

## Shivaji University, Kolhapur.

Revised Syllabus of the B.Sc. Part - I Semester I & II to be implemented from  
the academi year 2010-11 onwards.

### Course structur for B.Sc.Part-I Semester I & II

Subjects	Name of the Paper	Marks		
		Theory	Internal	Practical
<b>B.Sc. Part I: Sem. I</b>	ENGLISH Paper-I	40	10	.....
Sem. I I	ENGLISH Paper-II	40	10	.....
B.Sc. -I Botany	<b>Semester I Paper- I</b> Diversity and Classification of Plants (Non Vascular)	40	10	50
	<b>Semester I Paper -II</b> Basic Plant Biochemistry and Techniques in Cell Biology	40	10	.....
	<b>Semester II Paper- III</b> Diversity and classification of Plants (Vascular Plants)	40	10	.....
	<b>Semester II Paper - IV</b> Cell Biology	40	10	.....
B.Sc. Part-I Seed Technology	<b>Semester – I Paper – I</b> Seed Development and Morphology	40	10	50
	<b>Semester- I, Paper – II</b> Plant Breeding.	40	10	.....
	<b>Semester – II Paper – III</b> <b>Seed Physiology</b>	40	10	.....
	<b>Semester – II Paper – IV</b> Seed Production	40	10	.....
<b>B.Sc. Part-I Chemistry</b>	<b>SEMESTER – I Paper – I</b> (Physical and Inorganic Chemistry)	40	10	50

	<b>Semester -I Paper – II (Organic and Inorganic Chemistry)</b>	40	10	.....
	<b>SEMESTER – II Paper – III (Physical and Inorganic Chemistry)</b>	40	10	.....
	<b>Paper – IV (Organic and Inorganic Chemistry)</b>	40	10	.....
B. Sc. I – Electronics	<b>SEMESTER – I Paper I – Basic Electronics.</b>	40	10	50
	<b>SEMESTER – I Paper-II Electronic Devices</b>	40	10	.....
	<b>SEMESTER – II Paper III – Digital Electronics-I</b>	40	10	.....
	<b>SEMESTER – II Paper IV – Digital Electronics-II</b>	40	10	.....
B.Sc .I Geography	<b>Semester-I Paper-I : Physical Geography</b>	40	10	50
	<b>Semester-I Paper-II Geomorphology</b>	40	10	.....
	<b>Semester-II Paper-III Climatology</b>	40	10	.....
	<b>Semester-II Paper-IV Oceanography</b>	40	10	.....
B.Sc .I Geology	<b>Semester I Paper I – General Geology</b>	40	10	50
	<b>Semester I Paper II – Mineral and Crystallography</b>	40	10	.....
	<b>Semester II Paper -III – Physical Geology</b>	40	10	.....
	<b>Semester II Paper IV – Petrology</b>	40	10	.....
<b>B.Sc.Part-I MATHEMATICS</b>	<b>SEMESTER –I Paper – I ALGEBRA</b>	40	10	50
	<b>SEMESTER –I Paper – II CALCULUS</b>	40	10	.....
	<b>SEMESTER–II Paper – III</b>	40	10	.....

	GEOMETRY			
	<b>SEMESTER-II</b> <b>Paper – IV</b> DIFFERENTIAL EQUATIONS	40	10	.....

B.Sc.Part – I Microbiology	<b>Semester-I Paper-I</b> Fundamentals of Microbiology	40	10	50
	<b>Semester I Paper II</b> Basic Microbial Techniques & Biochemistry	40	10	.....
	<b>Semester II Paper III</b> Medical Microbiology, Microbial Techniques and Bioinstrumentation.	40	10	.....
	<b>Semester II Paper IV</b> Applied Microbiology	40	10	.....
B.Sc.Part – I : Industrial Microbiology	<b>Semester I Paper I</b> Fundamentals of Industrial Microbiology	40	10	50
	<b>Semester I Paper II</b> Basics of Fermentation.	40	10	.....
	<b>Semester II Paper III</b> Fermenter Design & Instrumentation	40	10	.....
	<b>Semester II Paper IV</b> Fermentation Techniques	40	10	.....
B.Sc. Part-I Physics	<b>SEMESTER -I Paper I –</b> Mechanics and Properties of matter	40	10	50
	<b>SEMESTER I Paper- II -</b> Oscillations, Waves and Optics	40	10	.....
	<b>SEMESTER II Paper III :</b> Kinetic theory of gases, Heat and Thermodynamics.	40	10	.....
	<b>SEMESTER -II Paper IV :</b> Electricity, Magnetism and Basic Electronics	40	10	.....

B.Sc. Part-I STATISTICS	<b>SEMESTER-I PAPER-I</b> DESCRIPTIVE STATISTICS-I	40	10	50
	<b>SEMESTER-I PAPER-II</b> ELEMENTARY PROBABILITY THEORY	40	10	.....
	<b>SEMESTER-II PAPER-III</b> DESCRIPTIVE STATISTICS-II	40	10	.....
	<b>SEMESTER-II PAPER-IV</b> Discrete Probability Distributions	40	10	.....
B.Sc. -I Zoology	<b>Semester-I Paper I</b> Animal Diversity-I	40	10	50
	<b>Semester- I Paper- II</b> Cell Biology and Genetics,	40	10	.....
	<b>Semester-II Paper III</b> Animal Diversity-II	40	10	.....
	<b>Semester-II Paper-IV</b> Ecology, Ethology, Evolution and Applied Zoology	40	10	.....

B. Sc. Part-I BIOTECHNOLOGY OPTIONAL/VOCATIONAL	<b>Semester- I</b> Basics for Biotechnology	40	10	.....
	<b>Semester- I</b> Mathematics, Biostatistics and Computers	40	10	.....
	<b>Semester- II</b> Cell Biology and Genetics	40	10	.....
	Semester- II- Microbiology	40	10	.....
B.Sc. I Computer Science	<b>Semester-I Paper-I</b> Modern Operating Environment	40	10	50
	<b>Semester-I Paper-II</b> Introduction to programming	40	10	.....
	<b>Semester-II Paper-III</b> Fundamentals of Databases	40	10	.....
	<b>Semester-II Paper-IV</b> Procedure	40	10	.....

	Oriented Programming through 'C'			
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Shivaji University, Kolhapur  
**B.Sc. Part I: ENGLISH (Compulsory)**  
**English for Communication**  
**(Syllabus for Semester Pattern from June, 2010)**  
**SEMESTER: I**  
**Section I :- Communication Skills**

- Unit 1 : How to Express Your Views and Opinions.  
Unit 2 : Talking About Personal Experiences.  
Unit 3 : Preparing a C.V. and Writing a Letter of Application

**Section II :- Reading Comprehension Skill**

- Unit 7 : Forgetting -Robert Lynd  
Unit 8 : Wife's Holiday -R.K. Narayan  
Unit 9 : Man in the Future -Bill Williams  
Unit 10 : Prafulla Chandra Ray

**B.Sc. - I - BOTANY**

For each semester there will be two papers of 50 marks each.  
The pattern of the papers will be as follow :

**Semester I**

**Paper I : Diversity and Classification of Plants (Non Vascular)**

**Paper II - Basic Plant Biochemistry and Techniques in Cell Biology**

**Semester I**

**Paper – I. Diversity and Classification of Plants (Non Vascular) 40**

**Unit - 1 - Basic concept of Non - Vascular Plants: 08**

**Sub-unit 1.1** Diversity in lower plants with respect to

a) Habitat b) Form c) Nutrition and d) Ecological status.

03

**Sub-unit 1.2** A brief account of origin, evolution, phylogeny and extinction

03

of land plants.

