



**Karnatak University's,  
KARNATAK SCIENCE COLLEGE, DHARWAD  
NAAC Accredited**

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**1.3.1 Institution integrates crosscutting issues relevant to Professional Ethics, Gender, Human Values, Environment and Sustainability into the Curriculum**

# CRITERIA-I

## CURRICULAR ASPECTS

### 1.3 CURRICULAR ENRICHMENT

#### CROSS CUTTING ISSUES

#### INDEX

<b>List Of Courses Addressing Issues Related To Professional Ethics, Gender, Human Values, Environment And Sustainability</b>		
<b>PROFESSIONAL ETHICS :19</b>		
<b>Department</b>	<b>Course</b>	<b>Contents</b>
BCA II semester	Accounting and Financial Management	<ul style="list-style-type: none"> <li>+ Accounting as an information system</li> <li>+ Company account</li> <li>+ Cost Account</li> <li>+ Cost Classification</li> <li>+ Material Cost control</li> <li>+ Direct Labor</li> <li>+ Overhead Cost control</li> </ul>
BCA /B.Sc(CS) II semester	Personality development and Communication Skills	<ul style="list-style-type: none"> <li>+ Definition of Personality</li> <li>+ Determinants of Personality</li> <li>+ The self Concepts</li> <li>+ Communication and its importance</li> <li>+ Leadership as a process</li> </ul>
BCA/B.Sc(CS) V CBCS semester	Management Information System	<ul style="list-style-type: none"> <li>+ Role and Importance of Management</li> <li>+ Process Management:</li> <li>+ Strategic Management of Business:</li> <li>+ Development of MIS:</li> <li>+ Decision Support System</li> </ul>
BCA/B.Sc(CS) V CBCS semester	Managerial Economics	<ul style="list-style-type: none"> <li>+ Demand Analysis:</li> <li>+ Supply Analysis:</li> <li>+ Production Analysis and Cost Analysis</li> </ul>

		<ul style="list-style-type: none"> <li>✚ Market Structures and Pricing Policies:</li> </ul>
Biotechnology B.Sc V semester CBCS	Economic Botany And Biotechnology	<ul style="list-style-type: none"> <li>✚ : Origin of Cultivated Plants</li> <li>✚ Oils and Fats</li> <li>✚ Introduction to biotechnology</li> </ul>
Boatny B.Sc V semester CBCS	Nursary And Gardening	<ul style="list-style-type: none"> <li>✚ Nursery, Seed, :Vegetative propagation, Gardening, Sowing/raising of seeds and seedlings</li> </ul>
Botany B.Sc V semester CBCS	Floriculture	<ul style="list-style-type: none"> <li>✚ Nursery Management and Routine Garden Operations:</li> <li>✚ Ornamental Plants</li> <li>✚ Principles of Garden Designs:</li> <li>✚ Landscaping Places of Public Importance:</li> <li>✚ Commercial Floriculture</li> </ul>
Botany B.Sc V semester CBCS	Medicinal Botany	<ul style="list-style-type: none"> <li>✚ History, Scope and Importance of Medicinal Plants</li> <li>✚ Conservation of endangered and endemic medicinal plants</li> <li>✚ Ethnobotany and Folk medicines</li> </ul>
Biotechnology B.Sc VI semester CBCS	Industrial Biotechnology	<ul style="list-style-type: none"> <li>✚ Fermentation media</li> <li>✚ Process Development</li> <li>✚ Production of microbial products</li> <li>✚ Fermented Foods</li> </ul>
Biotechnology B.Sc VI semester CBCS	Pharmaceutical Biotechnology	<ul style="list-style-type: none"> <li>✚ Overview of protein based therapeutics</li> <li>✚ Drug delivery systems for biopharmaceuticals</li> <li>✚ Bio-safety</li> </ul>
Statistics B.Sc VI semester CBCS	Economic Statistics and Econometrics.	<ul style="list-style-type: none"> <li>✚ Index Numbers</li> <li>✚ Time Series Analysis</li> <li>✚ Introduction to Econometrics and Simple Linear Regression</li> <li>✚ Multiple Linear Regression</li> <li>✚ Multicollinearity, Autocorrelation and Heteroscedasticity</li> </ul>
Chemistry B.Sc V semester CBCS	Coordination Chemistry-II and Organometallic Compounds	<ul style="list-style-type: none"> <li>✚ Crystal Field Theory:</li> <li>✚ Industrial chemistry</li> <li>✚ Glass, Ceramics, Cements, Fertilizers</li> </ul>
Chemistry B.Sc V semester CBCS	Pharmaceutical Chemistry	<ul style="list-style-type: none"> <li>✚ Drugs &amp; Pharmaceuticals:</li> <li>✚ Fermentation</li> </ul>
Chemistry B.Sc VI semester CBCS	Pesticide Chemistry	<ul style="list-style-type: none"> <li>✚ acidity/alkalinity</li> <li>✚ Simple organophosphates, phosphonates</li> </ul>
Industrial Fish And Fisheries B.Sc I semester CBCS	Industrial Fish And Fisheries	<ul style="list-style-type: none"> <li>✚ Classification of super class Pisces</li> <li>✚ Internal anatomy of fish</li> <li>✚ Food and Feeding</li> <li>✚ Reproductive system in fishes</li> </ul>
Geology B.Sc V semester CBCS	Economic Geology and Hydrogeology	<ul style="list-style-type: none"> <li>✚ : Economic Geology and Prospecting</li> <li>✚ Hydrogeology</li> </ul>
MicroBiology B.Sc V semester CBCS	Food And Industrial Microbiology	<ul style="list-style-type: none"> <li>✚ Food and microorganisms</li> <li>✚ Food spoilage and preservation</li> <li>✚ Microbiology of milk</li> <li>✚ Fermentation and Fermentation media</li> </ul>

		<ul style="list-style-type: none"> <li>✚ Industrial production of chemicals by Microorganisms</li> </ul>
Biology B.Sc V semester	Environmental Biology & Zoogeography And Wildlife Biology	<ul style="list-style-type: none"> <li>✚ Biogeochemical Cycles</li> <li>✚ Abiotic And Biotic Factors</li> <li>✚ Population Ecology</li> <li>✚ Community Ecology</li> <li>✚ Pollution</li> </ul>
Microbiology B.Sc V semester	Food and dairy microbiology	<ul style="list-style-type: none"> <li>✚ Food as a substrate for microorganisms:</li> <li>✚ Spoilage of Food, Preservation and Food safety</li> <li>✚ Dairy Microbiology</li> <li>✚ Human Microbiome and Diet</li> </ul>

#### GENDER VALUES: 14

English(AECC) B.Sc I semester	Timeless Wisdom	<ul style="list-style-type: none"> <li>✚ Prose, Poetry</li> <li>✚ Grammar and Composition</li> </ul>
English(MIL) B.Sc I semester	One Stage One Act Plays	<ul style="list-style-type: none"> <li>✚ One Act Plays</li> </ul>
English(AECC) B.Sc II semester	Timeless Wisdom	<ul style="list-style-type: none"> <li>✚ Prose, Poetry</li> <li>✚ Grammar and Composition</li> </ul>
English(MIL) B.Sc I semester	Twelve Short Stories	<ul style="list-style-type: none"> <li>✚ Twelve short stories</li> <li>✚ Grammar and composition</li> </ul>
English(AECC) B.Sc III semester	Untouchable	<ul style="list-style-type: none"> <li>✚ Novel</li> <li>✚ Grammar and composition</li> </ul>
English(MIL) B.Sc III semester	Raja Rao's Kantapura	<ul style="list-style-type: none"> <li>✚ Novel</li> <li>✚ Grammar and composition</li> </ul>
Hindi(AECC) B.Sc I semester	Gadhyaprabha	<ul style="list-style-type: none"> <li>✚ Collection of Prose</li> </ul>
Hindi(AECC) B.Sc II semester	Ekankee Saptaka	<ul style="list-style-type: none"> <li>✚ Collection of one Act Play</li> </ul>
Hindi(AECC) B.Sc III semester	Katha Deepa	<ul style="list-style-type: none"> <li>✚ Collection of Short Stories</li> </ul>
Hindi(AECC) B.Sc IV semester	Kavya Prasar	<ul style="list-style-type: none"> <li>✚ Collection of Modern poetry</li> <li>✚ Precise Writing.</li> </ul>
Urdu(MIL) B.Sc I semester	Gulshan E Adab	<ul style="list-style-type: none"> <li>✚ Prose, Poetry &amp; Essays</li> </ul>
Urdu(MIL) B.Sc II semester	Gulshan E Adab	<ul style="list-style-type: none"> <li>✚ Prose, Poetry &amp; Essays</li> </ul>
Urdu(MIL) B.Sc III semester	Muntakhabat-e jamia – e Urdu	<ul style="list-style-type: none"> <li>✚ Prose, Poetry &amp; Essays</li> </ul>
Urdu(MIL) B.Sc IV semester	Muntakhabat-e jamia – e Urdu	<ul style="list-style-type: none"> <li>✚ Prose, Poetry &amp; Essays</li> </ul>

#### HUMAN VALUES: 08

BCA /B.Sc(CS) I semester	Indian Constitution	<ul style="list-style-type: none"> <li>✚ Significance of the constitution</li> <li>✚ Fundamental Rights</li> <li>✚ Nature of the directive principles of the policy of the state</li> <li>✚ Union Government</li> <li>✚ State Government</li> </ul>
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BCA /B.Sc(CS) II semester	Human Rights	<ul style="list-style-type: none"> <li>✚ Nature of Human Rights</li> <li>✚ Classification of Human Rights</li> <li>✚ Enforcement of Human Rights</li> </ul>
Criminology and Forensic Science B.Sc II semester	Social Problems and Crime	<ul style="list-style-type: none"> <li>✚ Introduction to Social Problems</li> <li>✚ Women and Child Related Social Problems and Crimes</li> <li>✚ Other Social Problems</li> </ul>
Geography B.Sc V semester	Population Resources and Dynamics	<ul style="list-style-type: none"> <li>✚ Population Change:</li> <li>✚ Migration</li> <li>✚ Population as Resource</li> <li>✚ Population Growth</li> </ul>
Geography B.Sc V semester	Intellectual Property Rights	<ul style="list-style-type: none"> <li>✚ Patents</li> <li>✚ Copyrights</li> <li>✚ Trademarks</li> <li>✚ Geographical Indications</li> <li>✚ :Protection of Traditional Knowledge</li> <li>✚ : Industrial Designs</li> <li>✚ Protection of Plant Varieties</li> </ul>
Geography B.Sc V semester	Human Geography	<ul style="list-style-type: none"> <li>✚ Man-Environmental Relationship</li> <li>✚ Social and Cultural Geography</li> <li>✚ Tribes: Habitat and Economy</li> <li>✚ Population Geography</li> </ul>
Anthropology B.Sc III semester	Socio-Cultural Anthropology	<ul style="list-style-type: none"> <li>✚ Socio-cultural Anthropology</li> <li>✚ Marriage, Family and Kinship</li> <li>✚ Religion</li> </ul>
Anthropology B.Sc VI semester	Archaeological And Linguistic Anthropology	<ul style="list-style-type: none"> <li>✚ Civilization</li> <li>✚ Linguistic Anthropology</li> </ul>
<b>ENVIRONMENT AND SUSTAINABILITY: 16</b>		
BCA /B.Sc(CS) II semester	Environmental studies	<ul style="list-style-type: none"> <li>✚ Nature of Environmental studies</li> <li>✚ Ecosystem</li> <li>✚ Biodiversity and its conservation</li> <li>✚ Environmental Pollution</li> <li>✚ Social Issues and environment</li> </ul>
B.Sc II CBCS (Compulsory Subject)	Environmental Studies	<ul style="list-style-type: none"> <li>✚ Introduction to Environmental Studies</li> <li>✚ Ecosystem</li> <li>✚ Natural Resources: Renewable and Non Renewable resources</li> <li>✚ Biodiversity and Conservation</li> <li>✚ Environmental Pollution</li> </ul>
Geography B.Sc II semester	Basics of Natural Disasters	<ul style="list-style-type: none"> <li>✚ Introduction to Natural Disaster</li> <li>✚ Atmosphere and Hydrosphere Natural Disasters</li> <li>✚ Biospher and Natural Disasters</li> </ul>
Geography B.Sc I semester	Geo-Environmental Studies	<ul style="list-style-type: none"> <li>✚ Earth environmental segments</li> <li>✚ Environmental Hazards:</li> </ul>
Botany B.Sc I semester	Biodiversity (Microbes, Algae, Fungi And Archegoniate)	<ul style="list-style-type: none"> <li>✚ Microbes, Algae</li> <li>✚ Fungi</li> </ul>



Botany B.Sc V semester	Plant Ecology And Taxonomy	<ul style="list-style-type: none"> <li>✚ : Ecological factors</li> <li>✚ Plant communities</li> <li>✚ Ecosystem</li> <li>✚ Botanical Nomenclature</li> <li>✚ Biometrics, numerical taxonomy and cladistics</li> </ul>
Botany B.Sc V semester	Plant Diversity And Human Welfare	<ul style="list-style-type: none"> <li>✚ Plant diversity</li> <li>✚ Loss of Biodiversity</li> <li>✚ Conservation of Biodiversity</li> <li>✚ Role of plants in relation to Human Welfare</li> </ul>
Industrial Fish And Fisheries B.Sc VI semester	Industrial Fish And Fisheries	<ul style="list-style-type: none"> <li>✚ Seed Production</li> <li>✚ Environmental Biology</li> <li>✚ BIOCHEMISTRY</li> </ul>
Geography B.Sc IV semester	Environmental Geography	<ul style="list-style-type: none"> <li>✚ Ecosystem, Bio-Diversity</li> <li>✚ Global Warming and Environmental Pollution</li> <li>✚ Conservation and Management of Environment</li> </ul>
Geology B.Sc V semester	Environmental Geology	<ul style="list-style-type: none"> <li>✚ Environmental Geology</li> <li>✚ Energy Budget</li> <li>✚ Resource management:</li> </ul>
Microbiology B.Sc IV semester	Environmental And Agricultural Microbiology	<ul style="list-style-type: none"> <li>✚ Microbiology of air</li> <li>✚ Microbiology of water</li> <li>✚ Microbiology of waste water</li> <li>✚ Bioremediation and Bioleaching</li> <li>✚ Microorganisms in Agriculture</li> </ul>
Botany B.Sc VI semester	Evolutionary and Developmental Biology	<ul style="list-style-type: none"> <li>✚ Origin and evolution of Human and Horse.</li> <li>✚ Evidences of Evolution:</li> <li>✚ Species Concept and Extinction:</li> </ul>
Botany B.Sc V semester	Plant Morphology And Taxonomy	<ul style="list-style-type: none"> <li>✚ Morphology</li> <li>✚ Herbaria and Botanical gardens:</li> <li>✚ Study of the diagnostic features of Angiosperm families</li> </ul>
Botany B.Sc V semester	Genetics And Plant Breeding	<ul style="list-style-type: none"> <li>✚ Plant Breeding:</li> <li>✚ Hybridization</li> <li>✚ Crop improvement and breeding Role of mutations</li> </ul>
Biotechnology B.Sc V semester	Plant and Animal Biotechnology	<ul style="list-style-type: none"> <li>✚ Plant Tissue culture methods</li> <li>✚ Animal Cell culture methods</li> </ul>
Biotechnology B.Sc VI semester	Bio process and Environmental Biotechnology	<ul style="list-style-type: none"> <li>✚ Bio reactors and own stream processing</li> <li>✚ Fundamentals of Environmental Biotechnology</li> <li>✚ Bio remediation and Waste Management</li> </ul>



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# CRITERIA-I

## CURRICULAR ASPECTS

### 1.3 CURRICULAR ENRICHMENT

#### CROSS CUTTING ISSUES

## PROFESSIONAL ETHICS

## List Of Courses Addressing Issues Related To Professional Ethics

### PROFESSIONAL ETHICS :19

Department	Course	Contents
BCA II semester	Accounting and Financial Management	<ul style="list-style-type: none"> <li>✚ Accounting as an information system</li> <li>✚ Company account</li> <li>✚ Cost Account</li> <li>✚ Cost Classification</li> <li>✚ Material Cost control</li> <li>✚ Direct Labor</li> <li>✚ Overhead Cost control</li> </ul>
BCA /B.Sc(CS) II semester	Personality development and Communication Skills	<ul style="list-style-type: none"> <li>✚ Definition of Personality</li> <li>✚ Determinants of Personality</li> <li>✚ The self Concepts</li> <li>✚ Communication and its importance</li> <li>✚ Leadership as a process</li> </ul>
BCA/B.Sc(CS) V CBCS semester	Management Information System	<ul style="list-style-type: none"> <li>✚ Role and Importance of Management</li> <li>✚ Process Management:</li> <li>✚ Strategic Management of Business:</li> <li>✚ Development of MIS:</li> <li>✚ Decision Support System</li> </ul>
BCA/B.Sc(CS) V CBCS semester	Managerial Economics	<ul style="list-style-type: none"> <li>✚ Demand Analysis:</li> <li>✚ Supply Analysis:</li> <li>✚ Production Analysis and Cost Analysis</li> <li>✚ Market Structures and Pricing Policies:</li> </ul>
Biotechnology B.Sc V semester CBCS	Economic Botany And Biotechnology	<ul style="list-style-type: none"> <li>✚ : Origin of Cultivated Plants</li> <li>✚ Oils and Fats</li> <li>✚ Introduction to biotechnology</li> </ul>
Boatny B.Sc V semester CBCS	Nursary And Gardening	<ul style="list-style-type: none"> <li>✚ Nursery, Seed, :Vegetative propagation, Gardening:, Sowing/raising of seeds and seedlings</li> </ul>
Botany B.Sc V semester CBCS	Floriculture	<ul style="list-style-type: none"> <li>✚ Nursery Management and Routine Garden Operations:</li> <li>✚ Ornamental Plants</li> <li>✚ Principles of Garden Designs:</li> <li>✚ Landscaping Places of Public Importance:</li> <li>✚ Commercial Floriculture</li> </ul>
Botany B.Sc V semester CBCS	Medicinal Botany	<ul style="list-style-type: none"> <li>✚ History, Scope and Importance of Medicinal Plants</li> <li>✚ Conservation of endangered and endemic medicinal plants</li> <li>✚ Ethnobotany and Folk medicines</li> </ul>
Biotechnology B.Sc VI semester CBCS	Industrial Biotechnology	<ul style="list-style-type: none"> <li>✚ Fermentation media</li> <li>✚ Process Development</li> <li>✚ Production of microbial products</li> <li>✚ Fermented Foods</li> </ul>
Biotechnology B.Sc VI semester CBCS	Pharmaceutical Biotechnology	<ul style="list-style-type: none"> <li>✚ Overview of protein based therapeutics</li> <li>✚ Drug delivery systems for biopharmaceuticals</li> <li>✚ Bio-safety</li> </ul>
Statistics B.Sc VI semester CBCS	Economic Statistics and Econometrics.	<ul style="list-style-type: none"> <li>✚ Index Numbers</li> <li>✚ Time Series Analysis</li> <li>✚ Introduction to Econometrics and Simple Linear Regression</li> <li>✚ Multiple Linear Regression</li> </ul>

