy M Harrison. 2nd Edn. The Royal Society of Chemistry Cambridge (1995)
5. Environmental Chemistry: A Global Perspective By: Gary W vanLoon& Stephen J Duffy. Oxford University Press (2000)
6. Handbook of Air Pollution Control Engineering & Technology By: John C Mycock, John D McKenna & Louis Theodore. Lewis Publishers, CRC London (1995)
7. Handbook of Pollution Control Processes By: Robert Noyes. JaicoPublisheing House, Mumbai (2001)
8. An Introduction to Air Pollution By: RK Trivedy& PK Goel. ABD Publishers Jaipur, India (2003)
9. Air Pollution By MN Rao& HVN Rao. Tata McGraw-Hill Publishing company Ltd., New Delhi (1994)
10. The Atmosphere by Tarbuch and Lutgen
11. Introduction to Atmospheric Chemistry by Hoobs, Peter V

**Semester II**  
**Biological Diversity and Conservation– Paper II**  
**(DSC-B2 – Biological Diversity and Conservation)**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

**Course Outcome:**

1. Study the concept, need, types and scope of biodiversity.
2. Know various biodiversity conservation measures and organizations working for it.

| Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Lecture Hours |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Unit I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>15</b>     |
| <b>A: Biodiversity Concept and Disciplines</b><br>Biodiversity concept, definition, need for assessment, scope of biodiversity studies various disciplines of Biodiversity- Evolutionary, taxonomic, Ecology, Genetics, Population, composition and level of biodiversity, Ecological, Organismal, genetic and cultural diversity, alpha-Beta-Gama diversity, process of diversification at genetic and species level<br>Value of biodiversity – direct & indirect value – food, timber, medicinal & ornamental.       | <b>8</b>      |
| <b>B: Loss of Biodiversity and It's Causes</b><br>Centers of diversity, concept of endemism, types & endemic species with example.<br>Loss of biodiversity, Founder Effects, Demographic bottlenecks, Genetic Drift, Inbreeding Depression, IUCN Threatened species Categories<br>Loss of Ecosystem Diversity: Factors Affecting Ecosystem Degradation & Loss fragmentation, habitat loss, pollution & over exploitation, change in habitat, effects of climate change, Human wildlife conflict                        | <b>7</b>      |
| <b>Unit II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>15</b>     |
| <b>A: Conservation Measures</b><br>Necessity of biodiversity conservation, Methods of biodiversity conservation: In situ (Biosphere reserves and national parks) & ex situ (Germplasm collection, botanical garden, seed banks, pollen banks, DNA banks) conservation, Conservation of genetic diversity, Species diversity and ecosystem diversity<br>Concept of hotspot, India as mega – biodiversity country<br>Conservation of biodiversity, need & awareness, Introduction, Biosphere Reserves and National Parks | <b>8</b>      |
| <b>B: Organizations and People's Movement</b><br>Organizations involved in biodiversity conservation IUCN, UNEP, UNESCO, WWF, ICSU, FAO, WCMC, ISBI. Organizations Involved in Financing Biodiversity<br>Introduction, International Biodiversity Law. Convention on Biological Diversity, Ramsar Convention,<br>National Legislation: Environmental Protection Act 1986, Biodiversity Act, Biodiversity Rules and Regulations<br>People's movement for biodiversity conservation, Biodiversity awareness programme    | <b>7</b>      |

**SUGGESTED BOOKS:**

1. Chaudhuri AB and Sarkar DD (2003) Megadiversity Conservation, Flora, Fauna and Medicinal Plants of India's Hotspots. Daya Publishing House, New Delhi.
2. Singh, B. K. 2004: Biodiversity Conservation and Management, Mangaldeep Publications, Jaipur
3. Krishnamurthy, K.V. 2003. An Advanced Textbook on Biodiversity – Principles and Practice, Oxford and IBH Publishing, New Delhi.
4. Kotwal, P.C. and S. Banerjee. Biodiversity Conservation – In Managed forest and Protected areas, (2002). Agrobios, India
5. Animal Ecology and Environmental Biology by H. R. Singh
6. Plant Diversity Hotspots in India – An Overview by Hajra P.K. and V. Mudgal
7. Plant Ecology by John E. Weaver and F.E. Clement
8. Restoration of Endangered Species by Bowles M.L. and Whelan C.J.
9. Understanding Biodiversity- Life, sustainability and Equity by Ashish Kothari