**Sub-unit 1.3** Fossil, process fossilization and types of fossils

02

<b>Unit - 2 Algae</b>	<b>10</b>
<b>Sub-unit 2.1</b> General characters, classification (as per G.M. Smith) and economic importance.	02
<b>Sub-unit 2.2</b> Important features and life history of following types	
a) Myxophyceae - <i>Nostoc</i>	02
b) Chlorophyceae - <i>Oedogonium</i>	02
c) Phaeophyceae - <i>Sargassum</i>	02
e) Rhodophyceae - <i>Polysiphonia</i>	02
<b>Unit - 3 Fungi</b>	<b>13</b>
<b>Sub-unit 3.1</b> General characters, classification (as per Ainsworth) and economic importance.	03
<b>Sub-unit 3.2</b> Important features and life history of following types	
a. Mastigomycotina - <i>Phytophthora</i>	02
b. Zygomycotina – <i>Mucor</i>	02
c. Ascomycotina - <i>Aspergillus</i>	02
d. Basidiomycotina – <i>Puccinia</i>	02
e. Deuteromycotina – <i>Cercospora</i>	02
<b>Unit - 4 Bryophytes</b>	<b>09</b>
<b>Sub-unit 4.1</b> General characters, classification (as per G.M. Smith) and economic importance.	03
<b>Sub-unit 4.2</b> Comparative study of following types with external morphology, anatomy, reproduction and inter-relationships of	06
a) Hepaticopsida - <i>Riccia</i>	
b) Anthocerotopsida - <i>Anthoceros</i>	
c) Bryopsida -- <i>Funaria</i>	

## **Paper II - Basic Plant. Biochemistry and Techniques in Cell Biology**

<b>Unit 1 - Cell Biochemistry.</b>	<b>12</b>
<b>Sub-unit 1.1</b> Cell as a biochemical entity	02
<b>Sub-unit 1.2</b> Covalent and non covalent interactions, electrostatic and hydrophobic interactions, Van-der Waal's forces and their significance.	03
<b>Sub-unit 1.3</b> Structure, properties and biological significance of water.	02
<b>Sub-unit 1.4</b> pH and Buffers -Significance of pH, pH scale, iso-electric point, inorganic and organic buffers and their significance.	02
<b>Sub-unit 1.5</b> ATP- The energy currency, phosphorylation and dephosphorylation of proteins.	03

<b>Unit 2- Bioenergetics</b>	<b>06</b>
<b>Sub-unit 2.1</b> First and Second Law of Thermodynamics.	02
<b>Sub-unit 2.2</b> Concept of free energy and energy transfer.	02
<b>Sub-unit 2.3</b> Redox potential.	02
<b>Unit 3 - Enzymology</b>	<b>12</b>
<b>Sub-unit 3.1</b> Classification and nomenclature of enzymes.	02
<b>Sub-unit 3.2</b> Enzymes as biocatalysts.	02
<b>Sub-unit 3.3</b> Physico-chemical properties of enzymes, cofactors, coenzymes and isozymes.	02
<b>Sub-unit 3.4</b> Kinetics of enzyme action and significance of Km.	02
<b>Sub-unit 3.5</b> Mechanism of enzyme action.	02
<b>Sub-unit 3.6</b> Factors affecting enzyme activity i.e. temperature and pH, allosteric modification and feedback regulation.	02
<b>Unit 4 - Techniques in Cell-Biology.</b>	<b>10</b>
<b>Sub-unit 4.1</b> Principles of Microscopy- light, phase contrast, and electron microscopy (TEM and SEM).	04
<b>Sub-unit 4.2</b> Principles of chromatography technique - Paper, and TLC.	04
<b>Sub-unit 4.3</b> Autoradiography and its applications.	02

## Reference Books

### Paper - I

- 1.A Hand book of Lichens - D. D. Awasthi (2000)
- 2.A Text book of Algae - Chopra G. L. (1969)
- 3.A Text book of Algae - Kumar H. D., Singh H. N. (1977)
- 4.A Text book of Botany - V. Singh, P. C. Pandey, Jain D. K. (1999)
- 5.A Text book of Botany Vol. I – Pandey S. N., S. P. Misra, P. S. Trivedi (1.982)
- 6.A Text book of Pteridophyte – S. N. Pandey, P. S. Trivedi, S. P. Misra (1995)
- 7.A Treatise on Algae - K. N. Bhatia (1980)
- 8.An Introduction to Embryophyta - Parihar N. S. (1961)
- 9.An Introduction to Fungi - Dube H. C. (1990)
10. An Introduction to Palaeobotany - Andrews H. N. (1961)
11. An Introduction to Palaeobotany - Arnold C. A. (1972)
12. An Introduction to Pteridophytes - Rashid A. (1978)
13. An Introduction to Pteridophyta (Diversity and Differentiation) -A.Rashid (1976)
14. Algae - Kumar H. D. and H. N. Singh (1991)
15. Algae - Sharma O. P. (1986)
16. Algae - Pandey B. P. (1994)
17. Anatomy of Seed Plants - Esau K. (1964)



18. Biodiversity of Plants (Floristic Aspects) - Rao R. R. (1980)
19. Biodiversity Principles and Conservation - Kumar U. (2002)
20. Biology of Lichens - Hale M. E. Jr. (1967)
21. College Botany - S. Sundararajan (1999)
22. College Botany Vol. I - Gangulee H. c., Dos K. S. and Datta C. T. (1991)
23. College Botany Vol. II - Gangulee H. C., Ka.: A. K. (1999)
24. College Botany Vol. III S. K. Mukarji (1990)
25. Cryptogamic Botany Vol. I- G. M. Smith (1955)
26. Cryptogamic Botany Vol. I - Algae and Fungi - G. M. Smith (1974)
27. Cryptogamic Botany: Bryophytes and Pteridophytes - Smith G. C. (1955)
28. Evolution and Classification of Flowering Plants- Cronquist A. (1968)
29. Flowering Plants and Their Evolution - Ronold G. (2003)
30. Fundamentals of Phycology - Khan M. (1970)
31. Fungi- Vashishtha B. K. (1996)
32. Fungi- Pandey B. P. (1994)
33. Gymnosperms- Vashishta (1976)
34. Gymnosperms- Chamberlein (1966)
35. Illustrated Manual of Ferns of Assam -  
S. K. Borthakur, P. Deka, K. K. Nath (2000)
36. Indian Gymnosperms in Time and Space - Ramanujan C. G. K. (1979)
37. Introduction to Bacteria - Clifton A. (1985)
38. Introductory Botany - A. Bendre, Pandey P. C. (1999)
39. Introduction to Fungi - Sundrarajan (2001)
40. Introductory Mycology - C. J. Alexopoulos, C. W. Mims, M. Blackwell
41. Introduction to Plant Anatomy - Eames and Macdeniels
42. Introductory Phycology - Kumar N. D. (1990)
43. Manual of Phycology - An Introduction to the algae  
and their biology – Smith G. M. (1994)
44. Morphology of Angiosperms - Eames A. J. (1961)
45. Morphology and Evolution of Vascular Plants –  
Gifford E. M., Foster A. S. (1989)
46. Morophology of Gymnosperms - Sporne K. R. (1967)
47. Morphology of Gymnosperms - Coulter and Chamberlein (1978)
48. Morphology of Pteridophytes - Sporne K. R. (1966)
49. Origin and Evolution of Gymnosperms - Ed Charles B. Beck (2002)
50. Phylogeny and form in the plant Kingdom - H. C. Dittmer (1964)
51. Plant Diversity and Conservation in India – An Overview, H. J. Chowdhery, S K. Murti  
(2000)
52. Plant Groups H. Mukherji (1990)
53. Plant Taxonomy - Benson L. (1962)
54. Pteridophyta – Vascular Cryptogams - P. C. Vashishtha (1972)
55. Principles of Angiosperm Taxonomy – Davis P. H., Heywood V. M. (1963)