		<ul style="list-style-type: none"> <li>✚ Multicollinearity, Autocorrelation and Heteroscedasticity</li> </ul>
Chemistry B.Sc V semester CBCS	Coordination Chemistry-II and Organometallic Compounds	<ul style="list-style-type: none"> <li>✚ Crystal Field Theory:</li> <li>✚ Industrial chemistry</li> <li>✚ Glass, Ceramics, Cements, Fertilizers</li> </ul>
Chemistry B.Sc V semester CBCS	Pharmaceutical Chemistry	<ul style="list-style-type: none"> <li>✚ Drugs &amp; Pharmaceuticals:</li> <li>✚ Fermentation</li> </ul>
Chemistry B.Sc VI semester CBCS	Pesticide Chemistry	<ul style="list-style-type: none"> <li>✚ acidity/alkalinity</li> <li>✚ Simple organophosphates, phosphonates</li> </ul>
Industrial Fish And Fisheries B.Sc I semester CBCS	Industrial Fish And Fisheries	<ul style="list-style-type: none"> <li>✚ Classification of super class Pisces</li> <li>✚ Internal anatomy of fish</li> <li>✚ Food and Feeding</li> <li>✚ Reproductive system in fishes</li> </ul>
Geology B.Sc V semester CBCS	Economic Geology and Hydrogeology	<ul style="list-style-type: none"> <li>✚ : Economic Geology and Prospecting</li> <li>✚ Hydrogeology</li> </ul>
MicroBiology B.Sc V semester CBCS	Food And Industrial Microbiology	<ul style="list-style-type: none"> <li>✚ Food and microorganisms</li> <li>✚ Food spoilage and preservation</li> <li>✚ Microbiology of milk</li> <li>✚ Fermentation and Fermentation media</li> <li>✚ Industrial production of chemicals by Microorganisms</li> </ul>
Biology B.Sc V semester	Environmental Biology & Zoogeography And Wildlife Biology	<ul style="list-style-type: none"> <li>✚ Biogeochemical Cycles</li> <li>✚ Abiotic And Biotic Factors</li> <li>✚ Population Ecology</li> <li>✚ Community Ecology</li> <li>✚ Pollution</li> </ul>
Microbiology B.Sc V semester	Food and dairy microbiology	<ul style="list-style-type: none"> <li>✚ Food as a substrate for microorganisms:</li> <li>✚ Spoilage of Food, Preservation and Food safety</li> <li>✚ Dairy Microbiology</li> <li>✚ Human Microbiome and Diet</li> </ul>

## COMPULSORY SUBJECT B.SC/B.SC(CS)/BCA

### BCA 305: PERSONALITY DEVELOPMENT & COMMUNICATION SKILLS

Total: 50 Hrs

- 1. Meaning and definition of Personality:** Personality development as a process. Importance of personality development, Theories of Personality. Psychological theories (Sigmund Freud), Phenomenological theory (Carl Rogers) Cognitive Theory (George Kelly). A trait factor – Analytic approach (Raymond B. Cattell), Psychosocial development theory (Erickson) (15 Hrs)
- 2. Determinants of personality:** Physical, intellectual, Emotional, social, educational, Familial. (7 Hrs)
- 3. The self concept:** Individual as a self sculptor, Process of perception cognition and their impact. Learning processes. What is attitude. The process of attitude formation. (8 Hrs)
- 4. Communication and its importance:** Process of Communication, Written and oral communication, Process of listening body language or non verbal communication, the art of public speaking. (10 Hrs)
- 5. Leadership as a process:** Working in a team, Management of conflict, interpersonal & intrapersonal intergroup, Profiles of great personalities, Career planning and role of career planning in personality development, How to face personal interview and group discussion. (10 Hrs)

#### References:

- 1) Cloninger, Susan C. (2000), Theories of Personality, Prentice Hall, London.
- 2) Eriksen, Karin (1979) Communication Skills for Human Services, Prentice – Hall, Reston
- 3) Hurlock, Elizabeth. B. (?), Personality Development.
- 4) Johnson, Roy Ivan (1956). Communication: Handling Ideas Effectively, McGraw Hill, New York.
- 5) Kagan, Jerome (1969), Personality Development, Harcourt Brace, New York.
- 6) Kundu, C.L. (1989), Personality Development, Sterling Bangalore.
- 7) Pervin Lawrence A. (1980). Personality: Theory, Assessment and Research, John Wiley & Sons, New York,
- 8) Rychman, Richard.M. (1978), Theories of Personality, D. Van Nostrand, New York
- 9) Smith. Henry Clay (1968), Personality Development, MacGraw Hill, New York
- 10) Taylor. Anita et al (1992), Communication, Prentice – Hall, New Jersey.



## DEPARTMENT OF BCA/COMPUTER SCIENCE

### B.C. A. 201 (B): ACCOUNTING AND FINANCIAL MANAGEMENT – II

Total: 50 Hrs

**Accounting as an Information system-** Concept and nature; Accounting system and MIS; Electronic data processing, Features, advantages & disadvantages.

**Company Account:** Issue of shares at par, premium and discount Forfeiture of Shares – Re – issue of forfeited shares. Issue of debentures at par, premium and at discount. Preparation of company final account.

**Financial statements Analysis and Interpretation** meaning, objectives and classification of ratios-liquidity, solvency, activity and profitability ratios; advantages and limitations of ratio analysis.

**Cost Accounting-** Meaning, Objectives & functions of cost Accounting; cost accounting versus financial accounting; advantages and limitations of cost accounting;

**Cost classification-** Need and significance and methods of classification-Functional, behavioral, controllability, Variability, time element-wise classification; cost classification for managerial purposes; Segregation methods of Semi-variable costs into variable and fixed components; Preparation of cost sheets.

**Material cost control-** Meaning, objectives and classification of material cost; Purchase routine and determination of various levels; Prices of materials issues (FIFO & LIFO methods only)

**Direct Labour cost control-** Meaning, objectives and classification of labor cost; Computation of total direct labor cost Methods of remuneration- time rate, piece rate(including differential piece-rates)-incentive Plans-Halsey and Rowan plans only...

**Overhead cost control-** Classification and collection of overhead cost; Primary and Secondary distribution of overheads; overheads absorption methods-direct labor hour rate and machine hour rate method only.

#### References:

1. Jain & Narang, Advanced Accounting, (Kalyani Publishers)
2. S. N. Maheshwari: Advanced Accounting, (S. Chand and Sons)
3. R.L. Gupta, Advanced Accounting.
4. Dutta: Cost Accounting Pearson Education 2003
5. Jain , Narang : Cost Accounting ; Kalyani Publishers ; New Delhi
6. B.K. Bhar, Cost Accounting, (Academic Publications, Kolkatta)
7. S. N. Maheshwari, Management Accounting, (S. Chand and Sons)
8. J. Madegouda, Management Accounting, (Himalaya Pub. House, Mumbai)
9. M.N. Arora : Cost Accounting ; Vikas Publications, New Delhi
10. Tulsian, Financial Accounting , Pearson Education.
11. Van Horne, Fundamentals of Financial Management 11/e Pearson Education.
12. Sharan, Fundamentals of Financial Management. Pearson Education 2005
13. Sharal, Fundamentals of Financial Management, Pearson Education 2005

**B.Sc.(CS)E 5.2A-DSE-1E: Elective-1: MANAGEMENT INFORMATION SYSTEM**

**Total: 48 Hours**

**UNIT 1:**

**Management Information Systems:** Management Information System: Concept, MIS: Definition, Role of the Management Information System, impact of the Management Information System, Management Information, System and computer, Management Information System and academics, MIS and the user.

**Role and Importance of Management:** Introduction to Management, Approaches to Management, Functions of the Manager, Managers and the Environment, Management as a Control System, Management by Exception, **MIS:** A support to the Management.

**(10 Hrs)**

**UNIT 2:**

**Process Management:** Management Effectiveness, planning, Organising, Staffing, Coordinating and directing, Controlling, **MIS:** A Tool for Management Process.

**Organization Structure and Theory:** Basic Model of Organization Structure, Modifications to the Basic Model of Organization Structure, Organization Behavior, Organization as a System, MIS: Organization.

**(15 Hrs)**

**UNIT 3:**

**Strategic Management of Business:** The Concept of Corporate Planning, Essentially of Strategic, Planning, Development of the Business Strategies, Types of Strategies, Short-range Planning, Tools of Planning, MIS: Business Planning.

**Decision Making:** Decision Making Concepts, Decision Methods, Tools and Procedures, Behavioral Concepts in Decision Making, Organizational Decision Making Concepts, MIS and Decision Making concepts.

**(13 Hrs)**

**UNIT 4:**

**Development of MIS:** Development of Long Range Plans of the MIS, Ascertainning. The Class of Information of the MIS, Management of Quality in the MIS, Organization for Development of the MIS, MIS: The Factors of Success and Failure.

**(6 Hrs)**

**UNIT 5:**

**Decision Support System:** Decision Support System (DSS): Concept and Philosophy, DSS: Deterministic Systems, Artificial Intelligence (AI) System, Knowledge Based Expert System (KBES), MIS and Role of DSS.

**(4 Hrs)**

**Text Books:**

1. W.S.Jawadekar, Management Information Systems, Tata McGraw-Hill.
2. Laudon and Laudon, Management Information Systems, Pearson Education, Asia.

**Reference Books:**

1. Devis and Olson, Management Information System, Tata McGraw-Hill.



## **B.Sc.(CS)E 5.2B-DSE-1E: Elective -1: MANAGERIAL ECONOMICS**

**Total: 48 Hours**

### **UNIT 1:**

**Introduction:** Meaning and definition- Managerial Economics, Salient features and significance, role of managerial economics, scope of managerial economics, uses/objectives of managerial economics, meaning of micro and macro economics, differences between micro and macro economics, importance and uses of micro economics, limitations of micro economics. **(8 Hrs)**

### **UNIT 2:**

**Demand Analysis:** Meaning of demand, individual and market demand, determinants of demand, demand-function, schedule, curve, the law of demand, exceptions to the law of demand, change in quantity demand vs change in demand, reasons for change in demand, Elasticity of demand, factors influencing elasticity of demand, price elasticity of demand and types, income elasticity of demand and types, cross elasticity of demand. Demand forecasting-meaning, significance and methods. **(10 Hrs)**

### **UNIT 3:**

**Supply Analysis:** Meaning of supply, determinants of supply, law of supply, extension and contraction in supply, increase and decrease in supply, causes of change in supply, elasticity of supply. **(4 Hrs)**

### **UNIT 4:**

**Production Analysis and Cost Analysis:** Production analysis: Concept of production function, factors of production, laws of production- the law of diminishing marginal returns, the law of variable proportions, the law of returns to scale, isoquants (only meaning), economies of scale and diseconomies of scale. Cost analysis: meaning of cost, types of cost, cost concepts-TFC, TVC, TC, AC, and MC their meaning and computation. **(14 Hrs)**

### **UNIT 5:**

**Market Structures and Pricing Policies:** Meaning of market, Pure and Perfect Competition & its features, Imperfect Competition & its features, Monopoly, Duopoly, Oligopoly, Monopolistic and Oligopolistic markets. Pricing policies – objective of pricing policy, factors involved in pricing policy, pricing methods- cost plus, going rate, pricing for rate of return, administered price. **(12 Hrs)**

### **Text Books:**

1. Managerial Economics, D.N. Dwivedi, Vikas publication
2. Managerial Economics - Theory and Application - D. M. Mithani

## DEPARTMENT OF BIOTECHNOLOGY

### KARNATAKA UNIVERSITY, DHARWAD BOTANY: DISCIPLINE SPECIFIC ELECTIVE (DSE)

### SEMESTER V

(Student shall choose either paper- I or Paper-II or paper –III)  
**PAPER-II: ECONOMIC BOTANY AND BIOTECHNOLOGY**  
(Credits: Theory-4, Practicals-2)

#### THEORY

Lectures: 60

#### Unit 1: Origin of Cultivated Plants

(4 Lectures)

Concept of centres of origin, their importance with reference to Vavilov's work

#### Unit 2: Cereals

(2 Lectures)

Wheat -Origin, morphology, uses

#### Unit 3: Legumes

(4 Lectures)

General account with special reference to Gram and soybean

#### Unit 4: Spices

(4 Lectures)

General account with special reference to clove and black pepper (Botanical name, family, part used, morphology and uses)

#### Unit 5: Beverages

(2 Lectures)

Tea (morphology, processing, uses)

#### Unit 6: Oils and Fats

(2 Lectures)

General description with special reference to groundnut

#### Unit 7: Fibre Yielding Plants

(4 Lectures)

General description with special reference to Cotton (Botanical name, family, part used, morphology and uses)

#### Unit 8: Introduction to biotechnology

(2 Lectures)

Historical account, branches of biotechnology.

#### Unit 9: Plant tissue culture

(16 Lectures)

Introduction, steps involved in plant tissue culture, Micropropagation: haploid production through androgenesis and gynogenesis; brief account of embryo & endosperm culture with their applications

#### Unit 10: Recombinant DNA Technology

(20 Lectures)

Blotting techniques: Northern, Southern and Western Blotting, DNA Fingerprinting; Molecular DNA markers i.e. RAPD, RFLP, SNPs; DNA sequencing, PCR and Reverse Transcriptase-PCR. Hybridoma and monoclonal antibodies, ELISA and Immunodetection. Molecular diagnosis of human disease, Human gene Therapy.

**SEMESTER VI**  
**SKILL ENHANCEMENT COURSE**  
**PAPER BT-SEC 2.1: PHARMACEUTICAL BIOTECHNOLOGY**  
**(Credits: Theory-2)**

**Theory**

**Total hours allotted 30**

1. **Introduction:** Introduction pharmaceutical biotechnology, current status and future prospects, generic and branded biopharmaceuticals, overview of life history for development of biopharmaceuticals and specifically Identification of Target and selection of protein or peptide based therapeutics: In-silico, pharmaco-informatics. Drug Discovery stages (Drug Target selection, screening of drugs, *In vivo* and *In vitro* study of drug efficacy, cell based analysis, Pre-clinical toxicity assessment, Clinical trial phases and design, clinical data management, concept of Pharmacovigilance.  

**(9 hrs)**
2. Overview of protein based therapeutics (Insulin, streptokinase, erythropoietin, Rituximab, etc), biologics for autoimmunity and inflammation, vaccine- adjuvant technology (Complete and Incomplete Adjuvants), genetically engineered vaccines, cancer vaccines, present and future biologics.**(6 hrs)**
3. Introduction to Genomics, transcriptomics, proteomics, and study of structural, functional proteins, and comparative genomics, pharmacogenomics. DNA & oligonucleotides microarrays, genetically engineered animals, Integration of personalized and systems medicines, pharmacogenomics in preclinical and clinical development of drugs.  

**(7 hrs)**
4. Drug delivery systems for biopharmaceuticals (rate controlled and site specific), Nanotechnology based miniaturization of biopharmaceuticals and therapeutics,**(4 hrs)**
5. **Bio-safety:** Genetic Engineering Appraisal Committee (GEAC), rules and regulations of handling genetically modified organisms. (Formation of Institutional bio-safety committee, Central Drugs Standard Control Organisation (CDSCO) Drug Control General of India.)  

**(4 hrs)**

**REFERENCES:**

**PHARMACEUTICAL BIOTECHNOLOGY**

1. Bhatia, S., Goli, D. (2018). Introduction to Pharmaceutical Biotechnology: Basic Techniques and Concepts. United Kingdom: Institute of Physics Publishing.
2. Daan J A Crommelin (2010), Pharmaceutical Biotechnology, 2nd Edition, Taylor & Francis Group.
3. Gary Walsh (2007) Pharmaceutical Biotechnology: Concepts and Applications. John Wiley & Sons, Inc.
4. Oliver Kayser, Heribert Warzecha (2012) Pharmaceutical Biotechnology: Drug Discovery and Clinical Applications, 2nd Edition. John Wiley & Sons, Inc.
5. Pharmaceutical Biotechnology by Daan J. A. Crommelin, et al
6. "Principles of Pharmacology by D. Golan, A. Tashjian, E. Armstrong, J.Galanter, A.W. Armstrong, R. Arnaout and H.Rose. 2005, Lippincott Williams and Wilkins.
7. Rodney J. Y. Ho (2013) Biotechnology and Biopharmaceuticals: Transforming Proteins and Genes into Drugs, 2nd Edition, John Wiley & Sons, Inc.
8. Walsh, G. (2013). Pharmaceutical Biotechnology: Concepts and Applications. Germany: Wiley.

## DEPARTMENT OF BOTANY

KARNATAKA UNIVERSITY, DHARWAD  
BOTANY: SKILL ENHANCE COURSES (SEC-I)  
(Student shall choose either paper- IA or Paper-IIB for SEC-I)

### SEMESTER V

#### PAPER-IB: NURSARY AND GARDENING

(Credits: 2)

##### THEORY

Lectures: 30

**Unit 1:** Nursery: definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants. (4 Lectures)

**Unit 2:** Seed: Structure and types - Seed dormancy; causes and methods of breaking dormancy - Seed storage: Seed banks, factors affecting seed viability, genetic erosion - Seed production technology - seed testing and certification. (6 Lectures)

**Unit 3:** Vegetative propagation: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants - green house - mist chamber, shed root, shade house and glass house. (6 Lectures)

**Unit 4:** Gardening: definition, objectives and scope - different types of gardening - landscape and home gardening - parks and its components - plant materials and design - computer applications in landscaping - Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting. (8 Lectures)

**Unit 5:** Sowing/raising of seeds and seedlings - Transplanting of seedlings - Study of cultivation of different vegetables: cabbage, brinjal, lady's finger, onion, garlic, tomatoes, and carrots - Storage and marketing procedures. (6 Lectures)

##### SUGGESTED READINGS

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
4. Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.
5. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and Cooperation, National Seed Corporation Ltd., New Delhi.
6. Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA.