**Semester II**  
**Climate Change and Sustainable Development – Paper III**  
**(DSC-B3– Climate Change and Sustainable Development)**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

**Course Outcome:**

1. Study the causes and effects of global environmental issues in relation to global warming and ozone depletion.
2. Inculcate the concept of sustainable development and practices.

| Unit                                                                                                                                                                                                                                                                                                                                                                                                                               | Lecture Hours |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Unit I</b>                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>15</b>     |
| <b>A: Global Warming and Ozone Depletion</b><br>Definition and causes of global warming, role of CO <sub>2</sub> in climate change, global impacts, Concept of atmospheric window, impact of climate change on atmosphere, sea level rise, agricultural productivity, introduction to carbon dating, Ozone layer and its importance, causes of ozone layer depletion, Ozone depleting substances, Effects of ozone layer depletion | <b>8</b>      |
| <b>B: Climate Change and Policies</b><br>International agreements regarding climate change, Montreal protocol, Kyoto protocol, Carbon credit and carbon trading, Mitigation strategies for climate change, Paris agreement, United Nations Framework on Climate Change, Vienna Convention                                                                                                                                          | <b>7</b>      |
| <b>Unit II</b>                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>15</b>     |
| <b>A: Sustainable Development</b><br>Definition, Concept and strategies of sustainable development, United Nation Conference on Environment and Development with special reference to agenda 21, CSR and sustainability, Clean development mechanism, Commission on sustainable development, The world summit on sustainable development, threats to sustainable development, principles of sustainable development                | <b>8</b>      |
| <b>B: Sustainable Development Practices in India:</b><br>Major issues in sustaining growth and development in India, Interlinking of rivers, desertification and its control, Environmental priorities in India, Role of India in environmental treaties, urban and rural planning                                                                                                                                                 | <b>7</b>      |

**SUGGESTED BOOKS:**

1. Ecology & Environment by P.D.Sharma
2. Environmental Science by S. C. Santra
3. Atmosphere, Weather and Climate by Barry R. G.
4. Climate Change: Causes, Effects and Solutions by Hardy J. T.
5. Climate and Global Climate Change by Harvey D
6. Climate Change: The Science of Global Warming and Our Energy Future by Mathez E. A.
7. Climate Change and India by Mitra A. P., Sharma S., Bhattacharya S., Garg A., Devotta S. and Sen K.

**Semester II**  
**Forest management– Paper IV**  
**(DSC-B4 – Forest Management)**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

**Course Outcome:**

1. Study the need of forest management and agroforestry, principles of forest management and legal aspects of forest management.
2. Understand the concept of silvicultural systems and management of forest resources.

| Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Lecture Hours |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Unit I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>15</b>     |
| <b>A: Forest Management and Silvicultural System</b><br>Definition, Objectives, Importance of forest management in India<br>Introduction to silviculture&silvicultural systems, types & advantages and disadvantages of different systems<br>History of forest management in India<br>Forest as ecosystem, productivity, forest types in India                                                                                                                                                                                                                                                                                                                                             | 7             |
| <b>B: Forest Management Systems and Forest Resources</b><br><b>Forest Management Systems:</b> Objective and principles; techniques; sustained yield relation; rotation of growing stock through management, Forest Working Plan, integrated approach, Forest Mensuration - Methods of measuring - diameter, girth, height and volume of trees; form-factor<br><b>Forest Resources and Utilization :</b> Direct and indirect, Environmentally sound forest harvesting practices, logging and extraction techniques and principles, transportation system, storage and sale, Need and importance of wood seasoning and preservation; Non-Timber Forest Products (NTFPs) definition and scope | 8             |
| <b>Unit II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>15</b>     |
| <b>A: Agroforestry and Joint Forest Management</b><br>Agroforestry, Social forestry, taungya system, shifting cultivation-Introduction, classification, scope<br>Advantages & disadvantages of all these practices<br>Joint Forest Management, introduction, objectives                                                                                                                                                                                                                                                                                                                                                                                                                    | 7             |
| <b>B: Laws and Regulations Regarding Forest Conservation</b><br>Forest conservation, need, services provided by forest, tangible, intangible<br>Indian forest Act, 1927<br>Forest Conservation Act, 1980<br>National Forest Policy, 1894,<br>National Forest Policy ,1952,<br>National Forest Policy, 1988                                                                                                                                                                                                                                                                                                                                                                                 | 8             |