56. Structure and Reproduction in Gymnosperms – Chamberlein (1935)
57. Studies in Palaeobotany - Andrews H. H. (1961)
58. Taxonomy of Angiosperms - V. Singh, D. K. Jain (1987)
59. Taxonomy of Vasular Plants – Mcmillan N. Y., Lawrence G. H. M. (1951)
60. Text Book of Botany “Diversity of Microbes and Cryptogams –  
V. Singh, P. C. Pandey, Jain D. K. (2003-04)
61. Text Book of Fungi - O. P. Sharma (2002)
62. Text Book of Fungi - J. S. Gupta (1981)
63. The Algae - Chapman V. J. (1970)
64. The Embryology of Angiosperms – S. S. Bhojvani, S. P. Bhatnagar (1999)
65. The Ferns - Bower F. O. (1963)
66. The Fungi - Sharma P. D. (1998)
67. The Fungi – An Introduction - B. S. Mehrotra (1992)
68. The Structure and Reproduction of the Algae – Vol. I – F. E. Fritsch (1979)
69. Topics in Algae - N. D. Kamat (1982)
70. Vikas Hand book of Botany –  
Srivastava K. C., B. S. Dattatreya, A. B. Raizada (1977)

## Paper – II

1. A Biologists Guide to Principles and Techniques of Practical Biochemistry. –  
Wilson and Goulding (1996),
2. A Manual of Radiobiology - Stewart. J.C. and D. M. Hawcraftl (1977)
3. Analytical Chemistry - G. L. Davida Krupadanam, D. Vijaya Prasad,  
K. Varaprasadrao, K. L. N. Reddy, C. Sudhakar (1999)
4. An Introduction'to Practical Biochemistry - D. T Plummen (1993)
5. An Introduction to Microbiology - P Tauro, K. K. Kapoor, K. S. Yadav (1996)
6. Archaeobacteria - Kandler, O. (1982)
7. Biochemistry - C. B. Powar and G. R. Chatwal (1988)
8. Biochemistry - (4<sup>th</sup> Ed.) - Stryer, L. (1995)
9. Biochemistry - K. Trehan (1987)
10. Biochemistry - D. L. Rawh (1989)
11. Biochemistry - Campbell, M. K. (1999)
12. Biochemistry - S. C. Rastogi (1993)
13. Biochemistry - Zubay, G. (1993)
14. Biological Techniques - H. S. Srivastava (1999)
15. Biophysical Chemistry - Uppadhyay, Upadhyay (1997)
16. Biochemical Thermodynamics - Jones, M. N. (1979)
17. Cell Biology - S. C. Rastogi (1992)
18. Cell Biology - C. B. Powar (2000)
19. Cell Biology, Genetics, Evolution and Ecology –  
P S. Verma, V K. Agarwal (2001)
20. Cell Biology - R. Dowben (1971)

21. Cell and Molecular Biology - P K. Gupta (1999)
22. Cell and Molecular Biology (2001) –  
E. D. P De Robertis & E. M. F De Robertis (Jr.)
23. Cell Physiology - A C. Giese (1979)
24. Cellular Energy Metabolism and Its Regulation - Atkinson, D. E. (1977)
25. Chromatographic Methods - Stock, R. and C B F Rince (1978)
26. College Botany VoL IV- S, Sunder Rajan (1992)
27. Cytogenetics - S Sunder Rajan (2000)
28. Essentials of Cell and Molecular Biology –  
E D, P. De Robertis, E. M. F De Robertis (1981)
29. Elements of Biochemistry - H. S. Srivastava (1999)
29. Experimental Biochemistry - Dryer R. L. and Lata, G. F (1989)
30. Fundamental Concepts of Cell Biology - K G. Purohit (1982)
31. Fundamentals of Genetics - B. D. Singh (2001)
32. Genetics - P. K Gupta (1997)
33. Gene Action - Hartman alld Suskind (1968)
34. Lehninger Principles of Biochemistry - Nelson D. L. and M. M. Cox (2000)
35. Living Process, Book.2 Bioenergetics - Ho. M. W (1995)
36. Molecular Cell Biology - G. S. Sandhu (2002)
37. Molecular Cell Biology - H. S. Bhamrah (1999)
38. Molecular and Cellular Biology - Wolfe, S. (1993)
39. Molecular Cell Biology –  
Alberts, B., Bray, D.; Lewis, J.; Robert, K., Raff M. and J. D. Watson
40. Molecular Biology - H. D. Kumar (1999)
41. Microbiology and Plant Pathology - P. D. Sharma (1999)
42. Plant Biochemistry - Ed. P. M. Dey and J. B. Harborne (2000)
43. Plant Biochemistry - Cell - Stumpf, P. K and E. E. Conn. (1981)
44. Plant Cell Biology - A Practical Approach - Harris, N. Oparka, K J. (1994)
45. Plant Cell Biology - Structure and function –  
Gt11nillg, B. E. S. alld M. W Steer (1996)
46. The Cell – C. P. Swanson & P. L. Webster (1980)
47. Text Book of Cell and Molecular Biology – Gupta, P. K. (1999)

## SEED TECHNOLOGY (Theory)

### Semester – I Paper – I

### Seed Development and Morphology

#### Lectures - 40

#### Unit – 1 - Crop Families and Embryology.

- 1.1 Major families of Dicotyledons and Monocotyledons - 4  
- Fabaceae, Brassicaceae, Solanaceae, Poaceae
- 1.2 Structure and development of anther and male - 3

	gametophyte	
1.3	Structure of ovule and development of female gametophyte	- 3
	<b>Unit – 2 – Reproductive Biology</b>	
2.1	Pollination, Autogamy, Allogamy	- 3
2.2	Fertilization, Endosperm formation & Embryo	- 4
2.3	Apomixis	- 2
2.4	Polyembryony.	- 1
	<b>Unit – 3 Morphological Development of fruit and seed</b>	
3.1	Development of Fruit and Seed	-2
3.2	Definition, external and internal structure of following Seeds e.g. Cotton, Pea, Castor and Maize.	-4
3.3	Classification of fruits	- 2
3.4	Germination of seeds- Hypogeal and Epigeal	- 2
	<b>Unit - 4 Testing of Cultivars genuineness and identification of variety.</b>	
4.1	Testing of cultivar's genuineness - objectives, general principles and methods	- 3
4.2	Morphology of crops and seeds for variety identification of the following : Gram, Groundnut, Soybean, Jowar, Rice, Wheat	- 7
	<b>Total</b>	<b>- 40</b>

## Semester- I, Paper – II : Plant Breeding.

**Lectures- 40**

### **Unit – 1 – Concepts in Plant breeding.**

1.1	Definition, history, nature, scope and objectives of plant breeding	- 3
1.2	Sterility : concept of male sterility, utility of male sterility in hybrid seed production.	- 4
1.3	Incompatibility : self incompatibility morphology, concept and its utility	- 3
	<b>Unit-2 Plant exploration and Plant Introduction.</b>	
2.1	Plant exploration – centers of origin, centers of genetic diversity	- 3
2.2	Plant introduction and acclimatization: concept, objectives, types, merits and demerits and its	- 7

achievements.