**KARNATAKA UNEVIRSIY, DHARWAD**  
**BOTANY: SKILL ENHANCE COURSES (SEC-II)**  
(Student shall choose either paper- IIA or Paper-IIB for SEC-II)

**SEMESTER V**  
**PAPER-IIA: FLORICULTURE**  
(Credits: 2)

**THEORY**

**Lectures: 30**

- Unit 1:** Introduction: History of gardening; Importance and scope of floriculture and landscape gardening. **(2 Lectures)**
- Unit 2:** Nursery Management and Routine Garden Operations: Sexual and vegetative methods of propagation; Soil sterilization; Seed sowing; Pricking; Planting and transplanting; Shading; Stopping or pinching; Defoliation; Wintering; Mulching; Topiary; Role of plant growth regulators. **(8 Lectures)**
- Unit 3:** Ornamental Plants: Flowering annuals; Herbaceous perennials; Divine vines; Shade and ornamental trees; Ornamental bulbous and foliage plants; Cacti and succulents; Palms and Cycads; Ferns and Selaginellas; Cultivation of plants in pots; Indoor gardening; Bonsai. **(5 Lectures)**
- Unit 4:** Principles of Garden Designs: English, Italian, French, Persian, Mughal and Japanese gardens; Features of a garden (Garden wall, Fencing, Steps, Hedge, Edging, Lawn, Flower beds, Shrubbery, Borders, Water garden. Some Famous gardens of India. **(5 Lectures)**
- Unit 5:** Landscaping Places of Public Importance: Landscaping highways and Educational institutions. **(2 Lectures)**
- Unit 6:** Commercial Floriculture: Factors affecting flower production; Production and packaging of cut flowers; Flower arrangements; Methods to prolong vase life; Cultivation of Important cut flowers (Carnation, Aster, Chrysanthemum, Dahlia, Gerbera, Gladiolous, Marigold, Rose, Liliium, Orchids). **(6 Lectures)**
- Unit 7:** Diseases and Pests of Ornamental Plants. **(2 Lectures)**

**SUGGESTED READINGS**

1. Randhawa, G.S. and Mukhopadhyay, A. 1986. Floriculture in India. Allied Publishers.

**KARNATAKA UNIVERSITY, DHARWAD**  
**BOTANY: SKILL ENHANCE COURSES (SEC-II)**  
(Student shall choose either paper- IIA or Paper-IIB for SEC-II)

**SEMESTER V**  
**MEDICINAL BOTANY**

(Credits: 2)

**THEORY**

**Lectures: 30**

**Unit 1:** History, Scope and Importance of Medicinal Plants. Indigenous Medicinal Sciences; Definition and Scope-Ayurveda: History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments, Siddha: Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine. Unani: History, concept: Umoor-e- tabiya, tumors treatments/ therapy, polyherbal formulations. **(10 Lectures)**

**Unit 2:** Conservation of endangered and endemic medicinal plants. Definition: endemic and endangered medicinal plants, Red list criteria; In situ conservation: Biosphere reserves, sacred groves, National Parks; Ex situ conservation: Botanic Gardens, Ethnomedicinal plant Gardens. Propagation of Medicinal Plants: Objectives of the nursery, its classification, important components of a nursery, sowing, pricking, use of green house for nursery production, propagation through cuttings, layering, grafting and budding. **(10 Lectures)**

**Unit 3:** Ethnobotany and Folk medicines. Definition; Ethnobotany in India: Methods to study ethnobotany; Applications of Ethnobotany: National interacts, Palaeo-ethnobotany. folk medicines of ethnobotany, ethnomedicine, ethnoecology, ethnic communities of India. Application of natural products to certain diseases- Jaundice, cardiac, infertility, diabetics, Blood pressure and skin diseases. **(10 Lectures)**

**SUGGESTED READINGS**

1. Trivedi P C, 2006. Medicinal Plants: Ethnobotanical Approach, Agrobios, India.
2. Purohit and Vyas, 2008. Medicinal Plant Cultivation: A Scientific Approach, 2<sup>nd</sup> edn. Agrobios, India.

KARNATAKA UNIVERSITY, DHARWAD  
BOTANY: DISCIPLINE SPECIFIC ELECTIVE (DSE)

**SEMESTER VI**

(Student shall choose either paper- I or Paper-II or paper –III)

**PAPER-I: GENETICS AND PLANT BREEDING**

(Credits: Theory-4, Practical-2)

**THEORY**

**Lectures: 60**

**Unit 1: Heredity**

**(20 Lectures)**

Brief life history of Mendel, Terminologies, Laws of Inheritance, Modified Mendelian Ratios: 2:1- lethal Genes; 1:2:1- Co- dominance, incomplete dominance; 9:7; 9:4:3; 13:3; 12:3:1., Chi- Square, Pedigree Analysis, Cytoplasmic Inheritance: Shell Coiling in Snail, Kappa particles in Paramecium, leaf variegation in *Mirabilis jalapa*, Male sterility, Multiple allelism in *Nicotiana tobaccum*, Pleiotropism, Chromosome theory of Inheritance.

**Unit 2: Sex-determination and Sex-linked Inheritance**

**(4 Lectures)**

Sex-determination in *Drosophila sp.* and Sex-linked Inheritance in *Melandrium album*.

**Unit 3: Linkage and Crossing over**

**(8 Lectures)**

Linkage: concept & history, complete & incomplete linkage, bridges experiment, coupling & repulsion, recombination frequency, linkage maps based on two and three factor crosses. Crossing over: concept and significance, cytological proof of crossing over.

**Unit 4: Mutations and Chromosomal Aberrations**

**(4 Lectures)**

Types of mutations, effects of physical & chemical mutagens. Numerical chromosomal changes: Euploidy, Polyploidy and Aneuploidy ; Structural chromosomal changes: Deletions, Duplications, Inversions & Translocations.

**Unit 5: Plant Breeding**

**(4 lectures)**

Introduction and objectives. Breeding systems: modes of reproduction in crop plants. Important achievements and undesirable consequences of plant breeding.

**Unit 6: Methods of crop improvement**

**(8 lectures)**

Introduction: Centres of origin and domestication of crop plants, plant genetic resources; Acclimatization; Selection methods: For self pollinated, cross pollinated and vegetatively propagated plants; Hybridization: For self, cross and vegetatively propagated plants – Procedure, advantages and limitations.

**Unit 7: Quantitative inheritance**

**(4 lectures)**

Concept, mechanism, examples. Monogenic vs polygenic Inheritance.

**Unit 8: Inbreeding depression and heterosis**

**(4 lectures)**

History, Genetic basis of inbreeding depression and heterosis; Applications.

**Unit 9: Crop improvement and breeding**

**(4 lectures)**

Role of mutations; Polyploidy; Distant hybridization and role of biotechnology in crop improvement.



**SEMESTER VI**  
**DISCIPLINE SPECIFIC ELECTIVE-DSE**  
**PAPER BT 6.1-DSE 1.1:INDUSTRIAL AND ENVIRONMENTAL BIOTECHNOLOGY**  
**(Credits: Theory-4, Practicals-2)**

**Theory**  
**Total hours allotted 60**

**PART A: INDUSTRIAL BIOTECHNOLOGY**                      **Total hours allotted: 30**

1. Introduction to Industrial biotechnology, Basic principles of fermentation technology.  

**(2 hrs)**
2. Screening and isolation of industrially important microorganisms for the production of enzymes and other secondary metabolites from microbes.  

**(3 hrs)**
3. **Fermentation media:** Natural and synthetic media. Sterilization techniques – dry heat and steam, Radiation, Filtration methods.  

**(4 hrs)**
4. **Fermenters:** Process of Aeration, Agitation, Temperature regulation and foam control. Types of Fermenters - Typical, Airlift. Bubble-up fermenter. Batch Fermenter, continuous Fermenter.  

**(4 hrs)**
5. **Process Development:** Shake flask fermentation. Downstream processing (DSP). Disintegration of cells. Separation. Extraction. Concentration and purification of products.  

**(4 hrs)**
6. **Production of microbial products:** Lactic acid. Alcohol, citric acid, Penicillin and amylase  

**(4 hrs)**
7. **Fermented Foods:** Yoghurt, Buttermilk. Dosa. Cheese. Tempeh. Microbial Foods - Single cell protection (SCP),Single cell oils (SCO). Mass culture of algae (Spirulina).  

**(5hrs)**
8. Plant cell suspension culture for the production of food additives: Saffron and Capsaicin and shikonin.

## **DEPARTMENT OF STATISTICS**

### **Discipline Specific Elective (DSE) under CBCS**

**B.Sc. Semester – VI**

### **STATISTICS: Paper-II (STT:P-II F)**

#### **Economic Statistics and Econometrics.**

**Unit 1 : Index Numbers** : Definition, Problems involved in the construction of index numbers, methods of constructing index numbers of prices and quantities, simple aggregate and price relatives method, weighted aggregate and weighted average of relatives method, important types of weighted index numbers: Laspeyre's, Paasche's, Bowley's, Marshall- Edgeworth, Fisher's, method of obtaining price and quantity index numbers, tests consistency of index numbers, time reversal test, factor reversal test, and Circular test for index numbers, Uses and limitations of index numbers. Consumer price index number : Problems involved in the construction of cost of living index number, advantages and disadvantages, Aggregative expenditure method and Family budget method for the construction of consumer price index numbers. Applications of Cost of Living Index numbers.

(10 Hours)

#### **Unit II Time Series Analysis :**

Introduction, definition and components of Time series, illustrations, Additive, Multiplicative and mixed models, analysis of time series, methods of studying time series : Secular trend, method of moving averages, least squares method – linear, quadratic, exponential trend fittings to the data. Seasonal variation - definition, illustrations, measurements, simple average method, ratio to moving average method, ratio of trend method, link relatives method, Cyclical variation- definition, distinction from seasonal variation, Irregular variation- definition, illustrations. (10

Hours)

**Unit III Introduction to Econometrics and Simple Linear Regression** : Definition and scope of econometrics, Relationship between econometrics, mathematical economics and Statistics, goals of econometrics, limitations. Simple linear regression model, role of disturbance term in the model, ordinary least square method (OLS), Statistical assumptions, desirable small sample properties of least square estimators, Large sample properties of estimators, Linearity, unbiasedness, minimum

## DEPARTMENT OF CHEMISTRY

Discipline Specific Elective (DSE) under CBCS

**B.Sc. Semester - V**

**CHEMISTRY: Paper-II (CHT:P-II E)**

(Candidate shall choose either Paper-I or paper-II)

Credits: I. Theory	: 04	Theory class 4hrs /wk. Total theory: 60 Lectures 80 marks for Sem end Examination(3 hrs) & 20 marks IA
II. Practical	: 02	Practical: 4 hrs./wk. Total Practical: 52 hrs. 40 marks for Sem end Examination(3 hrs) & 10 marks IA
Total Credits	: 06	Total Theory marks 100 and Practical marks 50

### I. Coordination Chemistry-II and Organometallic Compounds:

**Crystal Field Theory:** Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral symmetry. Factors affecting the magnitude of D. Spectrochemical series. Comparison of CFSE for  $O_h$  and  $T_d$  complexes, Tetragonal distortion of octahedral geometry. Jahn-Teller distortion, Square planar coordination.

**Organometallic Compounds:** Definition and Classification with appropriate examples based on nature of metal-carbon bond (ionic, s, p and multicentre bonds), heptacity. Structures of methyl lithium, Zeiss salt and ferrocene. EAN rule as applied to carbonyls. Structure and bonding of mononuclear and polynuclear carbonyls of 3d metals.  $\pi$ -acceptor behaviour of carbon monoxide. (15 Lectures)

### II. Industrial chemistry

**Glass:** Glassy state and its properties, classification (silicate and non-silicate glasses). Manufacture and processing of glass. Composition and properties of the following types of glasses: Soda lime glass, lead glass, armoured glass, safety glass, borosilicate glass, fluorosilicate, coloured glass, photosensitive glass.

**Ceramics:** Important clays and feldspar, ceramic, their types and manufacture. High technology ceramics and their applications, superconducting and semiconducting oxides, fullerenes carbon nanotubes and carbon fibre.

**Cements:** Classification of cement, ingredients and their role, Manufacture of cement and the setting process, quick setting cements.

**Fertilizers:** Different types of fertilizers. Manufacture of the following fertilizers: Urea, ammonium nitrate, calcium ammonium nitrate, ammonium phosphates; polyphosphate, superphosphate, compound and mixed fertilizers, potassium chloride, potassium sulphate.

SKILL ENHANCEMENT COURSES (SEC) in Chemistry

**B.Sc. Semester - V**  
**CHEMISTRY : SEC- II (SEC-CH- 2E)**

**Total Syllabus: 30 hrs / Sem.:**

**2 hrs / Week**

**Examination: Maximum Marks- 50 (40 Semester End exam + 10 IA Exam)**

**Duration of Exam: 1.5 hrs**

**PHARMACEUTICAL CHEMISTRY**

**Drugs & Pharmaceuticals:** Drug discovery, design and development; Basic Retrosynthetic approach. Synthesis of the representative drugs of the following classes: analgesics agents, antipyretic agents, anti- inflammatory agents (Aspirin, paracetamol, Ibuprofen); antibiotics (Chloramphenicol); antibacterial and antifungal agents (Sulphonamides; Sulphanethoxazol, Sulphacetamide, Trimethoprim); antiviral agents (Acyclovir), Central Nervous System agents (Phenobarbital, Diazepam), Cardiovascular (Glyceryl trinitrate), antilaprosy (Dapsone), HIV-AIDS related drugs (AZT- Zidovudine).

**Fermentation:** Aerobic and anaerobic fermentation. Production of (i) Ethyl alcohol and citric acid, (ii) Antibiotics; Penicillin, Cephalosporin, Chloromycetin and Streptomycin, (iii) Lysine, Glutamic acid, Vitamin B2, Vitamin B12 and Vitamin C.

**Practical in one hour, nevertheless no practical examination.**

- a. Preparation of Aspirin and its analysis.
- b. Preparation of magnesium bisilicate (Antacid).

**30 Lectures**

**Reference Books:**

1. G.L. Patrick: Introduction to *Medicinal Chemistry*, Oxford University Press, UK.
2. Hakishan, V.K. Kapoor: *Medicinal and Pharmaceutical Chemistry*, VallabhPrakashan, Pitampura, New Delhi.
3. William O. Foye, Thomas L., Lemke , David A. William: *Principles of Medicinal Chemistry*, B.I. Waverly Pvt. Ltd. New Delhi.



**SKILL ENHANCEMENT COURSES (SEC) in Chemistry**

**B.Sc. Semester - VI**

**CHEMISTRY: SEC- III (SEC-CH- 1F)**

**Total Syllabus: 30 hrs / Sem.:**

**2 hrs / Week**

**Examination: Maximum Marks- 50 (40 Semester End exam + 10 IA Exam)**

**Duration of Exam: 1.5 hrs**

**PESTICIDE CHEMISTRY**

General introduction to pesticides (natural and synthetic), benefits and adverse effects, changing concepts of pesticides, structure activity relationship, synthesis and technical manufacture and uses of representative pesticides in the following classes:

Organochlorines (DDT, Gammexene,);

Organophosphates (Malathion, Parathion );

Carbamates (Carbofuran and carbaryl);

Quinones ( Chloranil), Anilides (Alachlor and Butachlor).

**Practical in one hour, nevertheless no practical examination.**

- 1 To calculate acidity/alkalinity in given sample of pesticide formulations as per BIS specifications.
- 2 Preparation of simple organophosphates, phosphonates and thiophosphates.

**30 Lectures**

**Reference Book:**

1. Cremllyn, R. *Pesticides. Preparation and Modes of Action*, John Wiley & Sons, NewYork, 1978.

## DEPARTMENT OF IND FISHERIES

### B.Sc. Semester - I

DSC - *INDUSTRIAL FISH AND FISHERIES*: IF-Th : A

Credits: I. Theory	: 04	Theory class 4hrs /wk. Total theory: 60 Lectures
		80 marks for Sem end Examination(3 hrs) & 20 marks IA
II. Practical	: 02	Practical: 4 hrs./wk. Total Practical: 52 hrs.
		40 marks for Sem end Examination(3 hrs) & 10 marks IA
Total Credits	: 06	Total Theory marks 100 and Practical marks 50

#### Syllabus :

##### BIOLOGY OF FIN FISH AND SHELL FISH: PART-I

###### Classification of super class Pisces;

The differences between elasmobranches and teleosts. Study of external morphology of typical elasmobranches and teleosts. The structures used in taxonomic studies like skin, colouration, scales, mouth, jaws etc., External characters of fishes – shape, head, mouth, eyes, barbels, operculum, fins, spines, trunk, tail, scales, lateral line. External characters of Prawn, Lobsters, Bivalve, Gastropods and Cephalopods (two examples from each)

15 hrs

Commercially important orders, families, genera and species of elasmobranches and teleosts of Indian region and their identification. Identification of commercially important Fishes, Prawn, Lobsters, Bivalves, Gastropods and Cephalopods of India.

15 hrs

**Internal anatomy of fish;** Alimentary canal and associated structures. Respiratory system, Gill, Swim bladder, Accessory respiratory organs. Heart and circulatory system. Nervous system and lateral line system, Sense organs.

10 hrs

**Food and Feeding;** Feeding habitat in various groups of marine and freshwater fishes. Natural food of fishes. Anatomical difference of herbivore and carnivore fishes. Feeding habitat of Prawn, Crab, Lobsters, Bivalve and Cephalopods.

10 hrs

**Reproductive system in fishes:** Reproductive behaviour and parental care in fishes. Special behaviour, aggregation and shoaling. Migration of fishes; anadromous and catadromous.

10 hrs

## **DEPARTMENT OF GEOLOGY**

### **5<sup>th</sup> SEMESTER**

#### **Discipline Specific Elective (DSE) under CBCS**

**Title of the Course: Paper I- Economic Geology and Hydrogeology**

**Course Code: (DSE) GLG-SET-(E)-556-P-I**

**(Candidate shall choose either Paper-I or Paper-II)**

<b>Credits: 06 Hrs</b>	<b>Theory class 4Hrs/wk</b>	<b>Total Th: 60 Lectures</b>	<b>4Hrs/wk Total Pr: 52 Hrs.</b>
<b>Theory: 04</b>	<b>Theory Marks 100</b>	<b>80 Marks (3 Hrs)</b>	<b>20 Marks IA</b>
<b>Practical: 02</b>	<b>Practical Marks 50</b>	<b>40 Marks (3Hrs)</b>	<b>10 Marks IA</b>

#### **Unit-1: Economic Geology and Prospecting                      50 Marks Each**

1. Definition of Ore, Gangue and Tenor; Metallic and Non-metallic Ore minerals; Strategic, Critical and Essential minerals.
2. Processes of formation of economic mineral deposits: Magmatic- Early and Late magmatic, Contact metasomatism, Hydrothermal processes (cavity filling and metasomatic replacement), Sedimentation processes, oxidation and supergene enrichment deposits (with Indian examples).
3. Study of mineralogy, mode of occurrence, origin and uses of the following economic mineral deposits with reference to Indian occurrences:
  - a) Metallic mineral deposits: Aluminium, Copper, Manganese, Iron, Lead, Zinc and Gold.
  - b) Non-metallic mineral deposits: Limestone, Gypsum, Mica, Magnesite, Sillimanite, Asbestos.

30

- e) Organic mineral deposits: Origin and occurrence of coal and petroleum in India.