**SUGGESTED BOOKS:**

1. Sarma, P. K.: Forest Resources and their Utilization in India, Mittal Publishers, New Delhi
2. Agrawal, V. P.: Forestsin India, Oxford & IBH, New Delhi
3. Desai, V. : Forest Management in India : Issues and Problems, Himalaya Publishing House, New Delhi

4. Principle and practices of Silviculture by L. S. khanna
5. Forestry in India by A. P. Dwiwedi
6. Forest and Forestry by KP Sagaraya
7. Handbook of Forestry by S SNegi
8. Social Forestry by K M Tiwari
9. Forest Ecology by A S Puri
10. Forest Mensuration by L. S. Khanna
11. India's Forest Policies: Analysis and Appraisal by L K Jha

**Semester II**  
**Solid and Hazardous Waste Management– Paper V**  
**DSC-B5 – Solid and Hazardous Waste Management**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

**Course Outcome:**

1. Study the fundamentals of solid and hazardous waste management.
2. Learning the rules and regulations of solid and hazardous waste.

| Unit                                                                                                                                                                                                                                                                                                                                                                                                   | Lecture Hours |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Unit I</b>                                                                                                                                                                                                                                                                                                                                                                                          | <b>15</b>     |
| <b>A: Introduction to Solid Waste</b><br>Solid waste: Introduction and definition, classification of solid waste, sources of solid waste generation, components in solid waste, Collection and volume reduction prior to disposal, Physio-chemical properties of solid waste                                                                                                                           | 7             |
| <b>B: Solid Waste Management Systems</b><br>Solid Waste Management, advantages<br>Factors affecting solid waste management system<br>Indian Scenario of Solid Waste Management<br>Case studies for solid waste management<br>Traditional methods, ecofriendly methods-conversion of solid waste to energy/manure, other techniques for solid waste management<br>Constraints in solid waste management | 8             |
| <b>Unit II</b>                                                                                                                                                                                                                                                                                                                                                                                         | <b>15</b>     |
| <b>A: Introduction to Hazardous Waste</b><br>Hazardous waste definition, characteristics, types-biomedical, radioactive and other wastes, source of hazardous waste, handling and storage of hazardous waste, Health risks associated with hazardous waste,                                                                                                                                            | 7             |
| <b>B: Waste Management Rules and Methods</b><br>Hazardous Waste (management and handling) rules, Biomedical (handling and management) rules, 2008Waste minimization, Waste treatment methods: Incineration, Stabilization, Secure Landfill, Disinfection, Irradiation, Pyrolysis<br>Disposal of radioactive waste                                                                                      | 8             |

**SUGGESTED BOOKS:**

1. Integrated Solid Waste Management – Engineering Principles & Management By: Issues by George Tchobanoglous, Hilary Theisen& Samuel A Vigil. McGraw-Hill International Editions, New York (1993)
2. Solid Waste Management in Developing Countries By: AD Bhide& BB Sunderesan. Indian National Scientific Documentation Centre, New Delhi (1983)
3. Solid Waste Engineering By: PA Vesilind, William Worrell & R. Thomas Brooks/Cole, Australia (2002)
4. Basics of Solid and Hazardous Waste Management Technology By: K.L Shah. Prentice Hall, Ohio (2000)
5. Industrial and Hazardous Wastes – Health Impacts & Management Plans By: Rajiv K Sinha& Sunil Heart. Pointer Publishers, Jaipur (2004)
6. Prospects and Perspectives of Solid Waste Management