**Unit – 3 – Plant selection**

- |     |  |     |
|-----|--|-----|
| 3.1 | Mass selection – definition, procedure, merits and demerits  | - 3 |
| 3.2 | Pure line selection – definition, characters, field techniques, advantages, limitations and achievements.                | - 4 |
| 3.3 | Clonal selection – definition, characters, sources, important field techniques, advantages, limitations and achievements | - 3 |

**Unit – 4 – Hybridization**

- |     |   |     |
|-----|---|-----|
| 4.1 | Hybridization in cross pollinating crops, development of inbred lines, effect of selfing, single cross and double cross hybrids, development of synthetic and composite varieties | - 4 |
| 4.2 | Hybridization in self pollinated crops, concept of heterosis  | - 3 |
| 4.3 | Pedigree method, bulk method, back cross method, multiline varieties, F <sub>1</sub> hybrids.   | - 3 |

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<b>Total</b>	- 40
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**Lectures - 40**

**Unit – 1 – Physiology of seed development.**

- |     |   |     |
|-----|---|-----|
| 1.1 | - Allometry.                            | - 1 |
| 1.2 | - Seed ripening and maturation process. | - 3 |
| 1.3 | - Chemical Composition of Seed          | - 3 |
| 1.4 | - Synthesis of food reserve             | - 3 |

**Unit – 2 – Physiology of seed germination.**

- |     |   |     |
|-----|---|-----|
| 2.1 | - Pattern of water absorption                                     | - 2 |
| 2.2 | - Breakdown of different seed storage products during germination | - 2 |
| 2.3 | - Respiratory pathways during germination                         | - 6 |

**Unit – 3 – Seed dormancy, seedling abnormalities and deterioration**

- |     |   |     |
|-----|---|-----|
| 3.1 | Seed dormancy – concept, causes and methods of breaking seed dormancy and importance of seed dormancy | - 6 |
|-----|---|-----|

3.2	Seedling abnormalities and their causes	- 2
3.3	Seed deterioration during storage and factors affecting it.	- 2
<b>Unit – 4 – Concept of advanced seed.</b>		
4.1	Seed longevity behaviour : orthodox and recalcitrant seed	- 3
4.2	Seed pelleting and coating (Artificial or synthetic seed production)	- 3
4.3	Micropropagation: techniques, significance, use, scope and limitations.	- 4
<b>Total</b>		<b>- 40</b>

**B.Sc. Part-I Chemistry**  
**Chemistry**  
**CHEMISTRY – SYLLABUS**

N. B. (i) Figures shown in bracket indicate the total lectures required for the respective units.

(ii) The question paper should cover the entire syllabus. Marks allotted to questions should be in proportion to the lectures allotted to respective to units.

(iii) All units should be dealt with S.I. units.

(iv) Industrial tour is prescribed.

(v) Use of recent editions of reference books is essential.

(vi) Use of Scientific calculator is allowed.

**SEMESTER – I PAPER – I**  
**(Physical and Inorganic Chemistry)**  
**Section – I Physical Chemistry**

**UNIT - 1. Mathematical Concepts: - - - - - [7]**

1.1 Graphical representation: Graph paper, co-ordinates of a point, equation of straight line, intercept, slope and nature of the graph. Plotting of graph based on experimental data.

1.2 Derivative: Rules of differentiation (without proof) pertaining to algebraic and exponential functions. Examples related to chemistry.

1.3 Integration: Rules of integration (without proof) pertaining to algebraic and

exponential functions. Example related to chemistry.  
(Numerical Problems not expected)

**UNIT - 2. Thermodynamics: - - - - [7]**

- 2.1 Spontaneous & non-spontaneous processes – Definitions, distinguishing points and examples. Second law of thermodynamics and its different statements.
- 2.2 Carnot's cycle, its efficiency and Carnot's Theorem (Heat engine).
- 2.3 Numerical Problems.

**UNIT - 3. Colloidal State: - - - - [11]**

- 3.1 Definition of colloids
- 3.2 Types of colloidal systems.
- 3.3 Solids in liquids (sols):
  - i) Preparation of sols: Dispersion and Aggregation methods
  - ii) Purification of Sols: Dialysis, Electrodialysis and Ultrafiltration.
  - iii) Properties of sols : Colour, optical, kinetic and electrical properties.
  - iv) Stability of sols, protective action, Hardy-Schulze law, gold number
- 3.4 Liquids in liquids (emulsions):
  - Types of emulsions, preparation, Emulsifier.
- 3.5 Liquids in solids (gels):
  - Classification, preparation and properties, inhibition,
- 3.6 General applications of colloids.

**Section – II (Inorganic Chemistry)**

**UNIT – 1 Chemical Bonding : - - - - [3]**

- 1.1 Introduction and definition with example of each.
  - (a) Ionic bond.
  - (b) Covalent bond.
  - (c) Coordinate bond.
  - (d) Metallic bond.
  - (e) Hydrogen bond.
  - (f) van der Waal's forces.

**UNIT –2 Ionic Solids :**

- 2.1 Ionic Bonding : - - - - (4)

- (a) Formation of ionic bond, Energetics of ionic bonding : Ionisation potential, Electron affinity and Lattice energy.
- (b) Born–Haber Cycle for Alkali metal halide (NaCl) (Numerical problems not expected)
- (c) Characteristics of ionic compounds.
- (d) Fajan’s rule.

**2.2 Radius ratio & Crystal structure : ----- (6)**

- (a) Definitions of Radius ratio (  $r^+ / r^-$  ), co-ordination number, stoichiometry and unit cell.
- (b) Concept and calculation of radius ratio (  $r^+ / r^-$  ) for ionic solid with octahedral geometry.
- (c) Radius ratio effect on geometry.
- (d) Crystal structure of NaCl and CsCl, w.r.t. unit cell, radius ratio, coordination number and stoichiometry.
- (e) Stoichiometric defects in ionic solids and their consequences.

## SEMESTER –I PAPER – II

### (Organic Chemistry and Inorganic Chemistry)

#### Section – I (Organic Chemistry)

**UNIT -- 1. Qualitative and Quantitative elemental analysis : ----- [9]**

- 1.1 Qualitative analysis of Carbon, Hydrogen, Nitrogen, Sulphur and Halogen.
- 1.2 Quantitative analysis of,
  - (i) Carbon and Hydrogen by Combustion method.
  - (ii) Nitrogen by Kjeldahl’s method.
  - (iii) Halogen, Sulphur and Phosphorus by Carius method.
- 1.3 Determination of molecular weight of an acid by titration method and of base by platinichloride method.
- 1.4 Numerical problems.

**UNIT – 2 Stereochemistry of organic compounds : ----- [5]**

- 2.1 Stereoisomerism – Introduction.
- 2.2 Optical isomerism –Introduction.
- 2.3 Elements of symmetry.



2.4 Chiral centre. (Explanation with lactic acid.)

2.5 Optical isomerism in tartaric acid and 2:3 dihydroxybutanoic acid.

2.6 Enantiomers and diastereoisomers.

2.7 Racemic modification.

2.8 Geometrical isomerism – Cause of geometrical isomerism.

2.9 Geometrical isomerism with respect to  $\begin{matrix} \diagup & & \diagdown \\ \text{C} & = & \text{C} \\ \diagdown & & \diagup \end{matrix}$ ,  $\begin{matrix} | \\ -\text{C} = \text{N} - \end{matrix}$  – and alicyclic compounds (Introduction). Geometrical isomerism in maleic acid and fumaric acid.