#### **Unit-2: Hydrogeology**

1. Definition, Hydrological parameters: precipitation, evaporation, transpiration, infiltration; Hydrologic cycle.



## DEPARTMENT OF MICROBIOLOGY

**SEMESTER V**  
**DISCIPLINE SPECIFIC ELECTIVE-DSE**  
**PAPER MB 5.1 DSE 1E - FOOD AND INDUSTRIAL MICROBIOLOGY**  
**(Credits: Theory-4, Practicals-2)**

Theory

Total hours allotted: 60 hrs (4 hrs/week)

1. **Food and microorganisms**  
Food as a substrate for microorganisms, sources of contamination of food. (4 hrs)
2. **Food spoilage and preservation**  
Spoilage of canned foods, cereals, fruits, vegetables. Meat, fish and fermented foods (Soya sauce, olives, idli, butter milk and yoghurt, cheese and Kefir)  
Principles of food preservation- physical and chemical methods, food sanitation and control (10 hrs)
3. **Microbiology of milk**  
Sources of milk contamination, Methods to detect microbial spoilage by SPC. Reductase test. Biochemical changes of milk souring. Gassy fermentation. Proteolysis. Lipolysis. Ropiness, Phosphatase test, Clot on boiling test. Starter culture and its role. Methods of Preservation of milk and milk products (Pasteurization and sterilization). (8 hrs)
4. **Food Infections and Intoxications:**  
Endotoxin. Food infection (Salmonellosis) Food intoxication- (Staphylococcal food poisoning, Botulism). Mycotoxins produced by Fungi: Aflatoxins in stored food and grains. Food safety and quality control- brief account of HACCP, FSSAI and Food safety and standard act 2006. (8 hrs)
5. **Introduction to Industrial Microbiology**

16

History, scope and development of industrial microbiology. Isolation and screening of industrially important microorganisms and Strain improvement methods. (4 hrs)

6. **Fermentation and Fermentation media**  
Basic structure, construction and various types of fermentors - Typical stirred aerated fermentor. Tower fermentor and Bubble cap fermentor Types of fermentation (Batch, Continuous, surface, submerged and solid state fermentation). Inoculum preparation. Media components and formulation (Crude media components, anti foam agents, precursors, inducers, Inhibitors and buffering agents). Sterilization of media and raw materials and maintenance of sterility at critical points during fermentation (8 hrs)
7. **Process parameters**  
Aeration, Agitation, Temperature regulation, Foam regulation and pH Regulation. Down stream processing- Precipitation, filtration, centrifugation, distillation, cell disruption, solvent recovery, drying, crystallization. (8 hrs)
8. **Industrial production of chemicals by Microorganisms**  
Microbial production of Alcohol, Lactic acid, Penicillin, Cephalosporin, Protease and Insulin. Immobilization of cells and enzymes –Types, advantages and applications, Role of microorganisms for production and recovery of minerals and petroleum. (10 hrs)

## B.Sc. Semester–V

Discipline Specific Core Course DSCC-11

**Course Title:** Food and dairy microbiology (Theory)

**Course Code:** 035MCB013

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSCC-11	Theory	04	04	56hrs.	2hrs.	40	60	100

**Course Pre-requisite(s):**

**Course Outcomes (COs):** After the successful completion of the course, the student will be able to:

- CO1. To understand the association of microbes in food and dairy, quality testing of food and dairy products
- CO2. To understand the preservation and food safety protocols
- CO3. To understand the methods of spoilage of food and the diseases associated with it
- CO4. To learn the properties of milk and the types of preservation of milk.
- CO5. To learn the human microbiota and its significance in Diet.

**CONTENTS**

**56 Hrs**

**Unit I-Microbes and Food**

**Food as a substrate for microorganisms:** Intrinsic and extrinsic parameters affecting the growth of microbes. Microorganisms in food and their sources (molds, yeast and bacteria).

**Food borne infections and Intoxication:** Causative agents, foods involved, symptoms and preventive measures for Salmonella, Shigella, *Yersinia enterocolitica*, *Staphylococcus*, *Clostridium*, *Salmonella*, *Bacillus cereus*, *Brucella*, *Listeria monocytogenes*, Mycotoxin, Phycotoxins.

**Fermented Food:** Fermented vegetable-sauerkraut, pickles. Meat- sausage. Beverages kombucha. Sourdough. Microbes as food- SCP, SCO. Nutraceuticals and Synbiotics.

**14 hrs**

**Unit II-Spoilage of Food, Preservation and Food safety**

**Spoilage of Food:** Principles of food spoilage. Sources of food contamination, Types of spoilage. Spoilage of meat and poultry, Fish and sea foods. Spoilage cereals, fruits and vegetables.

Spoilage of canned food.

**Food Preservation:** Principles of food Preservation. Methods of preservation Physical (temperature, drying, irradiation), chemical (Class I and Class II). Bio preservation. Canning, Food Packaging- Types of packaging materials, properties and benefits.

**Quality control in Food-** Food Sampling, preparation and handling, Surface and environmental monitoring in food industry, basic physical and chemical analysis of food, Microbiological analysis of food and food products, Rapid microbiological and molecular methods to detect food pathogens.

**Food Sanitation and Safety:** Good Hygiene practices, GLP, GMP (Waste treatment disposal methods), Food Safety HACCP, FSSAI and Food safety and Standard act 2006, Food control agencies and their regulation.

**14hrs**



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# CRITERIA-I

## CURRICULAR ASPECTS

### 1.3 CURRICULAR ENRICHMENT

#### CROSS CUTTING ISSUES

## **GENDER VALUES:**

## List Of Courses Addressing Issues Related To Gender Values

### GENDER VALUES: 14

Department	Course	Contents
English(AECC) B.Sc I semester	Timeless Wisdom	<ul style="list-style-type: none"> <li>✚ Prose, Poetry</li> <li>✚ Grammar and Composition</li> </ul>
English(MIL) B.Sc I semester	One Stage One Act Plays	<ul style="list-style-type: none"> <li>✚ One Act Plays</li> </ul>
English(AECC) B.Sc II semester	Timeless Wisdom	<ul style="list-style-type: none"> <li>✚ Prose, Poetry</li> <li>✚ Grammar and Composition</li> </ul>
English(MIL) B.Sc I semester	Twelve Short Stories	<ul style="list-style-type: none"> <li>✚ Twelve short stories</li> <li>✚ Grammar and composition</li> </ul>
English(AECC) B.Sc III semester	Untouchable	<ul style="list-style-type: none"> <li>✚ Novel</li> <li>✚ Grammar and composition</li> </ul>
English(MIL) B.Sc III semester	Raja Rao's Kantapura	<ul style="list-style-type: none"> <li>✚ Novel</li> <li>✚ Grammar and composition</li> </ul>
Hindi(AECC) B.Sc I semester	Gadhyaprabha	<ul style="list-style-type: none"> <li>✚ Collection of Prose</li> </ul>
Hindi(AECC) B.Sc II semester	Ekankee Saptaka	<ul style="list-style-type: none"> <li>✚ Collection of one Act Play</li> </ul>
Hindi(AECC) B.Sc III semester	Katha Deepa	<ul style="list-style-type: none"> <li>✚ Collection of Short Stories</li> </ul>
Hindi(AECC) B.Sc IV semester	Kavya Prasar	<ul style="list-style-type: none"> <li>✚ Collection of Modern poetry</li> <li>✚ Precise Writting.</li> </ul>
Urdu(MIL) B.Sc I semester	Gulshan E Adab	<ul style="list-style-type: none"> <li>✚ Prose, Poetry &amp; Essays</li> </ul>
Urdu(MIL) B.Sc II semester	Gulshan E Adab	<ul style="list-style-type: none"> <li>✚ Prose, Poetry &amp; Essays</li> </ul>
Urdu(MIL) B.Sc III semester	Muntakhabat-e jamia –e Urdu	<ul style="list-style-type: none"> <li>✚ Prose, Poetry &amp; Essays</li> </ul>
Urdu(MIL) B.Sc IV semester	Muntakhabat-e jamia –e Urdu	<ul style="list-style-type: none"> <li>✚ Prose, Poetry &amp; Essays</li> </ul>

## DEPARTMENT OF ENGLISH

**Karnatak University, Dharwad**  
**Syllabus for B.Sc/B.Sc (CS)/BCA I Sem**  
**English-1 (AECC)**  
**From 2020-21 to 2022-23 for three years**  
**80 marks paper for 3 hours duration and 20 marks for Internal Assessment**  
**45 hrs Syllabus for 3 Credits**  
**Teaching Hours: 3 Hours (per week)**

---

### Course and Skill Outcome

1. This paper aims at introducing English poetry and prose to develop reading skills
2. It teaches the learners basics of English grammar.
- 3.

**Text Book: Timeless Wisdom**, Board of Editors, Orient Blackswan, Hyderabad

### I. Prose

1. Playing the English Gentleman - Mahatma Gandhi
2. Let's Go Home - Kewlin Sio
3. Marriage is a Private Affair - Chinua Achebe

### II. Poetry

1. River - A. K. Ramanujan
2. The Road not Taken - Robert Frost
3. If - Rudyard Kipling

### III Grammar and Composition

1. Parts of Speech with special emphasis on Prepositions and Articles  
(Focus may be on the following prepositions: On, in, of, off, for, into, with, beside, besides, under, over, by, from, to, at, across, since, between, among, above, up, after, before, through)
2. Tenses (with focus on use of simple present tense and past tense)
3. Words used in different parts of speech
4. Functional vocabulary (synonyms and antonyms: see Annexure-1))

**Reference Book: R. P. Singh's Functional Skills in Language and Literature, OUP**

Question Paper Pattern	80 Marks
1. Objective type Questions	1×10=10
2. Reference to context (two out of four)	2x5 =10
3. Essay type Question on Prose (one out of two)	1×10=10
4. Essay type Question on Poetry (one out of two)	1x10=10
5. A) Use of Articles (5 x 1 = 5)	10
B) Use of Prepositions (5 x 1 = 5)	
6. Use of Verbs (tenses)	10x1=10
7. Words used in different Parts of Speech	5 x 2=10
8. Functional Vocabulary (synonyms and antonyms)	10x 1=10



**Karnatak University, Dharwad**  
**Syllabus for B.Sc/B.Sc (CS)/BCA I Sem**  
**MIL Additional English-1 (AECC)**  
**From 2020-21 to 2022-23 for three years**  
**80 marks paper for 3 hours duration and 20 marks for Internal Assessment**  
**45 hrs Syllabus for 3 Credits**  
**Teaching Hours: 3 Hours (per week)**

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**Course and Skill Outcome**

1. This paper introduces the students to appreciate one-act-plays in English.
2. It teaches the learners writing headlines, slogans and report writing.

I Text Book – **On the Stage: One Act Plays**, ed K. Sujata, Blackswan, Hyderabad

1. Before Breakfast - Eugene O'Neill
2. Sunny Morning: a Comedy of Madrid- Serafin and Jaoquin Alvarez Quintero
3. The Trick - Erisa Kironde
4. Matsyagandhi - M. Sajitha

**II Grammar:** Match the words with their meanings, Preparation of Headlines and Slogans, Report Writing

**Pattern of Question Paper**

	<b>Marks</b>
1. Objective type Questions	1×10=10
2. Reference to Context (two out of four)	2×5=10
3. Essay type question on the first two one-act plays (one out of two)	10
4. Essay type question on the last two one-act plays (one out of two)	10
5. Short notes on all the one-act plays (two out of four)	2×5=10
6. Match the words with their meanings	10×1=10
7. Preparation of Headlines and Slogans	10
8. Report Writing	10

**Karnatak University, Dharwad**  
**Syllabus for B.Sc/B.Sc (CS)/BCA II Sem**  
**English-2 (AECC)**

**80 marks paper for 3 hours duration and 20 marks for Internal Assessment**

**45 hrs Syllabus for 3 Credits**

**Teaching Hours: 3 Hours (per week)**

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**Course and Skill Outcome**

1. This paper aims at introducing English poetry and prose to develop reading and comprehension skills.
2. It teaches them the basics of communicative English.

**Text Book: Timeless Wisdom**, Board of Editors, Orient Blackswan, Hyderabad

**I. Prose**

1. Sparrows - K. A. Abbas
2. An Astrologer's Day - R. K. Narayan
3. The Function of Education - J. Krishnamurti

**II . Poetry**

1. The World is Too Much With Us - William Wordsworth
2. Prayer Before God - Louis MacNeice
3. Gandhi - Niranjan Mohanty

**III Grammar and Composition**

Correction of Errors

Combining sentences with appropriate conjunctions

Use of adverbs and adjectives

Dialogue Writing: Common situations

Short speeches for welcoming, introducing, proposing vote of thanks and Independence

Day ad Republic Day

One word substitution (See Annexure-2), Collocations (See Annexure-2)

**Suggested Reading: R. P. Singh's *Functional Skills in Language and Literature*, OUP**

**Question Paper Pattern for B.Sc/B.Sc (CS)/BCA**

	<b>Marks</b>
1. Objective type Questions	10×1=10
2. Essay type question on prose (one out of two)	10
3. Essay type question on poetry (one out of two)	10
4. Short notes on Prose & Poetry (two out of four)	2x5=10
5. Correction of errors	10×1=10
6. a. Combining sentences with appropriate conjunctions (5) b. Use of proper adverbs and adjectives (5)	10
7. A) Dialogue Writing (5) B) Short speeches (5)	10
8. A) One word substitution (5) B) Collocations (5)	10



**Karnatak University, Dharwad**  
**Syllabus for B.Sc/B.Sc (CS)/BCA II Sem**  
**MIL Additional English-2 (AECC)**

**80 marks paper for 3 hours duration and 20 marks for Internal Assessment**

**45 hrs Syllabus for 3 Credits**

**Teaching Hours: 3 Hours (per week)**

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**Course and Skill Outcome**

1. This paper introduces the students to appreciate short stories in English.
2. It teaches them how to expand an idea or proverb into paragraph and other writing skills.

**I. Text Book – Twelve Short Stories, ed C. M. Sharma, OUP**

1. How Much Land Does a Man Need? - Leo Tolstoy
2. A True Story - Mark Twain
3. My Uncle Jules - Guy de Maupassant
4. The Mother - Somerset Maugham

**II. Grammar and Composition: Expansion of an idea and proverb, Letters of Congratulations and Compliments, Paragraph writing on current topics**

**Pattern of Question Paper**

	<b>Marks</b>
1. Objective type Questions	10×1=10
2. Reference to Context (two out of four)	2×5=10
3. Essay type questions on short stories (one out of two)	10
4. Essay type questions on short stories (one out of two)	10
5. Short notes on short stories (one out of two)	2×5=10
6. Expansion of an idea and proverb (2×5)	10
7. Letters of Congratulations and Compliments	10
8. Paragraph writing on current topics	10

**Syllabus for B.Sc/B.Sc (CS)/BCA III Sem MIL Additional English-3 (AECC)**

**80 marks paper for 3 hours duration and 20 marks for Internal Assessment**

**45 hrs Syllabus for 3 Credits  
Teaching Hours: 3 Hours per Week**

**Course and Skill Outcome**

1. This paper aims at introducing the learner to appreciate a novel.
2. To teach the learners to form new words, writing compositions on leisure activities.

**I Novel:**

**50 Marks**

Mulk Raj Anand's *Untouchable* (any edition)

**II Grammar and Composition:**

Noun forms of words, plural forms of words, writing a note on leisure activities, and expansion of an idea

**30 Marks**

**Question Paper Pattern**

1. Objective type questions 1x10=10
2. Comprehension questions (five out of eight) 2x5=10
3. An essay type question on novel (one out of two) 10
4. An essay type question on novel (one out of two) 10
5. Short notes on novel (two out of four) 2x5=10
6. a) Noun forms of words 1x5=5  
b) Plural forms of words 1x5=5 10
7. Essay Writing 1x10=10  
(one out of two)
8. Preparation of a note on leisure activities 10

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**Syllabus for B.Sc/BSc (CS)/BCA IV Sem English-4 (AECC)**

**80 marks paper for 3 hours duration and 20 marks for Internal Assessment**

**45 hrs Syllabus for 3 Credits**

**Teaching Hours: 3 Hours per Week**

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**Course and Skill Outcome**

1. This paper introduces the English novel and teaches them skills in descriptive writing.
2. It teaches them simple compositions like paragraphs and developing the ideas into short paragraphs.

**I Raja Rao's *Kanthapura* (Any edition) 40 marks**

**II Grammar and Composition 40 Marks**

Framing of WH questions, use of affixes, Transformation of sentences, comprehension of a passage, paragraph writing and job application

**Question Paper Pattern**

- |   |       |    |
|---|-------|----|
| 1. Objective type questions   | 1x10= | 10 |
| 2. Comprehension questions (Five questions out of eight)  | 5x2=  | 10 |
| 3. An essay type question on the novel  |       | 10 |
| 4. Short notes on the novel (two out of four)   | 5x2=  | 10 |
| 5. a) Framing WH questions  | 1x5   |    |
| b) Use of affixes   | 1x5   | 10 |
| 6. Transformation of sentences  | 1X10  | 10 |
| (Active/passive voice 2, direct and indirect 2, simple, compound, complex 2, Degrees of comparison, 2, assertive interrogative 2) |       |    |
| 7. Comprehension of a Passage ( not less than 250 words)  |       | 10 |
| a. Objective type questions (1X5)   |       |    |
| b. Short question (5X1)   |       |    |
| 8. a) Paragraph writing (one out of two)(5X1)   |       |    |
| b) Job Application (5X1)  |       | 10 |

## DEPARTMENT OF HINDI

**KARNATAK UNIVERSITY, DHARWAD**

**DEPARTMENT OF HINDI**

**Syllabus for: B.Sc/BCA/B.Sc.(CS)/BA-SC/BA-SLP:**

AECC: Ability enhancement Compulsory Course: (CBCS):

<b>Semester</b>	<b>Title of the Paper</b>	<b>L.T.P.</b>	<b>Total Credit</b>
I	1. Gadhya Prabha (Collection of Prose) Translation &Scientific Terminology.	3-0-0	3
II	1. Ekankee Saptak: (Collectin of one Act Play) Essays on Scientific aspects and Official Letter	3-0-0	3
III	1. Katha Deep (Collection of Short Stories) official Hindi.	3-0-0	3
IV	1. Kavya Parasar (Collection of Modern poetry) Precise Writting.	3-0-0	3



## DEPARTMENT OF URDU

### I Semester

Sub : Urdu (MIL)

Title : Prose, Poetry & Essays

Teaching Credits : 3 Hours Per Week (3+0+0=3)

Total Marks : 100 (80 marks for Sem end Examination & 20 marks IA)

Paper Duration : 3 hrs

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#### Course and Skill out come :

1. This MIL Urdu course aims at familiarizing the students with the basics of Urdu language and literature.

2. It also aims at imparting the knowledge of inventions of Khadeem aur

Bhap ki taqat ka daur.

#### Prescribed Text Books

I - **Gulshan-e-Adab** -- Edited by – Majlis-e-Idarat

- Pub by – Nasheman Publisher .Shimoga

#### Prose ;

1. Khushamad ( P-9) - Sir Sayed Ahmed Khan
2. Sir Sayed ke askhalaq (P-13) –Moulana Haali
3. Talaash (P-22) – Imtiyaz Ali Taj/Khudsiya Zaidi
4. Abdul Rahim Khane Khana ki daryadDili (P-37) - Mohd Hussain Azad .

#### Poetry : Nazme

1. Awara hona Bakawali ka (P-93) – Daya Shankar Naseem
2. Banjara naama (P-96) – Nazeer Akbar Abadi
3. Khake Hind (P-98) – Brij Narayan Chakbast

**KARNATAK UNIVERSITY , DHARWAD**

**B.Sc / BCA/ B.Sc.CS/ BA .SC/ BA.SLP**

**II Semester**

**Sub : Urdu (MIL)**

**Title : - Prose, Poetry & Essays**

**Teaching Credits : 3 Hours Per Week (3+0+0=3)**

**Total Marks : 100 (80 marks for Sem end Examination & 20 marks IA)**

**Paper Duration : 3 hrs**

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**Course and Skill out come :**

1. This course aims at teaching the students different forms of prose and poetry which highlight problems of our society, Indian freedom struggle and human values..
2. It also aims at giving them the knowledge of inventions of Bijli ki taqat aur gas petrol aur desile engine ka daur.