7. Hazardous Waste management by M. LaGrega and others, McGraw-Hill Publication
8. Biomedical (handling and management) rules, 2008

**Semester II**  
**Occupational Health & Safety– Paper VI**  
**DSC-B6 – Occupational Health & Safety**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

**Course Outcome:**

1. Get acquainted with importance of industrial safety to workers and use of PPE'S.
2. Making students to understand the methods of strategic planning for hazard prevention.

| <b>Unit</b>                                                                                                                                                                                                                                                                                                                                | <b>Lecture Hours</b> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| <b>Unit I</b>                                                                                                                                                                                                                                                                                                                              | <b>15</b>            |
| <b>A:Introduction to safety and PPEs</b><br>Definition, goals, needs, Principles & Practices of industrial safety<br>Role of Management in Industrial Safety<br>Adverse health effects of noise, vibration, cold, heat stress, improper illumination, thermal radiation, ionising& non-ionising radiations<br>Importance and types of PPEs | <b>8</b>             |
| <b>B:Strategic Planning and Hazard Prevention Hierarchy</b><br>Definition, purpose, nature, scope and procedure<br>Strategic planning and tools of implementation,<br>Management by objectives (MBO) and its role in Safety, Health and Safety Management,<br>Hazard prevention hierarchy                                                  | <b>7</b>             |
| <b>Unit II</b>                                                                                                                                                                                                                                                                                                                             | <b>15</b>            |
| <b>A: Leadership and Motivation</b><br>Direction: Definition, process, principles and techniques<br>Leadership: Role, functions and attributes of a leader<br>Theories of motivation and their application to safety, role of supervisors and safety departments in motivation                                                             | <b>7</b>             |
| <b>B: Introduction to Communication</b><br>Communication: Purpose, process, types and channels, Essential rules in communication, Two ways communication, Barriers in communication, Essentials of effective communication, Communication and group-dynamics, Team building                                                                | <b>8</b>             |

**SUGGESTED BOOKS:**

1. Industrial Safety and Environment. V. K. Gupta, 2006
2. Industrial Safety and Health Management. C. Asfahl, 1984
3. Leading with safety. Thomas R Krause, 2005
4. Safe by Accident?: Take the Luck Out of Safety : Leadership Practices that Build a Sustainable
5. Industrial Safety and Risk Management. Doug McCutcheon and Laird Wilson, 2003Culture. Judy L. Agnew, Aubrey C. Daniels, 2010
6. Practical Industrial Safety, Risk Assessment and Shutdown Systems for Industry. Dave Macdonald, 2004
7. Industrial Safety Management: Hazard Identification and Risk Control by Deshmukh L. M.

**Semester II**  
**Remote Sensing & GIS– Paper VII**  
**DSC-B7 – Remote Sensing & GIS**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

**Course Outcome:**

1. Introduction to remote sensing, GIS and satellites.
2. Study applications of Remote Sensing, GIS and satellites.

| Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Lecture Hours |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Unit I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>15</b>     |
| <b>A: Terms Related to Remote sensing</b><br>Definition and Scope of Remote Sensing, Electromagnetic spectrum- Electromagnetic spectrum, Aerial photography- Classification Of Aerial Photographs , Types of aerial photographs, Geometry of Aerial photograph, Scale and Relief Displacement, overlap, drift crab, Principal Point and Conjugate Principal, Point of Aerial Photographs, Stereoscopy- Stereoscope, stereoscopic photograph, Parallax, elements of aerial photo interpretation and Applications of Aerial Photographs | <b>7</b>      |
| <b>B: Introduction to Satellites</b><br>Satellite imageries-Scanners, pixels, grey levels, bands. Introduction, Remote Sensing Satellites- Meteorological Remote Sensing Satellite (Polar and Geostationary Satellites), Non Meteorological RS Satellites (Landsat, Spot, IRS), Resolution (Spectral and Spatial and Frequency of Coverage) , Satellite data products and selection of satellite data; Data Reception Archiving and distribution                                                                                      | <b>8</b>      |
| <b>Unit II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>15</b>     |
| <b>A: Introduction to GIS</b><br>Definition of GIS, Capabilities and advantages of GIS, Sources of data, types of data, hardware requirement, components of GIS.,Data structure, Raster and Vector data models, advantages and disadvantages of vector data and raster data, GIS packages, Application of GIS in Environmental Management                                                                                                                                                                                             | <b>8</b>      |
| <b>B: Terms in GIS</b><br>Topology: Error and editing, GIS data quality, errors, policies. Vectordataanalysis:Buffering,Overlayanalysis(pointinpolygon,lineinpolygon,polygoninpolygonetc.);Networkanalysis;Terrainanalysis:DEM,DTM andTIN; Interpolationtechniques in GIS; Rasterdataanalysis; Non-spatial data: Database Managementsystem(DBMS)                                                                                                                                                                                      | <b>7</b>      |