### UNIT – 3 Carboxylic acids and their derivatives

----- [7]

3.1 Monocarboxylic acids:

Introduction, Method of formation of halo acids, mono-, di- and trichloroacetic acids. Substitution reactions of monochloroacetic acids by nucleophiles  $\text{CN}^-$ ,  $\text{OH}^-$ ,  $\text{I}^-$  and  $\text{NH}_3$

3.2 Hydroxy acids: Malic acid and citric acid.

Methods of formation of maleic acid from maleic acid, from  $\alpha$  – bromo succinic acid and moist  $\text{Ag}_2\text{O}$ . Reactions of malic acid- action of heat, oxidation and reduction with HI. Uses of Malic acid.

Method of formation of citric acid from glycerol.

Reactions of citric acid- acetylation by acetic anhydride, reduction by HI and action of heat at 422K. Uses of citric acid.

3.3 Unsaturated acids: Acrylic acid and Cinnamic acid.

Methods of formation of acrylic acid from acrolin and by dehydration of  $\beta$  – hydroxy Propionic acid. Reactions of acrylic acid – addition of  $\text{H}_2\text{O}$ , reduction by  $\text{Na}/\text{C}_2\text{H}_5\text{OH}$ . Uses of acrylic acid.

Methods of formation of cinnamic acid from benzaldehyde using diethyl malonate and by using acetic anhydride and sodium acetate.

Reactions of cinnamic acid - Bromination and oxidation. Uses of cinnamic acid.

3.4 Dicarboxylic acids: Succinic acid and Phthalic acid.

Methods of formation of succinic acid from ethylene bromide, maleic acid

Reactions of succinic acid:- action of heat, action of  $\text{NaHCO}_3$ ,  $\text{C}_2\text{H}_5\text{OH}$  in presence of acid. Uses of succinic acid.

Methods of formation of Phthalic acid from o-xylene, naphthalene.

Reaction of phthalic acid- action of heat, reaction with sodalime,  $\text{NH}_3$ . Uses of phthalic acid.

3.5 Carboxylic acid derivatives:- Acetyl chloride and Acetic anhydride.

Acid halide derivative:- acetyl chloride: methods of formation from acid by action with  $\text{PCl}_5$  and  $\text{SOCl}_2$ . Reactions with  $\text{H}_2\text{O}$ , alcohol and  $\text{NH}_3$ . Uses of acetyl chloride.

Acid anhydride derivative:- Acetic anhydride: Method of formation by dehydration of acetic acid. Reactions with  $H_2O$ , alcohol and  $NH_3$ . Uses of acetic anhydride.

**UNIT – 4 Organosulphur compounds: ----- [4]**

- 4.1 Introduction and nomenclature
- 4.2 Thiols (simple examples).
- 4.3 Methods of formation- (i) from sodium hydrosulphide and alkyl halide
  - (ii) from alcohol vapors and hydrogen sulphide
  - (iii) from Grignard reagent and sulphur.
- 4.4 Physical properties
- 4.5 Chemical reactions
  - (i) Acidity-formation of mercaptide
  - (ii) Reaction with sodium
  - (iii) Reaction with carboxylic acids and acid chlorides
  - (iv) Reaction with aldehyde and ketones
  - (v) Oxidation
- 4.6 Thioethers (simple examples)
- 4.7 Method of formation
  - (i) from potassium sulphide and alkyl halide
  - (ii) from salt of thiol and alkyl halide
  - (iii) from thiols and alkynes
- 4.8 Physical properties.
- 4.9 Chemical reactions:
  - (i) Reaction with alkyl halides
  - (ii) Oxidation to sulphoxide and sulphone
  - (iii) Addition to halogens.

**Section – II (Inorganic Chemistry)**

**UNIT – 1 S– block elements : ----- [6]**

- 1.1 General electronic configuration.
- 1.2 Comparative study of group 1(IA) & group 2(IIA) with respect to (i) Family relationship, (ii) Chemical properties, (iii) Hydroxides and (iv) Halides.
- 1.3 Diagonal relationship between – (i) Li – Mg, (ii) Be – Al

**UNIT – 2 Environmental Chemistry : ----- [6]**

- 2.1 Introduction :
- 2.2 Meaning of terms – Environment, Pollution, Pollutant, Threshold Limit Value (TLV), Dissolved Oxygen (DO), Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD).
- 2.3 Types of pollution (only brief introduction) : Air pollution, water pollution, sound pollution, soil pollution, automobile pollution and nuclear pollution.

2.4 Air Pollution : Classification of air pollutants, oxides of carbon, sulphur and nitrogen as air pollutants w.r.t. source and health hazards.

**Reference Books :**

**PHYSICAL CHEMISTRY**

- 1) Mathematical preparation of Physical Chemistry : F. Daniel,  
Mc-Graw Hill Book company.
- 2) Elements of Physical Chemistry : S. Glasstone and D. Lewis  
(D. Van Nostrand Co-Inc)
- 3) Physical Chemistry : W. J. Moore (Orient Longman)
- 4) Principles of Physical Chemistry : Maron – Prutton
- 5) University Chemistry : B. H. Mahan (Addision – Weseley Publ. Co.)
- 6) Chemistry – Principle & Applications : P. W. Atkins, M. J. Clugsto,  
M. J. Fiazer, R. A. Y. Jone (Longman)
- 7) Physical Chemistry : G. M. Barrow (Tata Mc-Graw Hill)
- 8) Essentials of Physical Chemistry : B. S. Bahl & G. D. Tuli (S. Chand)
- 9) Physical Chemistry : A. J. Mee
- 10) Physical Chemistry : Daniels – Alberty.
- 11) Principles of Physical Chemistry : Puri – Sharma (S. Nagin)
- 12) Text Book of Physical Chemistry : Soni – Dharmarha.
- 13) University General Chemistry : CNR. Rao (McMillan)
- 14) Chemistry : Sienko – Plane (Recent Edn.)
- 15) Basic Chemical Thermodynamics : V. V. Rao.
- 16) Physical Chemistry through Problems : Dogra and Dogra (Wiley Eastern Ltd.)
- 17) Physical Chemistry : S. Glasstone.
- 18) A Text Book of Physical Chemistry: A.S. Negi and S.C. Anand (New Age International (P) Ltd.)
- 19) A Text Book of Quantitative Inorganic Analysis Including Elementary Instrumental Analysis: A.I. Vogel (Third Ed.) (ELBS)

**ORGANIC CHEMISTRY**

- 1) Organic Chemistry : Hendrickson, Cram, Hammond.
- 2) Organic Chemistry : Morrison and Boyd.
- 3) Organic Chemistry : Volume I & II. I. L. Finar.
- 4) Organic Chemistry : Pine
- 5) Advanced Organic Chemistry : Sachin Kumar Ghosh.
- 6) Advanced Organic Chemistry : B. S. Bahl & Arun Bahl.
- 7) A Guide book to Mechanism in Organic Chemistry : Peter Sykes.
- 8) Stereochemistry of Organic Compounds : Kalsi.