**Prescribed Text Books:**

- I - Gulshan-e-Adab** - Edited by – Majlis-e-Idarat  
- Pub by – Nasheman Publisher .

**Prose :**

- |                                 |                    |        |
|---------------------------------|--------------------|--------|
| 1. Athara aane                  | – Akhtar Ansari    | (P-45) |
| 2. Khal mey raho begum          | – Ibrahim Jalees   | (P-61) |
| 3. Shakhsiyat aur khud aitamadi | - Dail Kamagi      | (P-66) |
| 4. Addu                         | – Jeelani Banu - . | (P-74) |

**Poetry : Nazmen**

- |                       |                   |         |
|-----------------------|-------------------|---------|
| 1. Tazheek-e-rozgar   | - Mirza Souda     | (P-104) |
| 2. Jibreel-o-ibalees  | – Mohd Iqbal      | (P-106) |
| 3. Chand taron ka bun | - Makhdum         | (P-108) |
| 4. Taj Mahal          | - Saher Ludhyanvi | (P-110) |

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B.Sc / BCA/ B.Sc.CS/ BA .SC/ BA.SLP

III Semester

Sub : Urdu (MIL)

Title : Prose, Poetry & Short Story

Teaching Credits : 3 Hours Per Week (3+0+0=3)

Total Marks : 100 (80 marks for Sem end Examination & 20 marks IA)

Paper Duration : 3 hrs

---

Course and Skill out come :

1. This course aims to get the students acquainted with Nasr, Ghazal, Nazm and Short stories which highlight self help time management , ethical and moral values .
2. It also intend to give an understanding of literature through which students will be able to understand the basics of Urdu.

**Texts :**

**I-Muntakhabat-e-Jamia-e-Urdu** - Dr.Shujaat Ali Sandelvi

( Hissa Duvam)

Pub : Education Book House Aligarh

**Prose :**

- 1.Apni madad aap - Sir Syed Ahmed Khan (P-17)
- 2.Akber ka darbar - Mohammed Hussain Azad (P-33)
- 3.Waqat - Molvi Nazeer Ahmed (P-42)
4. Zaibunnisa Begum - Shibli Numani (P-62 )

**Poetry : Nazmen :**

**KARNATAK UNIVERSITY , DHARWAD**

**B.Sc / BCA/ B.Sc.CS/ BA .SC/ BA.SLP**

**IV Semester**

**Sub : Urdu( MIL)**

**Title : Prose, Poetry & Short Story**

**Teaching Credits : 3 Hours Per Week (3+0+0=3)**

**Total Marks : 100 (80 marks for Sem end Examination & 20 marks IA)**

**Paper Duration : 3 hrs**

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**Course and Skill out come :**

1. This course aims at teaching the students different forms of prose and poetry which highlight village life, health awariness , unity, brotherhood and Indian culture and ethics from Ramayan .
2. It also intend to give an understanding of literature through which students will be able to understand the basics of Urdu.

**Texts :**

**I-Muntakhabat-e-Jamia-e-Urdu - Dr.Shujaath Ali Sandelvi**

( Hissa Duwam)

Pub : Education Book House Aligarh

**Prose :**

- 1.Dchat ki zindagi - Abdul Haleem Sharur (P-82)
- 2.Cricket Match - Mirza Azeem Baig Chughtai (P-91)
3. Khaul Ka Paas - Munshi Prem Chand ( P-111)
- 4.Hali - Moulvi Abdul Haq (P-120)

**Poetry : Nazmen**

1. Mukafat –e-Amul - Nazeer Akber Aabadi (P-256)
2. Zahur-e-Rehmath - Khawaja Altaf Hussain Hali (P-259)
3. Ramayan ka ek scene - Brij Narayan Chakbust (P-262)
4. Aadmi de aiy Khuda - Josh Malechhabadi (P-274)



## DEPARTMENT OF ANTHROPOLOGY

### Content of Theory SOCIO-CULTURAL ANTHROPOLOGY (DSCC-10)

Units	Hours Allotted
<b>Unit -1 Introduction to Socio-cultural Anthropology</b>	<b>14 hours</b>
<b>Chapter 1:</b> Meaning, Scope and Relevance of Socio-cultural Anthropology, <b>Chapter 2:</b> Relationship of Socio-cultural Anthropology with other disciplines <b>Chapter 3:</b> Distinctiveness of Social-cultural Anthropology from Sociology.	
<b>Unit -2 Marriage, Family and Kinship</b>	<b>14 hours</b>
<b>Chapter 4:</b> Marriage: Definition, Nature and Functions of Marriage, Types of Marriage, Rules of Marriage and Marriage Payment. <b>Chapter 5:</b> Family: Meaning and Definition, Characteristics of Family, Functions of Family, Types of Family and Change in Family system in recent times. <b>Chapter 6:</b> Kinship: The Concept of Kinship and Functions of Kinship, Kinship Rule: Consanguineal and Affinal, Kinship Terminology, Clan, Principles of Descent, Inheritance Rule, and Succession Rule.	
<b>Unit -3 Economic and Political Anthropology</b>	<b>14 hours</b>
<b>Chapter 7:</b> Economic Anthropology: Meaning, Characteristics of Primitive Economy. Stages of Economy, Types of Exchange: Reciprocity, Redistribution, Barter Exchange, Gift and Ceremonial Exchange, Kula Ring and Potlatch. <b>Chapter 8:</b> Stages of Economy: Food gathering and Hunting, Pastoralism, Shifting Cultivation, Settled agriculture, Artisan and Labour. <b>Chapter 9:</b> Political Anthropology: Band, Tribe, Chiefdom and State. Power and Authority, Social Control, Law, and Justice in simple societies. Government and Law in Simpler societies: Nature and Characteristics,	
<b>Unit -4 Religion</b>	<b>14 hours</b>
<b>Chapter 10:</b> Religion and its characteristics, Religion in simpler societies and its types, <b>Chapter 11:</b> Concept of Sacred and Profane, Myths and Rituals <b>Chapter 12:</b> Difference among Magic, Religion and Science, Magico-religious functionaries	

**Pedagogy:** Pedagogy includes lectures, active learning, course projects, problem or project-based learning, self-study like seminars, assignments, demonstration, discussion methods.

Formative Assessment	
Assessment Occasion/type	Weightage in Marks (40)
1st IA Test	10
2nd IA Test	10
Assignment	10
Seminar	10
<b>Total</b>	<b>40</b>

Course Code: 036ANT013

ARCHAEOLOGICAL AND LINGUISTIC ANTHROPOLOGY (DSCC-15)

Units	Total Hours
<b>Unit-I Introduction to Archaeological Anthropology</b>	14 hrs
<b>Chapter 1:</b> Meaning, Definitions, Types of Archaeology, Nature, Scope and Relevance of Archaeological Anthropology. <b>Chapter 2:</b> Relationship of Archaeological Anthropology with other disciplines. <b>Chapter 3:</b> Methods of studying Archaeological Anthropology .	
<b>Unit-II Chronology</b>	14 hrs
<b>Chapter 4:</b> The concept of chronology, Relevance of dating in archaeology. Absolute & Relative methods of dating. <b>Chapter 5:</b> Geo-chronology: Pleistocene Epoch, The Great Ice age, Glacial and Interglacial periods and Pluviation and Inter-Pluviation . <b>Chapter 6:</b> Cultural Chronology: Stone Age, Bronze Age and the Iron Age . Life of Man during the Paleolithic, Mesolithic and Neolithic Cultures, Classification of Tools and Technique of tool manufacture.	
<b>Unit-II Civilization</b>	14 hrs
<b>Chapter 7:</b> Definition and Characteristic Features of Civilization. <b>Chapter 8:</b> Earliest Civilizations of the world <b>Chapter 9:</b> Indus Valley Civilization.	
<b>Unit-IV Linguistic Anthropology</b>	14 hrs
<b>Chapter 10:</b> Meaning and Scope of Linguistic Anthropology, Language and Culture . <b>Chapter 11:</b> Structure and Characteristics of Human Language, Theories on Origin of Human Language, Subfields in Linguistic Anthropology . <b>Chapter 12:</b> Verbal or Non- Verbal Communication	

**Pedagogy:** Pedagogy includes lectures, active learning, assignments, demonstration, classroom discussion and seminars.

Formative Assessment	
Assessment Occasion/type	Weightage in Marks (40)
1st IA Test	10
2nd IA Test	10
Assignment	10
Seminar	10
<b>Total</b>	<b>40</b>



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# **CRITERIA-I**

**CURRICULAR ASPECTS**

**1.3 CURRICULAR ENRICHMENT**

**CROSS CUTTING ISSUES**

**HUMAN VALUES:**

## List Of Courses Addressing Issues Related To Professional Ethics, Gender, Human Values, Environment And Sustainability

### HUMAN VALUES: 08

Department	Course	Contents
BCA /B.Sc(CS) I semester	Indian Constitution	<ul style="list-style-type: none"> <li>✚ Significance of the constitution</li> <li>✚ Fundamental Rights</li> <li>✚ Nature of the directive principles of the policy of the state</li> <li>✚ Union Government</li> <li>✚ State Government</li> </ul>
BCA /B.Sc(CS) II semester	Human Rights	<ul style="list-style-type: none"> <li>✚ Nature of Human Rights</li> <li>✚ Classification of Human Rights</li> <li>✚ Enforcement of Human Rights</li> </ul>
Criminology and Forensic Science B.Sc II semester	Social Problems and Crime	<ul style="list-style-type: none"> <li>✚ Introduction to Social Problems</li> <li>✚ Women and Child Related Social Problems and Crimes</li> <li>✚ Other Social Problems</li> </ul>
Geography B.Sc V semester	Population Resources and Dynamics	<ul style="list-style-type: none"> <li>✚ Population Change:</li> <li>✚ Migration</li> <li>✚ Population as Resource</li> <li>✚ Population Growth</li> </ul>
Botany B.Sc V semester	Intellectual Property Rights	<ul style="list-style-type: none"> <li>✚ Patents</li> <li>✚ Copyrights</li> <li>✚ Trademarks</li> <li>✚ Geographical Indications</li> <li>✚ :Protection of Traditional Knowledge</li> <li>✚ : Industrial Designs</li> <li>✚ Protection of Plant Varieties</li> </ul>
Geography B.Sc V semester	Human Geography	<ul style="list-style-type: none"> <li>✚ Man-Environmental Relationship</li> <li>✚ Social and Cultural Geography</li> <li>✚ Tribes: Habitat and Economy</li> <li>✚ Population Geography</li> </ul>
Anthropology B.Sc III semester	Socio-Cultural Anthropology	<ul style="list-style-type: none"> <li>✚ Socio-cultural Anthropology</li> <li>✚ Marriage, Family and Kinship</li> <li>✚ Religion</li> </ul>
Anthropology B.Sc VI semester	Archaeological And Linguistic Anthropology	<ul style="list-style-type: none"> <li>✚ Civilization</li> <li>✚ Linguistic Anthropology</li> </ul>



**COMPULSORY SUBJECT B.Sc/BCA/B.Sc(CS)**

**B.Sc. (C.S) 105: INDIAN CONSTITUTION**

**Total: 50 Hrs**

1. Significance of the constitution: Making of the Constitution Pole of the Constituent Assembly. Salient features, the Preamble, Citizenship, Procedure for amendment of the Constitution. (10 Hrs)
2. Fundamentals Rights, the Right to Equality, the Right to Freedom, the Right against Exploitation, the Right to Freedom of Religion, Cultural and Educational Rights, the Right to Constitutional Remedies. (10 Hrs)
3. Nature of the Directive Principles of State Policy, Difference between of Fundamental Rights and Directive Principles of State Policy – Implementation of Directive Principles of State Policy, Fundamental Duties (8 Hrs)
4. Union Government – Powers and Functions of the President, the Prime Minister, Council of Ministers. Composition, powers and functions of the Parliament., Organization of Judiciary, Jurisdiction of the Supreme Court, Independence of Judiciary. (12 Hrs)
5. State Government – Powers and Functions of Governor, Chief Minister, Council of Ministers. Composition, Powers and Functions of State Legislature, Local Government and the Constitution, Relation between the Union and the States. (10 Hrs)

**References:**

- 1) M.V. Pylee, An Introduction to the Constitution of India, New Delhi, Vikas 2005.
- 2) Subhash C. Kashyap, Our Constitution: An Introduction to India's constitution and constitutional Law. New Delhi, National Book Trust 2000.
- 3) Durga Das Basu, Introduction to the Constitution of India, New Delhi, Prentice Hall of India, 2001
- 4) D.C. Gupta, India Government and Politics, VIII Edition, New Delhi, Vikas, 1994.
- 5) J.C. Johari, Indian Government and Politics, Delhi, Sterling Publishers, 2004.
- 6) V.D. Mahajan, Constitutional Development and National Movement in India, New Delhi, S. Chand and Co. latest edition.
- 7) Constitution Assembly Debates, New Delhi, Lok Sabha Secretariat, 1989.
- 8) Granville Austin, Working of a Democratic Constitution: The Indian Experience, New Delhi, Oxford University Press, 1999.
- 9) A.P. Avasthi, Indian Government and Politics, Agra Naveen Agarwal, 2004
- 10) S.A. Palekar, Indian Constitution, New Delhi, Serials Publication, 2003.
- 11) Brij Kishore Sharma, Introduction to the Constitution of India (Second Edition), New Delhi, Prentice – Hall of India, 2004.
- 12) H.M. Rajasekhar, Understanding the Indian Constitution, Mysore, Prabodha, 2005.
- 13) J.N. Pandey, Constitutional Law of India, Allahabad: Central Law Agency, 2004.
- 14) *ಭಾರತೀಯ ಸಂವಿಧಾನದ ಮೂಲಭೂತ ಮೌಲ್ಯಗಳು, ಬಿ.ಎಂ. ಶರಣ, 2004.*
- 15) *ಭಾರತ ಸಂವಿಧಾನ (ಆರ್ಟಿಕಲ್ 32ರ ಅಡಿಯಲ್ಲಿ ನಡವಳಿಸಬಹುದಾದ ಮೂಲಭೂತ ಮೌಲ್ಯಗಳು), ಭಾರತ ಸರ್ಕಾರದ ಪರಿಷತ್, ಕರ್ನಾಟಕ ಸರ್ಕಾರದ ಮೂಲ್ಯ, ಶಿವಮೊಗ್ಗ, ಮೈ ಸೃಷ್ಟಿಕರ್ತನ: ನಿರ್ದೇಶಕರ ಮುಖ್ಯತೆಯ ಪ್ರಕಟಣೆ, ೧೯೭೬*



## BCA 205: HUMAN RIGHTS AND ENVIRONMENTAL STUDIES

Total:60 Hrs

### Section A: Environmental Studies

**Unit 1: Nature of environmental studies:** Definition, scope and importance, Multimedisciplinary nature of environmental studies, need for public awareness.

**Natural resources and associated problems:** (a) **Forest resources:** Use and over-exploitation, deforestation timber extraction, mining, dams and their effects on forests and tribal people, (b) **Water resources:** Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. (c) **Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources. (d) **Food resources:** World food problems, changes caused by agriculture effects of modern agriculture, fertilizer-pesticide problems. (e) **Energy resources:** Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. (f) **Land resources:** land as resources, and land degradation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources Equitable use of resources for sustainable lifestyles. (6 Hrs)

**Unit 2: Ecosystems:** Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, Characteristic features, structure and function of the following ecosystem: a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) (4 Hrs)

**Unit 3: Biodiversity and its conservation:** Introduction-Definition: genetic, species and ecosystem diversity, Biogeographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option value, Biodiversity at global, national and local levels, India as a mega-diversity nation, Western ghats as a bio-diversity, Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife Conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ, Conservation of biodiversity. (5 Hrs)

**Unit 4: Environmental Pollution:** Definition, causes, effects and control measures of: a) Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear hazards., Solid waste management: causes, effects and control measures urban and industrial wastes, Role of an individual in prevention of pollution, Disaster management: folds, earthquake, cyclone and landslides, Tsunami. (5 Hrs)

**Unit 5: Social Issues and Environment:** From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns, Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Wasteland reclamation, consumerism and waste products, Environment protection Act, Air (Prevention and control of pollution) Act., Water (Prevention and



control of pollution) Act., Wildlife protection act, Forest conservation Act. Issues involved in enforcement of environmental legislation public awareness. (4 Hrs)

**Unit 6: Human Population and the Environment:** Population growth, variation among nations, Population explosion, Family welfare programme, Environment and human health, Value Education, Women and Child Welfare, Role of information technology in Environmental and human health. (3 Hrs)

**Unit 7: Field work:** Visit to a local area to document environmental assets-river/forest/grassland/hill/mountain., Visit to a local polluted site-Urban/Rural/Industrial/Agricultural, Study of common plants, insects, birds, Study of simple ecosystem-ponds, river, hill slopes, etc. (3 Hrs)

**Total 30 Hours**

**References:**

1. S. Sinha, M. Shukla & R. Shukla, Text book of Environmental studies AITBS Publishers, Delhi. (2005)
2. Agarwal, K.C., 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin publishing Pvt. Ltd. Ahmedabad-380013, India E mail: [mapin@icenet.net](mailto:mapin@icenet.net).
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
5. Clark R.S. Marine pollution, Clarendon Press Oxford.
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001 Environmental Encyclopedia, Jaico Publ. House. Mumbai, 1196p.
7. De. A.K. Environmental Chemistry, Wiley Eastern Ltd.,
8. Down to Earth, Centre for Science and Environment.
9. Gleick, H.P. 1993 Water in crisis, pacific institute for studies in Dev. Environmental & Security. Stockholm Env. Institute. Oxford University press 473p.
10. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay.
11. Jadhav H & Bhosle V.M. 1995 Environmental Protection and laws. Himalayas Pub. House Delhi, 284p
12. Mckinney M.L. & School R.M. 1996 Environmental Science systems & Solutions Web. Enhanced edition 639p.
13. Heywood, Vh & Watson R.T. 1995 Global biodiversity Assesment Cambridge Univ. press 1140p
14. Mhaskar A.K. Matter Hazardous Techno-Science Publications.
15. Miller T.G. Jr. Environment Science Wadsworth publishing co.
16. Odum E.P. 1971 Fundamental of Ecology W.B. Saunders Co. USA 574p
17. Rao M.N. & Data A.K. 1987 Waste Water treatment, Oxford and IBH Publ. Co pvt, ltd 345p
18. Sharma B.K. 2001 Environmental chemistry Goel Publ. House, Meerut.
19. Townsend C. Harper. J. and Michel Begon, Essetials of Ecology Blackwell Science.
20. Trivedi R.K. Handbook of Environmental Laws, rules, guidelines, ompliances and Standards, Vol I and II Enviro Media.
21. Trivedi R.K. and P.K. Goel introduction to air pollution, Techno-Science Publications.
22. Wagner K.D. 1998 Environmental Management. W.B. Saundars Co. Philadelphia, U.S.A. 499p.