**SUGGESTED BOOKS:**

1. Principles of Photo geology by Singh
2. Principles of Remote Sensing by Currain
3. Fundamentals of Photo geology by SN Pandey
4. Remote Sensing and Image Interpretation:-Tomas M.Lillesand and Ralph W.Keifer  
john Wiley and sons Inc.NewYark.
5. Introduction to Remote sensing:-James B. Campbell, Tylor and FraneisLtd.London.
6. Remote Sensing application in applied geosciences:-Sumitra Mukherjee, Milton Book Company.

7. Principles of Remote Sensing:-A.N.Gatel and S.Singh, Scientific Publishers (India). Jodhpur (1999Edition).
8. Remote Sensing for Environment and Forest Management:-A.Mehrotra and R.K.Suri. Indus Publishing Co.New.Dehli(1994 Edition)
9. Remote sensing for large wildfires:-E.Chuvieco, Springer, New York (1999 Edition).
10. Textbook of Remote Sensing and GIS by Anil Reddy
11. Fundamentals of Remote Sensing by George Joseph
12. Principles of Geographical Information system by Burrough, Peter A.
13. Remote Sensing and GIS by Bhatta B.

**Semester II**  
**Computer Applications – Paper VIII**  
**DSC-B8 – Computer Applications VIII**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

**Course Outcome:**

1. Understand the basic concepts of hardware and software.
2. Learn various computer applications through report writing in MS word and presentation of data through Excel and power point.

| Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Lecture hours |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Unit I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>15</b>     |
| <b>A: Introduction to Computer</b><br>Computer characteristics and Functionalities, Applications, Generations Types, Block Diagram, Concept of Hardware and Software                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 7             |
| <b>B: Input and Output Devices</b><br>Input devices- Keyboard, mouse, joystick, scanner, MICR, OMR, OCR. Output Devices- Monitor, Printers (Impact and non impact), plotter- Flat-bed and drum, Selection of printer and paper for output depending upon user requirements. Memory- concept, primary memory – RAM- SRAM, DRAM, ROM- PROM, EPROM, EEPROM, cache memory, Secondary memory- floppy disk, hard disk, Optical storage devices, Pen drive.                                                                                                                                                                                            | 8             |
| <b>Unit II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>15</b>     |
| <b>A: MS Excel</b><br>Basics of Excel – Ribbon, Workbook, worksheet, Format options, templates, data validation , sorting and filtering of data , Functions- Count and Sum, Logical, Date and Time, Text, Lookup and References, financial and statistical functions, using formula , Charts- column, pie, bar, line, scatter plot, data series.                                                                                                                                                                                                                                                                                                | 7             |
| <b>B: MS Word and MS Powerpoint</b><br><b>MS Word :</b> Introduction and feature , Creating word document, Editing features, Text formatting options, page formatting –adding header and footer, page number, insert page break, blank page, cover page, page orientation, print options. Working with tables, creating Table of Contents, Mail merge, shortcut keys, cursor control keys.<br><b>MS PowerPoint:</b> Features, factors to be considered for effective presentation, Creating Basic presentation, Editing and formatting options, inserting picture, chart, table, audio and video to slide, using animation and slide transition | 8             |