- 9) Stereochemistry of Carbon Compounds : Eliel.
- 10) Text Book of Organic Chemistry : P. L. Soni.
- 11) Practical Organic Chemistry : By A. I. Vogel.
- 12) Advanced Organic Chemistry - Reactions, Mechanism & Structure : Jerry March.
- 13) Organic Chemistry : M. R. Jain.
- 14) Organic Chemistry : J. M. Shaigel.
- 15) Organic Chemistry : Vol-I, II, and III by S.M. Mukharji, S.P. Singh, R.P. Kapoor (New Age International Pvt. Ltd. Publishers)
- 16) Organic Chemistry : By Bhupinder Mehta, Manju Mehta  
(Prentice-Hall of India Pvt. Ltd., New Delhi 110001)

### **INORGANIC CHEMISTRY**

- 1) Basic Inorganic Chemistry – F. A. Cotton, G. Wilkinson and P. L. Gaus Wiley.
- 2) Concise Inorganic Chemistry – J. D. Lee. ELBS 4<sup>th</sup> Edn.
- 3) Concepts and Models of Inorganic Chemistry – B. Dauglas, D. McDaniel and J. Alexander.  
John Wiley.
- 4) Inorganic Chemistry – D. E. Shriver, P. W. Atkins and C. H. Langford. Oxford.
- 5) Inorganic Chemistry – W.W. Porter field. Addison–Wesley.
- 6) Inorganic Chemistry – A. G. Sharpe. ELBS.
- 7) Inorganic Chemistry – G. L. Miessler and D. A. Tarr. Prentice Hall.
- 8) Inorganic Chemistry – G. S. Manku. Tata Mc Graw Hill.
- 9) Advanced Inorganic Chemistry – Satyaprakash, Tuli, Basu. (S.Chand & Co.)
- 10) Inorganic Chemistry – Puri and Sharma. (S.Chand & Co.)
- 11) Environmental Pollution Analysis – S. M. Khopkar. (Willey Estern Ltd.)
- 12) Environmental Chemistry – A. K. De. (Willey Estern Ltd.)
- 13) Text Book of Environmental Chemistry – O. D. Tyagi and M. Mehra.
- 14) Air Pollutin : Origin and Control – Wark and Werner.
- 15) Progressive Inorganic Chemistry - Thatte and Pandit.
- 16) Basic concepts of Analytical Chemistry – S. M. Khopkar.
- 17) University General Chemistry – CNR Rao. (McMillan)
- 18) Text book of Inorganic Chemistry – P.L.Soni

**B. Sc. I – Electronics**  
**Paper I – Basic Electronics. (Total Marks 50)**  
**SECTION – I(Passive Circuit Elements)**

## Unit:1. Resistors& capacitors

9

Definition of active and passive elements

Resistors: - Definition, symbol and colour code method.

Types of resistors: -

Linear Resistors (Fixed): -Carbon composition, carbon ceramic, carbon film, wire wound.

Linear resistors (Variable): -Wire wound, Potentiometer, Preset.

Non-Linear resistors: - Thermistors, photo resistors and varistors.

[Construction, specification application only.]

Capacitors: - Definition, . Capacitance, capacitive reactance (XC), Energy stored in a capacitor, charging and discharging of a capacitor, leakage current in capacitor, stray capacitance.

Types of capacitors: -

Fixed electrostatic capacitors: -ceramic, mica, plastic and paper

[Construction of

ceramic capacitor only]

Fixed electrolytic capacitors: - Aluminum and Tantalum polycarbonate polyethylene.

[Construction of Aluminum only]

Variable capacitors: -Air dielectric capacitor and Trimmers.

Reference: Applied Electronics by:R.S.Sedha

## Unit:2 Inductors & Capacitors

9

Inductors: - Definition, symbol, Inductance, Inductive reactance (XL ), Energy stored in an inductor Q-Factor.

Types of Inductors: - Air core, Iron core and ferrite core inductors.

Use of Inductors: - Filter chokes AFC & RFC and Variable inductor.

Transformers: - Principle and construction of transformer, Specification of transformer.

Types of Transformer: - Step-up, step-down transformer

Relays: - Principle, construction and working of electromagnetic relays

Types of Switches: (Explanation using Symbols)

Reference: Applied Electronics by:R.S.Sedha

7

## Unit :3 Circuit Fundamental

9

AC/DC Fundamentals:

Sources of DC voltage: Lead-Acid and Ni-Cd Battery:Construction ,Chemical action,

Current rating. Other DC sources (only names),Solar cell

Reference: Applied Electronics by:R.S.Sedha,Basic electronics by:Bernard Grob.

A.C.Fundamentals:Types of AC,Important terms of AC : Cycle,Time period ,Frequency,

Amplitude,Peak to peak value,Phase ,Phase Difference.

Reference: Applied Electronics by:R.S.Sedha,

Electric circuit, Active and Passive elements, Bilateral and unilateral element, Linear

and non Linear element, Lumped and distributed element.

Basic voltage and current relations for R, L and C.

Energy sources: - AC and DC sources, constant voltage and constant current source, and

their inter conversions, Reference direction for voltage and current.

Basic laws and rules: - Ohm's law, Kirchhoff's laws, voltage and current divider rules, power

in series and parallel circuits.

Mesh-analysis method and Nodal analysis method (only for dc resistive circuit)

## UNIT:4 Network Theorems

9

Network Theorems: - (only for dc resistive circuit)

Thevenin's Theorem, Norton Theorem, Superposition Theorem, Maximum power transfer

Theorem and Millman's Theorem.

Reference: B.L. Theraja

Books for Section I

- Basic Electronics Bernard Grob
- A text book of Applied Electronics R.S.Sedha (S.Chand & Company)
- Basic Electronics and Linear circuits N.N.Bharagava, D.C.Kulshreshtha and S.C.Gupta (TMH)
- Circuits and Networks: Analysis and synthesis. A.Sudhakar and Shyammohan (Tata McGrath-Hill Pub.)
- A course in Circuit Analysis Soni and Gupta.
- Linear Circuits. M.E. Valkenberg & Kinariwala.
- Electronics materials and components Madhuri Joshi.

## SEMESTER I

Paper-II Electronic Devices (Total Marks 50)

UNIT :5      Semiconductor diode: -  
9

Definition of PN junction, unbiased junction, formation of depletion layer and internal potential barrier.

Biased junction: - Forward and Reverse biased I-V characteristics of pn junction diode.

[Both forward and reverse biasing]

Junction resistance (i.e. diode resistance)

Diode application, power and current rating of diode, effect of temperature on PN junction diode.

Zener diode: - Breakdown mechanism, Zener and Avalanche Break down, Zener Diode as

voltage regulator. specification of Zener diode, point contact diode, applications, effect of

temperature on Zener diode, photo diode, varactor diode, LED [Construction and

applications only] ,Seven segment display, LCD.

Reference: Applied Electronics by:R.S.Sedha,

- Basic Electronics and Linear circuits      N.N.Bharagava,  
D.C.Kulshreshtha  
and S.C.Gupta (TMH)

UNIT:6      BJT (Bipolar Junction Transistor): -      9

The Junction Transistor, Types, Construction of PNP and NPN

Transistor configurations: - CB, CE and CC configuration ,

I-V characteristics of CB and CE and hence definition of  $\alpha$  and  $\beta$  .

Relation between  $\alpha$  and  $\beta$  , Leakage current in CB and CE (i.e.  $I_{CB0}$  &  $I_{CE0}$ )

Relation between  $I_{CB0}$  &  $I_{CE0}$

UNIT :7      Transistor Biasing and Thermal Stabilization: -      9

The operating point, The DC and AC load line, Need of transistor biasing and stability of

Q point, Thermal instability.

Method of Biasing: - Fixed bias, Collector to base bias, Self bias or Emitter bias, potential

Divider bias, Stabilization factors Definition of stability factors S. temperature compensation using single diode and two diodes, Transistor Rating and specifications for

typical transistor SL 100 and BC 148 or BC 548.

9

UNIT :8      Field Effect Transistor ,UJT,SCR,TRIC: -      9

Field Effect Transistor: -

JFET: - Structure and operation of n-channel FET. The volt-ampere characteristics of

FET. FET parameters & Applications.

MOSFETs: - Structure, operation and characteristics of MOSFETs & Applications.