### Section B: Human Rights

**Unit 1:** Nature of Human Rights, Origin and development of the concept of Human Rights, Functions of Human rights in modern society, Human rights and democratic governance: Limitations of Human rights. (10 Hrs)

**Unit 2:** Classification of Human Rights, Civil and political Rights-Nature and functions:, Social and Economic Rights; Right of vulnerable groups such as women, Children minorities, tribal and the disabled, Constitutional incorporation of Human Rights in India. (10 Hrs)

**Unit 3:** Enforcement of human rights-Basic principles governing enforcement of human rights at national, Regional and International levels. National Human Rights Commission-Organisation, functions and powers. (10 Hrs)

**Total 30 Hours**

**References:**

1. H.O. Agarwal-Human Rights, Central Law Publications, Allahabad.
2. Durga Das Basu- Human Rights in Constitutional Law (Relevant Chapters).
3. Henkin Luise; Right of Man today, London: Steven, 1978.
4. Singh Nagendra; Renforcement of Human rights in Peace and war and the future of Humanity, Calcutta, Eastern Law House, 1986.
5. Relevant international Instruments.

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	Total Teaching Hours	Exam. Marks	Internal Assessment Marks	Total Marks
Section A Environmental Studies	30	40	10	50
Section B Human Rights	30	40	10	50
<b>TOTAL</b>	<b>60 Hrs</b>	<b>80</b>	<b>20</b>	<b>100</b>

**Question paper pattern (Model):** The examination question paper will carry total 80 marks which is divided into two section A and B, each carrying 40 marks. Answer to Section A and Section B should be written in two separate answer books.

The question paper pattern for each section should be as given below.

- |  |           |
|--|-----------|
| 1) Question No. 1 should be short answer type questions of 2 marks each (5 out of 7) -       | 10 Marks. |
| 2) Question No. 2 & 3 should be essay type questions of 10 marks each with internal choice - | 20 Marks. |
| 3) Question No. 3 & 4 should be short notes of 5 marks each (2 out of 3) -                   | 10 Marks. |

**Total 40 Marks**



## PERSONALITY DEVELOPMENT & COMMUNICATION SKILLS

**Preamble:** The objective of every educational system is to prepare capable young men and women who can come up to the expectations of their teachers, parents society and nation at large in facing the difficult challenges in the course of student life as well as post student life. Unless an individual looks at himself with an objective to assess what personality inputs he possess and what he needs to develop, the process of developing one's personality will not start. An individual if he has to contribute meaningfully to society, it is not enough that he is healthy physically, he has to be psychologically healthy. He must be socially as well as culturally healthy. He must have awareness of ethical values in life and he should be able to provide a framework for a just society. The philosophy of human resource development embraced by Government of India two decades back intends to stimulate an all round holistic development of the individual is so as all to enable him to play his role effectively. In the process of one's personality development it is necessary for an individual to know the psychological processes that lead to personality development which are best explained by theories of personality. Similarly, processes of perception and cognition will enable an individual to understand inherent limitations of an individual and make him more open-minded. The aspects of working in a team, building interpersonal relation leadership skills, collaborative processes managing intra personal, inter personal and group conflict are aspects, which play an important role.

Another most important dimension of personality is communication. Most of the time an individual is communicating either in written or oral form. The communication process needs to be property understood and the individual must and should develop necessary skills, which can be developed through practice. Presentation skills such as conducting or giving a seminar, submitting a paper, doing public speaking are skills that can considerably alter the landscape of one's personality.

### **Objectives of the course:**

1. To provide an understanding of what is personality and what are the processes of developing one's personality.
2. Make the student aware of his or her role in different settings such as son, daughter, sister, brother, neighbour, citizen and so on.
3. To create awareness about physical intellectual, emotional, social, familial, educational aspects of personality.
4. To provide skills of written and oral communication with a focus on skill development.

**Methodology of Teaching:** This course will be taught through lectures, class room discussion, case discussions, student presentation, case method as well as role play. Field assignments will also be given to student to meet people in the field and assess their personality development experience. Videocassettes, films on the topic can shown. Eminent personalities should be invited to class room to present and interact with students.

Teacher shall provide an open environment where students will freely discuss and debate on various experiences, feelings and opinion.

**Eligibility conditions for teachers:** Teachers with Masters degree in Psychology, Sociology, management, Social Work and English with a flair for Human Resource Development are eligible to teach.

### **Scheme of examination:**

20 internal marks will be given as below:

Class participation                      5 Marks



**B.Sc. (Comp. Sc.) 205: HUMAN RIGHTS & ENVIRONMENTAL STUDIES**

**Total : 60 Hrs**

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**Total 30 Hours**

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- 2) Question No. 2 & 3 should be essay type questions of 10 marks each with internal choice - 20 Marks.
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Total 40 Marks

## DEPARTMENT OF CRIMINOLOGY /FORENSIC SCIENCE

### B.A / B.Sc Semester – II

**Subject: Criminology and Forensic Science**  
**Open Elective Course (OEC-2)**  
**(OEC for other students)**

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-2	OEC	Theory	03	03	42 hrs	2hrs	40	60	100

OEC-2: Title of the Course: **Social Problems and Crime**

#### Course Outcome (CO):

After completion of course, students will be able to:

- CO 1 :** Understand the different social problems in India, their causes, which leads to crimes, criminality and social disorder.
- CO 2 :** Explain the various forms of women and child related issues, crimes and their related laws.
- CO 3 :** Understand about alcoholism and drugs leads to social disorganization and crimes
- CO 4 :** Explain about the corruption and terrorism and their impact on society with related laws
- CO 5 :** Understand the effect of drug abuse on society

Syllabus- OEC: Title- Social Problems and Crime	Total Hrs: 42
<b>Unit-I Introduction to Social Problems</b>	<b>14 hrs</b>
<b>Chapter-1</b> Social problem and crime: concept, types and stages in the development of social problems.  <b>Chapter-2</b> Theoretical approaches to social problems, social disorganisation, cultural lag, value conflict and personal deviation  <b>Chapter-3</b> Causes of social problems leading to crime	
<b>Unit-II Women and Child Related Social Problems and Crimes</b>	<b>14 hrs</b>
<b>Chapter-4</b> Child abuse and child labour: Meaning, Causes and effects of child Abuse <b>Chapter-5</b> Special acts - Prohibition of Child Marriage Act 2006 , Child labour (Prohibition & Regulation) Act 1986, Immoral Traffic (Prevention) Act 1956 and Protection of Children from Sexual Offences Act, 2012  <b>Chapter-6</b> Women Related Issues, Crimes and Laws: Prostitution, Domestic Violence, Dowry Harassment, Sexual Harassment of Women at Workplace, Indecent representation of women etc and related laws, Sati System and Honour killing.	

## DEPARTMENT OF GEOGRAPHY

### B.A/B.Sc. Semester – V Discipline Specific Course (DSC)-9

**Course Title:** Population Resources and Dynamics

**Course Code:** 035 Geog 011(B.Sc)  
015 Geog 011 (B.A)

Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSCC-9	Theory	04	04	56 hrs.	2hrs.	40	60	100

**Course Outcomes (COs):** At the end of the course students will be able to:

- CO1:** Apply critical analysis skills on the demographic composition of a country.
- CO2:** Classify and evaluate migrations and their types.
- CO3:** Understanding the population resources.
- CO4:** Analyse population growth issues and challenges.
- CO5:** Investigate how migration takes place

Unit	Title:	56.hrs/ Sem
Unit I	<b>Introduction:</b> Nature and Scope of Population Geography, Population Geography and Demography, Sources of Population Data. Density of Population. World Population: Measures, patterns, and determinants. Growth, distribution, and problems.	14
Unit II	<b>Population Change:</b> Concept of over, under & optimum population; Growth of Population in the World and India, Components of Population Change. Fertility and Mortality Analysis: Indices, determinants, and world patterns. Demographic Attributes and Demographic Transition. Theories of Population Growth: Malthus, Sadler, and Ricardo. <b>Assignment:</b> Students are to be prepared a report regarding population change in their own area and submit a report.	14
Unit III	<b>Migration:</b> Meaning, types, causes, consequences, and models. Theories of Migration Ravenstein & Lee. Population composition and characteristics. Age, Sex, rural-urban, occupational structure, and educational level. <b>Field Activity:</b> Students need to visit a nearby village and get to know how and why migration takes place and submit a report.	14
Unit IV	<b>Population as Resource:</b> Population Resource Regions. Population Policy of India. Policy issues; Social well-being and quality of life; population as social capital. Contemporary Issues – Ageing of Population; Declining Sex Ratio; HIV/AIDS. Population policies in developed and developing countries. Human Development Index (HDI).	14



**B.Sc. Semester – II**  
**Discipline Specific Course (DSC) under CBCS**  
**GY-T B: Human Geography**

Unit	Title	Sub-unit	Hrs
I	Introduction to Human Geography	<b>Introduction:</b> Definition, Field and Scope of Human Geography. Branches of Human geography	08
II	Conceptual approaches of Man-Environmental Relationship	Environmental determinism, Possibilism and Neo-determinism	02
III	Social and Cultural Geography	<b>Major races of the world:</b> Classification and distribution of Caucasoid, Mangoloid, Negroid and Australoid. Culture and Religion of the World.	23
		<b>Settlements:</b> Types and Patterns of Rural settlements. Definition of urban places. The origin of towns and functional classification of towns.	
		<b>Urbanization:</b> Trends and Patterns of World Urbanizations	
IV	Tribes: Habitat and Economy	<b>Major tribes of the world (Primitive people):</b> Pygmies, Bushman, Eskimos, Semang and sakais.	19
		<b>Major Indian Tribes:</b> Todas, Bills, Gondas, Nagas and Santals.	
V	Population Geography	Growth and distribution of world population.	08
		<b>Population composition:</b> Sex-ratio and Literacy rate.	

**References:**

1. Dickens and Pitts: Introduction to Human Geography, 1963.
2. Harm D. Blij: Human and Economic Geography, Mac Millan, New York, 1992.
3. Husain M: Human Geography, Rawat Publications, Jaipur, 2003.
4. Nellson, Gabler & Vining Human: Human Geography, People, Culture and Land
5. Peter Danials, MichaelBradshaw Denis Shaw, James Sidaway: Human Geography, Issues for the 21<sup>st</sup> Century, Pearson, 2003.
6. Norris and Haring: Political Geography, Charles E. Merrill Publishing Company.

## DEPARTMENT OF BOTANY

### KARNATAKA UNIVERSITY, DHARWAD BOTANY: SKILL ENHANCE COURSES (SEC-II)

## SEMESTER VI

(Student shall choose either paper- IIA or Paper-IIB)

### PAPER- IIB: INTELLECTUAL PROPERTY RIGHTS

(Credits: 2)

THEORY

Lectures: 30

**Unit 1: Introduction to intellectual property right (IPR)**

(2 lectures)

Concept and kinds. Economic importance. IPR in India and world: Genesis and scope, some important examples. IPR and WTO (TRIPS, WIPO).

**Unit 2 : Patents**

(2 Lectures)

Objectives, Rights, Patent Act 1970 and its amendments. Procedure of obtaining patents, Working of patents. Infringement.

**Unit 3: Copyrights**

(2 Lectures)

Introduction, Works protected under copyright law, Rights, Transfer of Copyright, Infringement.

**Unit4: Trademarks**

(2 Lectures)

Objectives, Types, Rights, Protection of goodwill, Infringement, Passing off, Defences, Domain name.

**Unit 5: Geographical Indications**

(2 Lectures)

Objectives, Justification, International Position, Multilateral Treaties, National Level, Indian Position.

**Unit 6: Protection of Traditional Knowledge**

(6 Lectures)

Objective, Concept of Traditional Knowledge, Holders, Issues concerning, Bio-Prospecting and Bio-Piracy, Alternative ways, Protectability, need for a Sui-Generis regime, Traditional Knowledge on the International Arena, at WTO, at National level, Traditional Knowledge Digital Library.

**Unit 7: Industrial Designs**

(2 Lectures)

Objectives, Rights, Assignments, Infringements, Defences of Design Infringement

**Unit 8: Protection of Plant Varieties**

(4 Lectures)

Plant Varieties Protection-Objectives, Justification, International Position, Plant varieties protection in India. Rights of farmers, Breeders and Researchers. National gene bank, Benefit sharing. Protection of Plant Varieties and Farmers' Rights Act, 2001.

**Unit 9: Information Technology Related Intellectual Property Rights**

(4 Lectures)

Computer Software and Intellectual Property, Database and Data Protection, Protection of Semiconductor chips, Domain Name Protection

**Unit 10: Biotechnology and Intellectual Property Rights.**

(4 Lectures)

Patenting Biotech Inventions: Objective, Applications, Concept of Novelty, Concept of inventive step, Microorganisms, Moral Issues in Patenting Biotechnological inventions.

### SUGGESTED READINGS

1. N.K. Acharya: Textbook on intellectual property rights, Asia Law House (2001).
2. Manjula Guru & M.B. Rao, Understanding Trips: Managing Knowledge in Developing Countries, Sage Publications (2003).
3. P. Ganguli, Intellectual Property Rights: Unleashing the Knowledge Economy, Tata McGraw-Hill (2001).
4. Arthur Raphael Miller, Micheal H. Davis; Intellectual Property: Patents, Trademarks and Copyright in a Nutshell, West Group Publishers (2000).
5. Jayashree Watal, Intellectual property rights in the WTO and developing countries, Oxford University Press, Oxford.

**OR**  
**PAPER DSEZOOT 6.1B: ENVIRONMENTAL BIOLOGY & ZOOGEOGRAPHY AND WILDLIFE**  
**BIOLOGY**

**Credit: 04**

**Total Teaching Hours: 60 hrs**

I	INTRODUCTION  Ecological spectrum, subdivisions of ecology, scope of ecology	03 hrs
II	BIOGEOCHEMICAL CYCLES  Principles and concepts to biogeochemical cycles. Hydrological, Carbon, Nitrogen, Oxygen, Sulphur and Phosphorus cycles	06 hrs
III	ABIOTIC AND BIOTIC FACTORS  Biotic factors, light, effect of light on plants and animals. Temperature; thermal stratification, cyclomorphosis. Adaptations to extreme temperatures; soil; soil organisms; water; oxygen; carbon dioxide; fire and wind  Biotic factors, animal relationships, mutualism, commensalism, parasitism, amensalism, predation and competition with relevant examples	08 hrs
IV	HABITATS  Marine habitat, zonation of the sea and ecological classification of marine biota, coastal ecology, estuarine ecology and mangroves.  Freshwater habitat, lentic and lotic systems. Ecological classification of fresh water animals'  Terrestrial habitat; a brief account of biomes  Ecological adaptations to marine, freshwater and terrestrial habitats	06 hrs
V	POPULATION ECOLOGY  Population density, natality and mortality, age distribution, population growth rate, population growth curves, biotic potential, Allee's principle and Gause's Principle	04 hrs
VI	COMMUNITY ECOLOGY  Community structure, ecological determinants, ecological stratification, ecotone and edge effect, ecological niches, ecological succession, climax community, alpha, beta, gamma diversity, Shanon index. Liebig's and Shelford's laws and combined concept of limiting factors	06 hrs
VII	<b>POLLUTION</b>  Air, Water, Soil Pollution, noise, visual and agricultural pollution, e-waste, solid and hazardous waste management with example. <b>Toxicants – natural and synthetic toxicants and toxicity measurements. Global warming, acid rain, bio-accumulation, bio - magnification, eutrophication- types and its impact.</b>	06 hrs



Karnatak University's,

**KARNATAK SCIENCE COLLEGE, DHARWAD**

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# **CRITERIA-I**

## **CURRICULAR ASPECTS**

### **1.3 CURRICULAR ENRICHMENT**

#### **CROSS CUTTING ISSUES**

# **ENVIRONMENT AND SUSTAINABILITY**



## List Of Courses Addressing Issues Related To Professional Ethics, Gender, Human Values, Environment And Sustainability

### ENVIRONMENT AND SUSTAINABILITY: 16

Department	Course	Contents
BCA /B.Sc(CS) II semester	Environmental studies	<ul style="list-style-type: none"> <li>✚ Nature of Environmental studies</li> <li>✚ Ecosystem</li> <li>✚ Biodiversity and its conservation</li> <li>✚ Environmental Pollution</li> <li>✚ Social Issues and environment</li> </ul>
B.Sc II CBCS (Compulsory Subject)	Environmental Studies	<ul style="list-style-type: none"> <li>✚ Introduction to Environmental Studies</li> <li>✚ Ecosystem</li> <li>✚ Natural Resources: Renewable and Non Renewable resources</li> <li>✚ Biodiversity and Conservation</li> <li>✚ Environmental Pollution</li> </ul>
Geography B.Sc II semester	Basics of Natural Disasters	<ul style="list-style-type: none"> <li>✚ Introduction to Natural Disaster</li> <li>✚ Atmosphere and Hydrosphere Natural Disasters</li> <li>✚ Biosphere and Natural Disasters</li> </ul>
Geography B.Sc I semester	Geo-Environmental Studies	<ul style="list-style-type: none"> <li>✚ Earth environmental segments</li> <li>✚ Environmental Hazards:</li> </ul>
Botany B.Sc I semester	Biodiversity (Microbes, Algae, Fungi And Archegoniate)	<ul style="list-style-type: none"> <li>✚ Microbes, Algae</li> <li>✚ Fungi</li> </ul>
Botany B.Sc V semester	Plant Ecology And Taxonomy	<ul style="list-style-type: none"> <li>✚ : Ecological factors</li> <li>✚ Plant communities</li> <li>✚ Ecosystem</li> <li>✚ Botanical Nomenclature</li> <li>✚ Biometrics, numerical taxonomy and cladistics</li> </ul>
Botany B.Sc V semester	Plant Diversity And Human Welfare	<ul style="list-style-type: none"> <li>✚ Plant diversity</li> <li>✚ Loss of Biodiversity</li> <li>✚ Conservation of Biodiversity</li> <li>✚ Role of plants in relation to Human Welfare</li> </ul>
Industrial Fish And Fisheries B.Sc VI semester	Industrial Fish And Fisheries	<ul style="list-style-type: none"> <li>✚ Seed Production</li> <li>✚ Environmental Biology</li> <li>✚ BIOCHEMISTRY</li> </ul>
Geography B.Sc IV semester	Environmental Geography	<ul style="list-style-type: none"> <li>✚ Ecosystem, Bio-Diversity</li> <li>✚ Global Warming and Environmental Pollution</li> <li>✚ Conservation and Management of Environment</li> </ul>
Geology B.Sc V semester	Environmental Geology	<ul style="list-style-type: none"> <li>✚ Environmental Geology</li> <li>✚ Energy Budget</li> <li>✚ Resource management:</li> </ul>
Microbiology B.Sc IV semester	Environmental And Agricultural Microbiology	<ul style="list-style-type: none"> <li>✚ Microbiology of air</li> <li>✚ Microbiology of water</li> <li>✚ Microbiology of waste water</li> <li>✚ Bioremediation and Bioleaching</li> <li>✚ Microorganisms in Agriculture</li> </ul>
Botany B.Sc VI semester	Evolutionary and Developmental Biology	<ul style="list-style-type: none"> <li>✚ Origin and evolution of Human and Horse.</li> <li>✚ Evidences of Evolution:</li> <li>✚ Species Concept and Extinction:</li> </ul>

Botany B.Sc V semester	Plant Morphology And Taxonomy	<ul style="list-style-type: none"> <li>✚ Morphology</li> <li>✚ Herbaria and Botanical gardens:</li> <li>✚ Study of the diagnostic features of Angiosperm families</li> </ul>
Botany B.Sc V semester	Genetics And Plant Breeding	<ul style="list-style-type: none"> <li>✚ Plant Breeding:</li> <li>✚ Hybridization</li> <li>✚ Crop improvement and breeding Role of mutations</li> </ul>
Biotechnology B.Sc V semester	Plant and Animal Biotechnology	<ul style="list-style-type: none"> <li>✚ Plant Tissue culture methods</li> <li>✚ Animal Cell culture methods</li> </ul>
Biotechnology B.Sc VI semester	Bio process and Environmental Biotechnology	<ul style="list-style-type: none"> <li>✚ Bio reactors and own stream processing</li> <li>✚ Fundamentals of Environmental Biotechnology</li> <li>✚ Bio remediation and Waste Management</li> </ul>

# COMPULSORY SUBJECT

## Annexure "A"

Karnatak University, Dharwad  
All Under Graduate Programmes  
Semester -I  
Ability Enhancement Compulsory Course (AECC)  
Environment Studies: ES-A

Total Credit: 2  
Two Hours Lecture in a week.  
Total Number of marks: 50 (10 IA + 40 Sem. end exam)

Lecture/semester: 30 hrs  
Duration of exam: 1.5 hrs.