**SUGGESTED BOOKS:**

1. Schuurman, Nadine. 2000. "Trouble in the Heartland: GIS and its Critics in the 1990s." Progress in Human Geography, vol. 24, no. 4, pp. 569-590.
2. Schuurman, Nadine and G. Pratt. 2002. "Care of the Subject: Feminism and Critiques of GIS." Gender, Place and Culture, vol. 9, no. 3, pp. 291-299.
3. Schuurman, Nadine. 2004. GIS – A Short Introduction. Blackwell Publishing.
4. Computer Fundamentals- P. K. Sinha
5. Operating System – Godbole
6. Computer Today- S. Basndara
7. Computer Fundamentals- V. Rajaraman

**DSC-P1 and P2-LAB COURSE (Semester I)**

| <b>Sr. No.</b> | <b>Name of Experiment</b>                                                   |
|----------------|-----------------------------------------------------------------------------|
| 1              | Study of Phytoplanktons and Zooplanktons.                                   |
| 2              | Determination of frequency of species in ecosystem                          |
| 3              | Determination of species density in nearby ecosystem                        |
| 4              | Determination of Species Diversity Index                                    |
| 5              | Classification and identification of minerals                               |
| 6              | Classification and identification of rocks                                  |
| 7              | Study of floral resources in surrounding area                               |
| 8              | Determination of pH of given sample                                         |
| 9              | Determination of Electrical Conductivity of water sample                    |
| 10             | Determination of Dissolved Oxygen in water sample                           |
| 11             | Determination of Free Carbon Dioxide in water sample                        |
| 12             | Determination of Biochemical Oxygen Demand of water sample                  |
| 13             | Determination of Chemical Oxygen Demand of water sample                     |
| 14             | Determination of Total Dissolved Solids and Total Suspended Solids          |
| 15             | Estimation of Total Hardness of given water sample                          |
| 16             | Determination of Calcium and Magnesium hardness of given water sample       |
| 17             | Determination of Alkalinity in water sample                                 |
| 18             | Determination of Acidity in water sample                                    |
| 19             | Determination of Bulk Density of soil sample                                |
| 20             | Determination of porosity of soil sample                                    |
| 21             | Determination of water holding capacity and moisture content of soil sample |
| 22             | Determination of chlorophyll content of given plant material                |
| 23             | Study various soil and water conservation practices through field visits    |

**DSC- P3 and P4 LAB COURSE (Semester II)**

| <b>Sr. No.</b> | <b>Name of Experiment</b>                                                          |
|----------------|------------------------------------------------------------------------------------|
| 1              | Measurement of noise levels at silence, residential and commercial zone            |
| 2              | Study of Personal Protective Equipments                                            |
| 3              | Study of occupational health hazards in nearby industry                            |
| 4              | Field Visit to Sewage Treatment Plant to understand its functioning                |
| 5              | Determination of moisture content of solid waste                                   |
| 6              | Study of composting technique through field visit                                  |
| 7              | Study electricity generation from solid waste through field visits                 |
| 8              | Study working of High Volume Sampler                                               |
| 9              | Determination of of PM <sub>10</sub> in ambient air                                |
| 10             | Analysis of Sulphur Dioxide in ambient air                                         |
| 11             | Analysis of Nitrogen Oxides in ambient air                                         |
| 12             | Study and list out minor forest products used by community living near forest area |
| 13             | Interaction with community for awareness regarding environmental degradation       |
| 14             | Study of instruments used for measurement of metereological parameters             |
| 15             | Preparation of wind rose diagram                                                   |
| 16             | Study of well inventory                                                            |
| 17             | Measurement of height of tree                                                      |
| 18             | Measurement of clown density of tree                                               |
| 19             | Measurement of girth and diameter of tree                                          |
| 20             | Use of MS word for report preparation                                              |
| 21             | Use of MS excel for result preparation                                             |
| 22             | Use of MS power point for preparing presentations                                  |
| 23             | Interpretation of aerial photographs                                               |
| 24             | Determination of scale of aerial photographs                                       |