UJT and SCR: -

Structure, operation, characteristics and Applications. Traic- construction and applications. Books for Section II

- |   |                                 |
|---|---------------------------------|
| • Electronic Devices and Circuits                           | J.Millman & C.C. Halkias (TMH)  |
| • Electronic Devices and Circuits                           | Allen Mottershead (PHI)         |
| • A text book of Applied Electronics                        | R.S.Sedha (S.Chand & Company)   |
| • Basic Electronics and Linear circuits and S.C.Gupta (TMH) | N.N.Bharagava, D.C.Kulshreshtha |
| • Semiconductor Approximation                               | Malvino                         |
| • Principles of Electronics                                 | V.K. Mehta (New Edn.)           |
| • Electronic Devices and Circuit Theory                     | R.Boylested & Louis Nashlsky.   |
| • Electronic Devices  | Floyd                           |

10

## **B.Sc Part I Semester - I Geography**

### **Introduction to Physical Geography Paper - I**

**Marks-50**

No of Periods

Unit .I) Introduction to Physical Geography

- a) Definition of Physical Geography.
- b) Nature of Physical Geography.
- c) Scope of Physical Geography.
- d) Branches and importance of Physical Geography.

(8)

Unit .II) Interior of the Earth

- a) Structure of earths interior
- b) Earths movements – Orogenic – Slow movements.
- c) Earths movements – Orogenic – Sudden movements.
- d) Epeorogenic movements.

(10)

Unit .III) Alfred Wegners Theory of Continental Drift, Earth quakes and volcanoes

- a) Theory of Continental Drift, Evidences, Criticism.
- b) Earth quakes – Causes, types and effects.
- c) Volcanoes – Causes, types and effects.

(12)

Unit. IV) Rocks

- a) Origin of rocks.
- b) Classification of rocks.
- c) Characteristics of rocks.

(8)

### **Reference Books**

- 1) Dayal P.A (1996): Text book of Geomorphology, Shukla Book Depot, Patna.
- 2) Steers J.A.(1964): The Unstable Earth Some Recent views in Geography, Kalyani Publishers, New Delhi.
- 3) Small R.J.(1985): The Study of Landforms, MC Graw Hill, New York.



- 4) Kale V and Gupta A (2001): Elements of Geomorphology, Oxford University Press, Kolkata.
- 5) Singh Savindra (2000): Geomorphology, Prayag Pustakalay, Allahabad.
- 6) Wooldridge S. W. and Morgan R. S.(1959): The physical basis of Geography An outline of Geomorphology. Longman Green and Co. London.

**B.Sc Part I Geography  
Semester - I  
Paper – II  
Geomorphology**

**Marks-50**

No of Periods

- Unit. I) Weathering
- a) Denudation and Erosion
  - b) Types of Weathering - Mechanical Weathering.
  - c) Chemical Weathering.
  - d) Biotic Weathering. (10)
- Unit.II) Erosion
- a) Concept of cycle of erosion
  - b) Erosional work of River and Landforms associated with it.
  - c) Depositional work of River and Landforms associated with it. (8)
- Unit.III) Glaciers and Wind
- a) Erosional work of glaciers and landforms associated with it.
  - b) Depositional work of glaciers and landforms associated with it.
  - c) Erosional work of wind and landforms associated with it.
  - d) Depositional work of winds and landforms associated with it. (10)
- Unit.IV) Geomorphological Environment and Man.
- a) Impact of Geomorphological environment on settlements.
  - b) Impact of Geomorphological environment on surface transportation.
  - c) Impact of Geomorphological environment on agriculture. (9)

**Reference Books**

- 1) Chorley R.J: Spatial Analysis in Geomorphology, Meathun, London 1972.
- 2) Cooke R. U. and Doornkamp J. C.: Geomorphology in environmental management-A introduction Clavehdon press Oxford 1974.
- 3) Fair-Bridge R.W: Encylopedia of Geomorphology, Reinholdts, Newyork, 1968.

- 4) Pitty A. F: Introduction to Geomorphology, Methuen London 1974.
- 5) Singh Savindra (2000): Geomorphology, Prayag Pustakalay, Allahabad.
- 6) Sparks B.W: Geomorphology Longman, London 1960.
- 7) Thornbury W. D: Principle's of Geomorphology, Weley estern, 1969.
- 8) Wooldridge S. W. and Morgan R. S.: The physical basis of Geography-An outline of Geomorphology. Lonhgman Green and Coup London 1959.

### **Reference Books**

- 1) Davis Richard J. A.: Oceanography- An introduction to the marine environment, W.M.C., Brooth flowa-1987
- 2) Gralds S.: General oceanography- An introduction, Jon waley and sons Newyork 1980.
- 3) Garison T.: Oceanography, ward worth company. U.S.A. 1998.
- 4) Sharma and Vithal.: Oceanography.
- 5) Savindra Singh.-(2000)Physical Geography, Prayag Pustakalay, Allahabad.
- 6) W.R.Ahirrao, S.S. Alizad, C.S.Dhapte.: Climatology and Oceanography. Nirali Prakashan.(4<sup>th</sup> Edition 2003)

### **B. Sc. I Geology semester I**

<b>Paper I</b>	<b>:</b>	<b>Detailed syllabus of B. Sc. I (Semester I) Geology</b>	
		<b>General Geology</b>	<b>(Marks 50)</b>
			<b>(Total Period 40)</b>
		<b>Unit I – Introduction to General Geology</b>	<b>(6 Periods)</b>
		1. Introduction – Meaning, Scope and Significance of Geology	
		2. Brief outline of Universe – Origin – Big Bang Theory, Galaxies and Nebula	
		3. Solar System - Characteristics, Member, Constitution and mechanism of the systems; Planetary Laws.	
		<b>Unit II – Origin and Age of the Earth</b>	<b>(13 Periods)</b>
		1. Laplace and Kant Nebular Hypothesis; Buffon, Chamberlain and Moulton Planestimal Theory; Jean and Jeffery's Tidal Theory;	
		2. Physical data of the Earth – shape, size, mass, density, rotation, revolution, Galactic movements; solstices, equinox, precession of Earth's Axis.	
		3. Age of the Earth – Physical, Chemical, Biological and radioactive methods.	
		4. Geological Time-Scale	
		<b>Unit III – Earthquake and interior of the Earth</b>	<b>(15 Periods)</b>
		1. Seismology: - Definition, Focus, Epicenter, Seismic waves, Iso-seismal lines;	

Measurement of Earthquake- Seismographs and Seismograms, Intensity and Magnitude, Earthquake Scales: Mercalli scale and Richter scale; Classification of Earthquakes according to depth;

2. Causes of Earthquake- Natural and Man made; Elementary ideas of concepts of Continental Drift and Plate Tectonics; and effects of Earthquake; Prediction and precautions of earthquakes;
3. Distribution of earthquake centers in the world (i.e. Earthquake Belts); Major Seismic Centres and zones of India;
4. Interior of the earth: Importance and use of seismic waves in understanding the internal structure of the Earth – Inner core, Transition zone, Outer core, Mantle – Asthenosphere, Mesosphere, Lithosphere – Sial and Sima (Crust) and Main Discontinuities;

#### **Unit IV- Volcano**

**(6 Periods)**

1. Definition and structure of volcano, Two major types of volcano, their characteristics; Causes of volcano, Products of volcano;
2. Classification of central type of volcano on the basis of- Cones, State and Modes of Eruption. Associated features like fumaroles, solfatras, hot springs and geysers; submarine volcano.