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### Unit 1: Introduction to environmental studies

- Multidisciplinary nature of environmental studies;
- Scope and importance; Concept of sustainability and Sustainable development. (2 lectures)

### Unit 2: Ecosystems

- What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems:
  - a) Forest ecosystem
  - b) Grassland ecosystem
  - c) Desert ecosystem
  - d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)(6 lectures)

### Unit 3: Natural Resources: Renewable and Non-renewable Resources

- Land resources and land use change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity, and tribal populations.
- Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state).
- Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies. (8 lectures)

### Unit 4: Biodiversity and Conservation

- Levels of biological diversity : genetic, species and ecosystem diversity; Bio-geographic zones of India; Biodiversity patterns and global biodiversity hot spots
- India as a mega-biodiversity nation; Endangered and endemic species of India
- Threats to bio-diversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value. (8 lectures)

### Unit 5: Environmental Pollution

- Environmental pollution : types, causes, effects and controls; Air, water, soil and noise pollution
- Nuclear hazards and human health risks
- Solid waste Management: Control measures of urban and industrial waste.
- Pollution case studies. (6 lectures)

## DEPARTMENT OF GEOGRAPHY

### B.A / B.Sc. Semester – II

**Subject: Geography**  
**Open Elective Course (OEC-2)**  
**(OEC for other students)**

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-2	OEC	Theory	03	03	42 hrs	2hrs	40	60	100

OEC-2: Title of the Course: **Basics of Natural Disasters**

**Course Outcome (CO):**

After completion of course, students will be able to:

- CO 1** : To define the natural disasters related to Lithosphere.
- CO 2** : To identify the different types of atmospheric disasters and their impact.
- CO 3** : To identify the different types of atmospheric disasters and their impact.
- CO 4** : To define the biospheric disasters and their impact.

Syllabus- OEC: Title : Basics of Natural Disasters	Total Hrs: 42
<b>Unit-I : Introduction to Natural Disaster</b>	<b>14 hrs</b>
Meaning, definition and scope of natural disaster. Lithosphere and Natural Disasters.  Earthquakes, volcanoes, Landslides and Avalanches.	
<b>Unit-II : Atmosphere and Hydrosphere Natural Disasters</b>	<b>14 hrs</b>
Meaning and importance of Atmosphere causes for natural disaster. Heat wave and wild fire. Cloud burst, hailstorm. Drought and famines. Meaning and importance of hydrosphere and causes of natural disaster. Tsunami, Hurricanes and cyclones. Floods and flash floods.	
<b>Unit-III : Biosphere and Natural Disasters</b>	<b>14 hrs</b>
Significance of biosphere and causes of natural disasters. Epidemics and pandemics. Covid -19 and its effects.  Techniques and technology to mitigate natural disasters.	

**Books recommended:**

1. Dr. Mrinalini Pandey Disaster Management Wiley India Pvt. Ltd.
2. Tushar Bhattacharya Disaster Science and Management McGraw Hill Education (India) Pvt. Ltd.
3. Jagbir Singh Disaster Management : Future Challenges and Opportunities K W Publishers Pvt. Ltd.
4. J. P. Singhal Disaster Management Laxmi Publications.



**B.Sc. Semester – IV**  
**Discipline Specific Course (DSC) under CBCS**  
**GY-T D: Environmental Geography**

Unit	Title	Sub-unit	Hrs
I	Introduction	Meaning and components of environment. Field and scope of environmental Geography	05
II	Ecosystem	Types, Structure and Functions - Productivity, Food-chain, Food-Web, Ecological Pyramid. Bio-Geo-Chemical cycle – Hydrological, Carbon, Nitrogen Oxygen and Energy flow in the ecosystem.	20
III	Bio-Diversity	Types and Uses of Bio-Diversity, Threats to Bio-Diversity. Endangered Species of India. Conservation of Bio-Diversity.	13
IV	Global Warming and Environmental Pollution	Green House effects. Ozone layer depletion- Causes, Consequences and protection	05
		Causes, Effects and Measures to control the pollution : Air, Water Soil and Solid waste.	12
V	Conservation and Management of Environment	<b>National and International:</b> Policies, Rio Summit, Kyoto Declaration and Swatch Bharat Abhiyan	05

**References:**

12. Agarawal K.C: Environmental Biology, Nidhi Pub. Bikaner, 2001.
13. Chausasia B.P: Environmental Pollution, Consequences and Measures.
14. Mathur H.S: Environmental Resources, The Crises of Development.
15. Odum E.P: Fundamentals of Ecology, WBSaunders Co. London, 1971.
16. Saxena H.M: Environmental Geography, Rawat Pub. Jaipur, 1999.
17. Sharma P.D: Ecology and Environment: Rastogi Pub. New Delhi, 1999.
18. Strahler and Strahler: Geography and Mans Environment, John Wiley New York,
19. Heywood V.H. & Warson R.T: Global Bio-Diversity Assessment, CUP,1995.
20. Darsh M.C: Fundamentals of Ecology, Tata McGrow Hills New Delhi, 2002.

## DEPARTMENT OF GEOLOGY

B.Sc. Semester - I

Subject: GEOLOGY

SKILL ENHANCEMENT COURSE (SEC)-I

Title of Paper: GEO-ENVIRONMENTAL STUDIES

Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Mode of Examination	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
SEC-I	Theory + Practical	02	03hrs	30	Practical	2hr	25	25	50

### Course Outcome (CO):

After completion of Skill Enhancement course, students will be able to:

- CO 1 : Understanding of Earth environmental segments. Atmosphere (structure and composition), hydrosphere- hydrological cycle.
- CO 2 Describe Environmental Hazards: 1) Natural-Brief, 2) Manmade – Brief.
- CO 3 Understanding of Identification of rocks and minerals in the field and collection of samples.

### List of the Experiments for 52 hrs / Semesters

1. Earth environmental segments. Atmosphere (structure and composition), hydrosphere-hydrological cycle. Lithosphere-igneous rocks, sedimentary rocks and metamorphic rocks-rock cycle. Biosphere-chemical composition and classification of living matters.
2. **Environmental Hazards:** 1) Natural-Brief, 2) Manmade – Brief.

### Experiments

3. Identification of rocks and minerals in the field and collection of samples.
4. Importance of water, use and renewable. Physic-chemical parameters of water.
5. Field visit related to polluted areas, testing laboratories and report writing

### General instructions:

Lab records and it should be duly certified by the concerned Staff member and Head of the Department of Geology. A student should record all the practicals in prescribed laboratory journals.

Each batch should consist of not more than 12 students for the regular practical classes and examination for all classes

## 5<sup>th</sup> SEMESTER

### SKILL ENHANCEMENT COURSE (SEC)

Title of the Course: **Environmental Geology**

Course Code: (SEC) GLG-SET-522

<b>Total Syllabus: 30 hrs / Sem</b>	<b>2 hrs / Week</b>	<b>Duration of Exam: 1.5 hrs</b>
<b>Examination: Maximum Marks- 50 (40 Semester End exam + 10 IA Exam)</b>		

#### **Unit-1: Environmental Geology**

**20 Marks**

1. Earth and its spheres: Atmosphere, Hydrosphere, Lithosphere, Biosphere and Man; Earth Material.
2. Energy Budget: Solar Radiation; Global environments: Coastal, temperate, desertic, tropical, cold, and polar; Concept of global warming and climate change.
3. Geological hazards: Earthquakes, Volcanism, Landslides, Avalanches, Floods, Droughts; Hazard mitigation.
4. Resource management: Energy resources (conventional and non-conventional), watershed management, land use planning, management of water resources, land reclamation.

#### **Unit-2: Internal Assessment**

**10 Marks**

## DEPARTMENT OF BOTANY

KARNATAKA UNIVERSITY, DHARWAD  
BOTANY: SKILL ENHANCE COURSES (SEC-I)

### SEMESTER VI

(Student shall choose either paper- IA or Paper-IB)

PAPER-IA: PLANT DIVERSITY AND HUMAN WELFARE

(Credits: 2)

THEORY

Lectures: 30

**Unit 1:** Plant diversity and its scope- Genetic diversity, Species diversity, Plant diversity at the ecosystem level, Agrobiodiversity and cultivated plant taxa, wild taxa. Values and uses of Biodiversity: Ethical and aesthetic values, Precautionary principle, Methodologies for valuation, Uses of plants, Uses of microbes.

(8 Lectures)

**Unit 2: Loss of Biodiversity:** Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Loss of agrobiodiversity, Projected scenario for biodiversity loss,

**Management of Plant Biodiversity:** Organizations associated with biodiversity management- Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR; Biodiversity legislation and conservations, Biodiversity information management and communication.

(10 Lectures)

**Unit 3: Conservation of Biodiversity:** Conservation of genetic diversity, species diversity and ecosystem diversity, *In situ* and *ex situ* conservation, Social approaches to conservation, Biodiversity awareness programmes, Sustainable development.

(6 Lectures)

**Unit 4: Role of plants in relation to Human Welfare;** a) Importance of forestry their utilization and commercial aspects b) Avenue trees, c) Ornamental plants of India. d) Alcoholic beverages through ages. Fruits and nuts: Important fruit crops their commercial importance. Wood and its uses. (6 Lectures)

### SUGGESTED READINGS

1. Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity – Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi



**B.SC.: SEMESTER – V  
SUBJECT: BOTANY**

**THE COURSE BOTANY IN V SEMESTER HAS TWO PAPERS (THEORY PAPER- 033 BOT 011 FOR 04 CREDITS AND PRACTICAL PAPER- 033 BOT 012 FOR 02 CREDITS) FOR 06 CREDITS: BOTH THE PAPERS ARE COMPULSORY, DETAILS OF THE COURSES ARE AS**

**TITLE OF THE COURSE:  
PLANT MORPHOLOGY AND TAXONOMY (THEORY)  
COURSE CODE: 035 BOT 011  
THEORY: DISCIPLINE SPECIFIC CORE COURSE (DSCC-9)**

Program Name	<b>B.Sc. in BOTANY</b>	Semester	<b>V</b>
Course Title	<b>PLANT MORPHOLOGY AND TAXONOMY (THEORY)</b>		
Course Code:	<b>035 BOT 011</b>	No. of Credits	<b>04</b>
Contact hours	<b>56 Hours</b>	Duration of Exam	<b>2hours</b>
Formative Assessment Marks	<b>40</b>	Summative Assessment Marks	<b>60</b>

**COURSE OUTCOMES (COS):**

After the successful completion of the course, the student will be able to:

- CO1. Understanding the main features in Angiosperm evolution
- CO2. Ability to identify, classify and describe a plant in scientific terms, thereby, Identification of plants using dichotomous keys. Skill development in identification and classification of flowering plants.
- CO3. Interpret the rules of ICN in botanical nomenclature.
- CO4. Classify Plant Systematic and recognize the importance of herbarium and Virtual Herbarium, Evaluate the important herbaria and botanical gardens.
- CO5. Recognition of locally available angiosperm families and plants and economically important plants. Appreciation of human activities in conservation of useful plants from the past to the present.

**CONTENTS**

<b>CONTENTS</b>	<b>56 Hrs</b>
<b>Unit 1:</b>	<b>16 hrs</b>
<b>Morphology</b> of Root, Stem and Leaf. Their modifications for various functions. Inflorescence – types. Structure and variations of flower. Fruits–types. Floral diagram and floral formula. <b>Introduction to Taxonomy:</b> History, objectives, scope and relevance of Taxonomy <b>Systems of classification:</b> Artificial, Natural and Phylogenetic; brief account of Linnaeus', Bentham & Hooker's, Engler and Prantl's system and APG IV System (2016).-Merits and demerits of classification. <b>Taxonomic literatures:</b> Floras, Monograph. Revisions, Journals. <b>Herbaria and Botanical gardens:</b> Important herbaria and botanical gardens of the world and India. Technique of Herbarium Preparation and roles botanical gardens. <b>Virtual herbarium;</b> E-flora; Documentation.	
<b>Unit 2:</b>	<b>12 hrs</b>
<b>Taxonomic Hierarchy:</b> Concept of taxa (family, genus, species); Categories and taxonomic hierarchy; Species concepts (biological, morphological, evolutionary). Modes of speciation. Problems with species concepts. Rank less system of phylogenetic systematics <b>Botanical Nomenclature:</b> Principles and rules (ICN); Latest code –brief account, Brief account of Ranks of taxa, Type concept (Typification), Rule of priority, Author citation., valid publication, rejection of names, principle of priority and its limitations; Names of hybrids/cultivated species.	

**TITLE OF THE COURSE: GENETICS AND PLANT BREEDING (THEORY)**  
**COURSE CODE: 035 BOT 013**

**THEORY: DISCIPLINE SPECIFIC CORE COURSE (DSCC-11)**

Program Name	B.Sc. in BOTANY	Semester	V
Course Title	GENETICS AND PLANT BREEDING (THEORY)		
Course Code:	035 BOT 013	No. of Credits	04
Contact hours	56 Hours	Duration of Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

**Course Outcomes (COs):**

After the successful completion of the course, the student will be able to:

- CO1. Understanding the basics of genetics and plant breeding
- CO2. Ability to identify, calculate and describe crossing over, allelic generations and frequencies of recombination.
- CO3. Interpret the results of mating and pollinations.
- CO4. Classify Plant pollination methods
- CO5. Recognition of modes of inheritance of traits/ phenotypes and Phenotype-genotype correlation.

<b>CONTENTS</b>	<b>56 Hours</b>
<b>Unit 1:</b>	<b>16 hrs</b>
Mendelian genetics and its extension Mendelism: History; Principles of inheritance; Chromosome theory of inheritance; Autosomes and sex chromosomes; Probability and pedigree analysis; Incomplete dominance and codominance; Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, Recessive and Dominant traits, Penetrance and Expressivity, Numericals; Polygenic inheritance. Extrachromosomal Inheritance Chloroplast mutation: Variegation in Four o'clock plant; Mitochondrial mutations in yeast.	
<b>Unit 2:</b>	<b>16 hrs</b>
Linkage, crossing over and chromosome mapping. Linkage and crossing over-Cytological basis of crossing over; Recombination frequency, two factor and three factor crosses; Interference and coincidence; Numerical based on gene mapping; Sex Linkage. Variation in chromosome number and structure: Gene mutations Types of mutations; Molecular basis of Mutations; Mutagens – physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Role of Transposons in mutation. DNA repair mechanisms. Fine structure of gene (Population and Evolutionary Genetics, Allele frequencies, Genotype frequencies, Hardy-Weinberg Law, role of natural selection, mutation, genetic drift. Genetic variation and Speciation.	
<b>Unit 3:</b>	<b>12 hrs</b>
Plant Breeding: Introduction and objectives. Breeding systems: modes of reproduction in crop plants. Important achievements and undesirable consequences of plant breeding. Methods of crop improvement Introduction: Centers of origin and domestication of crop plants, plant genetic resources; Acclimatization; Selection methods: For self-pollination, cross pollination and vegetative Propagation in plants; Hybridization: For self, cross and vegetative propagation in plants – Procedure, advantages and limitations.	

# SEMESTER I

## CORE COURSE: BOTANY PAPER - I

### BIODIVERSITY (MICROBES, ALGAE, FUNGI AND ARCHEGONIATE)

(Credits: Theory-4, Practicals-2)

#### THEORY

Lectures: 60

#### Unit 1: Microbes

(10 Lectures)

Viruses – Discovery, general structure, replication (general account), DNA virus (T-phage); Lytic and lysogenic cycle, RNA virus (TMV); Economic importance; Bacteria – Discovery, General characteristics and cell structure; Reproduction – vegetative, asexual and recombination (conjugation, transformation and transduction); Economic importance.

#### Unit 2: Algae

(12 Lectures)

General characteristics; Ecology and distribution; Range of thallus organization and reproduction; Classification of algae; Morphology and life-cycles of the following: *Nostoc*, *Chlamydomonas*, *Oedogonium*, *Vaucheria*, *Sargassum*, *Batrachospermum*. Economic importance of algae

#### Unit 3: Fungi

(12 Lectures)

Introduction- General characteristics, ecology and significance, range of thallus organization, cell wall composition, nutrition, reproduction and classification; True Fungi- General characteristics, ecology and significance, life cycle of *Rhizopus* (Zygomycota) *Penicillium*, *Alternaria* (Ascomycota), *Puccinia*, *Agaricus* (Basidiomycota); Symbiotic Associations-Lichens:

General account, reproduction and significance; Mycorrhiza: ectomycorrhiza and endomycorrhiza and their significance

#### Unit 4: Introduction to Archegoniate

(2 Lectures)

Unifying features of archegoniate, Transition to land habit, Alternation of generations.

#### Unit 5: Bryophytes

(10 Lectures)

General characteristics, adaptations to land habit, Classification, Range of thallus organization. Classification (up to family), morphology, anatomy and reproduction of *Marchantia* and *Funaria*. (Developmental details not to be included). Ecology and economic importance of Bryophytes with special mention of *Sphagnum*.

#### Unit 6: Pteridophytes

(8 Lectures)

General characteristics, classification, Early land plants (*Cooksonia* and *Rhynia*). Classification (up to family), morphology, anatomy and reproduction of *Selaginella*, *Equisetum* and *Pteris*. (Developmental details not to be included). Heterospory and seed habit, stelar evolution. Ecological and economical importance of Pteridophytes.

## SEMESTER II

### CORE COURSE BOTANY –PAPER II PLANT ECOLOGY AND TAXONOMY (Credits: Theory-4, Practicals-2)

#### THEORY

Lectures: 60

**Unit 1: Introduction** (02 Hours)

**Unit 2: Ecological factors** (10 Hours)

Soil: Origin, formation, composition, soil profile. Water: States of water in the environment, precipitation types. Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes.

**Unit 3: Plant communities** (06 Hours)

Characters; Ecotone and edge effect; Succession; Processes and types.

**Unit 4: Ecosystem** (08 Hours)

Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Biogeochemical cycling; Cycling of carbon, nitrogen and Phosphorous

**Unit 5: Phytogeography** (04 Hours)

Principle Biogeographical zones, Endemism

**Unit 6 : Introduction to Taxonomy** (02 Hours)

Identification, Classification, Nomenclature

**Unit 7 : Identification** (04 Hours)

Functions of Herbarium, important herbaria and botanical gardens of the world and India; Documentation: Flora, Keys: single access and multi-access

**Unit 8 : Taxonomic Evidences** ( 06 Hours)

From Palynology, Cytology, Phytochemistry and Molecular data.

**Unit 9 : Taxonomic Hierarchy** Ranks, categories and taxonomic groups (02 Hours)

**Unit 10 : Botanical Nomenclature** ( 06 Hours)

Principles and rules (ICN); ranks and names; binominal system, typification, author citation, valid publication, rejection of names, principle of priority and its limitations.

**Unit 11 Classification** (06 Hours)

Types of classification-artificial, natural and phylogenetic. Bentham and Hooker (upto series), Engler and Prantl (upto series).

**Unit 12 Biometrics, numerical taxonomy and cladistics** (04 Hours)

Characters; variations; OTUs, character weighting and coding; cluster analysis; phenograms, cladograms (definitions and differences).



KARNATAKA UNIVERSITY, DHARWAD  
BOTANY: SKILL ENHANCE COURSES (SEC-I)

**SEMESTER VI**

(Student shall choose either paper- IA or Paper-IB)

**PAPER-IA: PLANT DIVERSITY AND HUMAN WELFARE**

(Credits: 2)

**THEORY**

**Lectures: 30**

**Unit 1:** Plant diversity and its scope- Genetic diversity, Species diversity, Plant diversity at the ecosystem level, Agrobiodiversity and cultivated plant taxa, wild taxa. Values and uses of Biodiversity: Ethical and aesthetic values, Precautionary principle, Methodologies for valuation, Uses of plants, Uses of microbes. **(8 Lectures)**

**Unit 2:Loss of Biodiversity:** Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Loss of agrobiodiversity, Projected scenario for biodiversity loss,

**Management of Plant Biodiversity:** Organizations associated with biodiversity management- Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR; Biodiversity legislation and conservations, Biodiversity information management and communication. **(10 Lectures)**

**Unit 3:Conservation of Biodiversity:** Conservation of genetic diversity, species diversity and ecosystem diversity, *In situ* and *ex situ* conservation, Social approaches to conservation, Biodiversity awareness programmes, Sustainable development. **(6 Lectures)**

**Unit 4: Role of plants in relation to Human Welfare;** a) Importance of forestry their utilization and commercial aspects b) Avenue trees, c) Ornamental plants of India. d) Alcoholic beverages through ages. Fruits and nuts: Important fruit crops their commercial importance. Wood and its uses. **(6 Lectures)**

**SUGGESTED READINGS**

1. Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity – Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi

## DEPARTMENT OF IND.FISHERIES

### B.Sc. Semester - VI

DSE- *INDUSTRIAL FISH AND FISHERIES*: Paper-I (IF-Th: P-I F)  
(Candidate shall choose either Paper-I or II)

Credits: I. Theory : 04	Theory class 4hrs /wk. Total theory: 60 Lectures 80 marks for Sem. end Examination (3 hrs) & 20 marks IA
II. Practical : 02	Practical: 4 hrs. / wk. Total Practical: 52 hrs. 40 marks for Sem. end Examination (3 hrs) & 10 marks IA
Total Credits : 06	Total Theory marks 100 and Practical marks 50

#### Syllabus :

**Seed Production:** Roll of gonadotrophin in fish breeding, Brood stock management, breeding of carps and other cultivable fishes, induced breeding. Ovulation agent used (fish pituitary glands, human chorionic gonadotrophin), pheromones and other new generation drugs. Hatchery technology, bund breeding, riverine seed collection, seed transportation, Different stages of fish seed (spawn, fry, fingerlings).

10 hrs

**Environmental Biology:** Definition, scope and importance of ecology. Ecological habitats, abiotic and biotic factors. Primary productivity of water mass and fish production, trophic levels of fish in the food chain, predatory prey relationship, ecology of freshwater ponds, ecology of river, ecology of estuaries, brackishwater and sea. Nutrition Cycles: Carbon cycle, Nitrogen cycle and oxygen cycle and Phosphorous. Water and soil pollution, source and effects and control. Pesticide impact on aquatic organisms, thermal pollution, radioactivity, assessment and monitoring of water pollution. Biogeoecycle: Carbon cycle, oxygen cycle, nitrogen cycle, sulphur cycle, Phosphorous cycle

20 hrs

#### BIOCHEMISTRY

Carbohydrates: Classification, properties of important monosaccharide, disaccharides, polysaccharides. Lipid classification, properties and functions. Protein classification, properties and functions. Enzymes, classification and applications. Vitamins dietary sources and functions. Special reference to fish moisture, fish protein, fats, ash, contents, fish enzymes and non protein nitrogen compounds like- Tri-methylamine oxide, urea, free alpha amino acids and volatile bases. Bioenergetics (Kreb's cycle, glycolysis, electron transport system)

## DEPARTMENT OF MICROBIOLOGY

**SEMESTER –IV**  
**CORE COURSE: MICROBIOLOGY**  
**PAPER MB 4.1DSC 1D -ENVIRONMENTAL AND AGRICULTURAL MICROBIOLOGY**  
**(Credits: Theory-4, Practicals-2)**

**THEORY**

**Total hours allotted: 60 hrs (4 hrs/week)**

**1. Introduction**

Soil, water and air as habitats for microorganisms and concept of environment, microbial populations in the above habitats. **(2 hrs)**

**2. Microbiology of air**

a) **Microbes and atmosphere:** Atmospheric layers, sources of microorganisms, air microflora of indoor and outdoor environment, factors affecting air microflora, significance and management of airborne microbes.

b) **Techniques of trapping airborne microorganisms:** Gravity slide, Petri plate exposure, liquid impingement, sieve device and filtration.

c) **Air borne diseases:** allergens, pathogens, significance of microorganisms in air. Control of air borne microorganisms. **(8 hrs)**

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**3. Microbiology of water**

a) **Sources of water:** surface and ground water and their microflora.

b) **Water pollution** - sources, water borne diseases-viral (Jaundice), bacterial (Cholera) and protozoan (amoebic dysentery), biological indicators of water pollution.

c) **Determination of sanitary quality of water:** SPC tests for coliform. MPN. IMViC reactions, membrane filter technique.

d) **Water purification in municipal water supply.** **(9 hrs)**

**4. Microbiology of waste water**

a) **Introduction:** Source of waste water - domestic, agricultural and industrial, physical, chemical and microbiological characteristics of waste water.

b) **Waste water treatment:** Single dwelling unit - Septic tank; municipal waste water treatment - **primary** (Screening, coagulation and Sedimentation). **Secondary** (trickling filter, activated sludge process, Osmosis, oxidation pond), **Tertiary** (reverse Ion exchange method and dialysis), reclamation of waste water and solid waste recycling.

c) **Waste as Resource (organic compost):** Biogas production and composting **(8hrs)**

**5. Bioremediation and Bioleaching**

Introduction, types, scope and applications of Bioremediation. Factors affecting the microbes in heavy metal tolerance Different microbial groups in bioremediation of environment pollution. Biodegradation of Petroleum (Hydrocarbons), pesticides (2,4-D and DDT), different microbial groups in bioremediation of environment. Scope, organisms involved, economic importance, mechanism of bioleaching of Cu and Fe.

**(4hrs)**

## DEPARTMENT OF ZOOLOGY

### B.Sc. Semester – VI Discipline Specific Course (DSCC)-14

**Course Title: Evolutionary and Developmental Biology (Practical)**  
**Course Code: 036 ZOO 012**

Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSCC-14	Practical	02	04	56 hrs	3hrs	25	25	50

**Course Outcomes (COs): At the end of the course, students will be able to:**

- CO 1: Explain core features of evolutionary theory and their applications to biological systems.
- CO 2: Explain how evolutionary patterns and processes can be inferred using sequence data, the biology of extant organisms, and fossils.
- CO 3: Study the process by which organisms grow and develop.
- CO 4: Understand the development of multicellular organisms from a single cell zygote.
- CO 5: Learn interesting and unique post-embryonic development in other animals.
- CO 6: Understand the concept of aging and the relevance of this knowledge in several medical applications.

Expt. No.	DSCC-14: Course Title: Evolutionary and Developmental Biology-Practical (Code:036 ZOO 012)	56.hrs/sem
1	Study and verification of Hardy-Weinberg Law by chi-square analysis.	3
2	Graphical representation and interpretation of data of height/weight of a sample of 100 humans in relation to their age and sex	3
3	Study of connecting links and fossils (models/pictures); Connecting links/ Living fossils: Neopilina, Peripatus, Limulus, Latimeria, Sphenodon, Archeopteryx and Duck Billed Platypus	3
4	Study of homology and analogy from suitable examples.	3
5	Study of aquatic, arboreal and volant adaptations with suitable examples: Shark, Turtle, Chameleon, Loris, Exocoetus, Bat, Pigeon and Draco	4
6	Vestigial organs: Vermiform appendix, Wisdom teeth, Coccyx (tail bone), Tonsils, Body hairs, Nipples on males, Nictitating membranes of eye (Any three)	4
7	Types of eggs based on quantity and distribution of yolk: Sea urchin, Insect, Frog, Chick.	5
8	Study of development of chick embryo through incubated chick eggs upto 96hrs	6
9	Study of stages of development of Frog: Cleavage stages, Blastula, Gastrula, Neurula stages (whole mount) and various stages of tadpole	6
10	Study of permanent slides of Chick embryo -18 hrs, 24 hrs, 36 hrs, 48 hrs (whole mount and T.S of 18 hrs and 24 hrs chick embryo)	6
11	Evolution of Man and Horse (Charts and models)	6
12	Study of Mesozoic Reptiles (Charts or models);	7



## DEPARTMENT OF BIOTECHNOLOGY

### B.Sc. Semester–V

Discipline Specific Core Course DSCC-11

**Course Title:** Plant and Animal Biotechnology

**Course Code:** 035BIT013

Type of Course	Theory / Practical	Credits	Instruction hour / week	Total No. of Lectures / Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSCC-11	Theory	04	04	56hrs.	2hrs.	40	60	100

### Course Objectives

1. To understand the fundamental aspects of plant and animal biotechnology.
2. Learn about biotechnological tools and techniques used in plant and animal research.
3. Explore methods of introducing foreign genes into plants and animals through transformation techniques.
4. Gain practical skills in plant tissue culture and animal cell culture for improvement.
5. Design strategies for plant genetic manipulation against biotic and abiotic stressors.
6. Hypothesize strategies to increase plant yield and fruit/seed quality.
7. Apply knowledge to real-world challenges in agriculture, veterinary medicine, conservation, and biomedical research.
8. Understand the need for animal biotechnology for human welfare.

### Course Outcomes

After completing this course, the student is expected to learn the following:

1. Demonstrate a comprehensive understanding of plant biology, physiology, genetics, and molecular biology.
2. Apply biotechnological tools and techniques used in plant research and agriculture, such as plant tissue culture, genetic engineering and transgenics.
3. Execute plant tissue culture techniques for callus induction, somatic embryogenesis, and micropropagation, and apply them in plant breeding and propagation.
4. Perform plant transformation methods and demonstrate the ability to introduce foreign genes into plants using different techniques.
5. Apply knowledge about ethical considerations and regulatory frameworks associated with plant biotechnology and genetically modified crops.
6. Understand the biology and characterization of cultured cells, including their adhesion, proliferation, differentiation, morphology, and identification.
7. Gain practical skills in basic mammalian cell culture techniques, measuring growth parameters, assessing cell viability, and understanding cytotoxicity.
8. Learn about germplasm conservation techniques and the establishment of gene banks, along with large-scale culture methods for cell lines.
9. Explore organ and histotypic culture techniques, biotransformation, 3D cultures, whole embryo culture, somatic cell cloning, and the ethical considerations surrounding stem cells and their applications.

<b>Plant and Animal Biotechnology-Content of Theory</b>	<b>56hrs</b>
<b>Unit-I-Plant Tissue culture methods</b>	<b>14</b>
Introduction, history, definition, hypothesis, and concept of totipotency. Principles of plant tissue culture, media and laboratory organization, types of culture, morphogenesis, differentiation, callus, direct, indirect organogenesis, and somatic embryogenesis, synthetic seeds. <i>In vitro</i> propagation and micropropagation, Seed culture, embryo culture, Meristem culture, bud culture, limitations and applications. Secondary metabolites, <i>In vitro</i> secondary metabolite production, Suspension cultures, cell cultures, growth vs secondary metabolite production, bioreactors and scaling up of secondary metabolite production, limitations, and applications.	
<b>Unit-II Transgenic Plants and biosafety</b>	<b>14</b>
Overview of transgenic plants and their significance in agriculture.- Techniques for introducing foreign genes into plants: Agrobacterium-mediated transformation, biolistics, and other methods. Selection and screening of transformed plants. Applications of Transgenic Plants-Improved crop traits through genetic engineering: pest resistance, herbicide tolerance, disease resistance, and abiotic stress tolerance. Biosafety assessment of transgenic plants: potential risks and benefits. International regulatory frameworks for releasing and commercializing genetically modified organisms (GMOs). Ethical and socio-economic impacts of transgenic crops. Intellectual property rights and access to transgenic technologies.	
<b>Unit-III Animal Cell culture methods</b>	<b>14</b>
History and laboratory organization, Media. Cell types and culture characters. Pluripotency, Multipotency, Differentiation, Transdifferentiation Reprogramming, Biology and characterization of cultured cells- cell adhesion, proliferation, differentiation, morphology of cells, and identification. The basic technique of mammalian cell culture <i>in vitro</i> , Measuring parameters of growth in cultured cells, cell viability, and cytotoxicity. Large-scale culture of cell lines- monolayer, suspension, and immobilized cultures. Organ and histotypic culture: Technique, advantages, limitations, applications. Stem cells: types (embryonic, adult, induced pluripotent), isolation, identification, expansion, differentiation and uses, stem cell engineering, ethical issues.	
<b>Unit-IV Gene transfer in animals and applications</b>	<b>14</b>
Gene constructs promoter/ enhancer sequences for transgene expression in animals. Selectable markers for animal cells- thymidine kinase. Transfection of animal cells- calcium phosphate coprecipitation, electroporation, lipofection, peptides, direct DNA transfer, viral vectors, Retrovirus, microinjection. Transgene identification methods. Transgenic and genome-edited animals. Ethical issues in transgenesis. Recent advances and applications in the field. Manipulation of animal reproduction and characterization of animal genes, Embryo transfer in cattle and applications. Somatic cell cloning- cloning of Dolly. Ethical issues. Production of recombinant vaccines.	

## B.Sc. Semester-VI

### Discipline Specific Core Course(DSCC)-15

**Course Title: Bioprocess and Environmental Biotechnology**

**Course Code:036BIT013**

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSCC-15	Theory	04	04	56hrs.	2hrs.	40	60	100

#### Course Objectives:

1. Perform simulation of microbial growth and metabolism
2. Design bioreactors for the production of various products.
3. Present knowledge about major metabolic pathways and those related to biofuel products from microbes.
4. Understand the fundamental concepts and principles of environmental biotechnology and Explore the interrelationship between biotechnology and the environment.
5. Gain knowledge of the various applications of biotechnology in environmental conservation, pollution control, and sustainability.

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6. Learn about microbial processes and their role in environmental biotechnology.
7. Understand the principles of bioremediation and its application in the clean-up of environmental pollutants.
8. Explore the potential of bioenergy production and waste management through biotechnological approaches.
9. Identify and characterize the most important contaminants in the Bioprocess and other industrial wastes.
10. Reuse/recycle the biological waste to clean technologies such as energy, biofuel, biofertilizer through bioremediation

#### Course outcomes:

- Exploitation of microorganisms for industrial use and their improvement, and formulation of media for efficient growth and production of microbial or cell-based products.
- The design, operation, and specific applications of various bioreactors.
- Demonstrate a comprehensive understanding of the fundamental concepts and principles of environmental biotechnology.
- Apply knowledge of biotechnological techniques to address environmental challenges, such as pollution control and waste management.
- Analyze and evaluate environmental biotechnology case studies, research findings, and real-world applications.

<b>BioprocessandEnvironmentalBiotechnology–ContentofTheory</b>	<b>56hrs.</b>
<b>UNIT-I–Introductiontobioprosesstechnology</b>	<b>14</b>
Basic principle components of fermentation technology. Strain improvement of industrially importantmicroorganisms. Types of microbial culture and its growth kinetics– Batch, Fed-batch, andContinuousculture.Principlesofupstreamprocessing–Mediapreparation,Inocula development,and sterilization.	
<b>UNIT-II-Bioreactorsanddownstreamprocessing</b>	<b>14</b>
Bioreactors-SignificanceofImpeller,Baffles,Sparger;Specializedbioreactors-designandtheirfunctions: airlift bioreactor, tubular bioreactors, membranebioreactors, tower bioreactors, fluidizedbedreactor,packed bed reactors Downstreamprocessing-celldisruption,precipitationmethods,solid-liquidseparation,liquid-liquidextraction,filtration,centrifugation,chromatography,dryingdevices (Lyophilization andspray drytechnology),crystallization,biosensors- constructionandapplications,Microbialproductionofethanol,amylaseandSingleCellProteins.	
<b>UnitIII-FundamentalsofEnvironmentalBiotechnology</b>	<b>14</b>

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IntroductiontoEnvironmentalBiotechnology-PrinciplesofEnvironmentalScience.RoleofBiotechnology in Environmental Conservation. Microbial Processes in EnvironmentalBiotechnology.Pollution and Biotechnology – Major issues in environmental pollution and the role of biotechnologyin addressing them. Biotechnological Methods of Pollution Detection-General bioassay methods forpollutiondetection. Cell biologicalmethods for assessingpollution levels.Use of biosensors inpollution monitoring. Biotechnological Methods in Pollution Abatement-Reduction of CO2 emissionusing biotechnologicalapproaches. Addressing eutrophication through biotechnological interventions.Application ofcellimmobilizationtechniquesinpollutionabatement.	
<b>UnitIV- BioremediationandWasteManagement</b>	<b>14</b>
Importance of bioremediation in environmental cleanup. Types of contaminants suitableforbioremediation. Microorganisms used in bioremediation. <i>In-situ</i> Bioremediation Methods. –Bioaugmentation.Biostimulation.Bioventing.Phytoremediation. <i>Ex-situ</i> BioremediationMethods– Composting, Land farming, Biopile and bioslurry systems. Xenobiotics. Bio metallurgy and bio-mining. WastewaterManagement.Wastewater Characterization and Composition.BiologicalProcesses inWastewaterTreatment.ActivatedSludgeProcessandBiologicalNutrientRemoval,Anaerobic Digestionand BiogasProduction.SolidWasteManagement.	