### **Paper II**

#### **Mineralogy and crystallography**

**Marks 50**

**(Total Periods 40 )**

**(10 Periods)**

#### **Unit I – Introduction to Mineralogy**

1. Definition of mineral; Chemical Bonding in minerals.
2. Properties of minerals like form, chemical composition, colour, lustre, streak, hardness, cleavage, fracture, specific gravity and transparency

#### **Unit II – Study of mineral groups**

**(12 Periods)**

1. Study of following minerals groups with reference to general physical properties; Chemical composition, and occurrence in rocks: Olivine group, Pyroxene group, Amphibole group, Mica group, Feldspar group and Silica group

#### **Unit III – Introduction to Crystallography**

**(10 Periods)**

1. Definition of crystal; Crystal Elements- Faces, Edges, Solid Angles, Forms ( Open and Closed), Zones;
2. Interfacial Angles, Law of Constancy of Interfacial Angles; Contact Goniometer.
3. Crystallographic Axes; Axial Angles; Parameters and Indices; Law of Rational Indices.
4. Elements of Symmetry, planes of symmetry, axis of symmetry and centre of symmetry

#### **Unit IV- Study of Crystal System**

**(8 Periods)**

1. Elements of symmetry; Classification of crystals into symmetry classes; Study of following Normal Symmetry Classes- Isometric/Cubic System (Galena type),
  1. Tetragonal System (Zircon type),
  2. Hexagonal System (Beryl type),
  3. Orthorhombic System (Barytes type),
  4. Monoclinic System (Gypsum type),
  5. Triclinic System (Axinite type)

**B.Sc. Part –I (SEMESTER –I)**  
**(MATHEMATICS)**  
**Paper – I (ALGEBRA)**

**UNIT – 1: DETERMINANTS**

9 lectures

- 1.1 Elementary properties of determinants .**
- 1.2 Minor of an element of a determinant, Cofactor of an element of a determinant.**
- 1.3 Determinant of special type.**
  - 1.3.1 Second minor.**
  - 1.3.2 Complementary to 2<sup>nd</sup> minor.**
  - 1.3.3 Expansion of a determinant in terms of minor of any order by Laplace's method.**
  - 1.3.4 Reciprocal determinant.**
  - 1.3.5 Properties of a reciprocal determinant.**
  - 1.3.5 Symmetric determinat. Skew – symmetric determinant.**
  - 1.3.6 Properties of symmetric and skew – symmetric determinants.**

**UNIT – 2: MATRICES**

9 lectures

- 2.1 Definitions of Hermitian and Skew Hermitian matrices.**
- 2.2 Eigen values, Eigen vectors and the characteristic equation of a matrix.**
- 2.3 Cayley Hamilton theorem and its use in finding inverse of a matrix.**
- 2.4 System of linear homogeneous equations.**
- 2.5 System of linear non-homogeneous equations.**
  - 2.5.1 Condition for consistency.**
  - 2.5.2 Nature of the general solution.**

**UNIT – 3: THEORY OF EQUATIONS**

9 lectures

- 3.1 Descartes rule of signs.**
- 3.2 Relation between the roots and coefficients.**
- 3.3 Transformation of equations.**
- 3.4 Solution of Cubic equations by Cardon method.**
- 3.5 Solution of biquadratic equations by Ferrari method.**

## UNIT – 4: ELEMENTARY FUNCTIONS OF COMPLEX VARIABLES

10 lectures

**4.1 De Moivre's Theorem and its applications.**

**4.2 All the values of  $(a + ib)^{\frac{1}{n}}$ , where n is a positive integer.**

**4.3 Expansion of  $\cos n\theta$ ,  $\sin n\theta$ .**

**4.4 Direct circular and hyperbolic functions.**

**4.5 Relation between circular and hyperbolic functions.**

**4.6 Some basic properties of hyperbolic functions.**

**4.7 Inverse circular and hyperbolic functions .**

### REFERENCE BOOKS

- 1. Algebra and Geometry for B.Sc. Part - I**, Dr. S. B. Kalyanshetti, Dr. S. D. Thikane, S. R. Bhosale, N. I. Dhanshetti, S. R. Patil, Shraddha Prakashan, Solapur.
- 2. Algebra and Geometry**, L. G. Kulkarni, Dr. B. P. Jadhav, Kubde, Phadke Prakashan, Kolhapur.
- 3. Algebra and Complex variables**, H. V. Kumbhojkar, Dattar and Bapat, Nirali Prakashan.
- 4 A Text Book of Algebra and Geometry**, J. D. Yadhav, S. A. Alandkar, N. I. Dhanshetti, Published by Shivaji University mathematics Society (SUMS),2003.
- 5. Determinants**, M. L. Khanna, Jai Prakash nath & co. Educational & Law publishers, Meerut.
- 6. A Text Book Of Matrices**, Shanti Narayan.

### Paper – II (CALCULUS)

#### UNIT – 1: SUCCESSIVE DIFFERENTIATION

9 lectures

**1.1  $n^{\text{th}}$  order derivative of standard functions : (i)  $(ax + b)^n$ , (ii)  $\frac{1}{ax + b}$ , (iii)  $\log(ax + b)$ , (iv)  $\sin(ax + b)$ , (v)  $\cos(ax + b)$ , (vi)  $e^{ax} \sin(bx + c)$ , (vii)  $e^{ax} \cos(bx + c)$ .**

**1.2 Leibnitz's Theorem and it's Applications.**

#### UNIT – 2: MEAN VALUE THEOREMS

10 lectures

**2.1 Rolle's Theorem.**

**2.2 Geometrical Interpretation of Rolle's theorem.**

**2.3 Lagrange's Mean Value Theorem.**

**2.4 Geometrical Interpretation of Lagrange's Mean Value theorem**

**2.5 Cauchy's Mean Value Theorem.**

**2.6 Taylor's Theorem and Maclaurin's Theorem ( Statement only).**

**2.7 Taylor's Series and Maclaurin's Series ( Statement only).**

**2.8 Series expansion of  $e^{ax}$ ,  $\cos x$ ,  $\sin x$ ,  $(1 + x)^n$ ,  $\log(1 + x)$ .**

**UNIT – 3: CURVATURE**

10 lectures

**3.1 Definition of Radius of Curvature.**

**3.2 Radius of Curvature for Intrinsic equations.**

**3.3 Radius of Curvature for Cartesian equations.**

**3.4 Radius of Curvature for Parametric equations.**

**3.5 Radius of Curvature for Polar equations.**

**UNIT – 4: PARTIAL DIFFERENTIATION**

9 lectures

**4.1 Partial derivatives of first order.**

**4.2 Partial derivatives of Higher order.**

**4.3 Composition functions.**

**4.4 Homogeneous functions.**

**4.5 Euler's Theorem on Homogeneous functions.**

**REFERENCE BOOKS**

- 1. Calculus and Differential equations for B.Sc. Part - I,** Dr. S. B. Kalyanshetti, Dr. S. D. Thikane, S. R. Bhosale, N. I. Dhanshetti, S. R. Patil, Shraddha Prakashan, Solapur.
- 2. Calculus and Differential equations,** L. G. Kulkarni, Dr. B. P. Jadhav, Kubde, Phadke Prakashan, Kolhapur.
- 3. Calculus and Differential equations,** H. V. Kumbhojkar, Dattar and Bapat, Nirali Prakashan.
- 4. A Text Book of Calculus and Differential equations,** H. T. Dinde, A. D. Lokhande, published by Shivaji University Mathematics society, Kolhapur.
- 5. Differential Calculus,** Shanti Narayan.
- 6. Integral Calculus,** Shanti Narayan.

## REFERENCE BOOKS

1. **Algebra and Geometry for B.Sc. Part - I**, Dr. S. B. Kalyanshetti, Dr. S. D. Thikane, S. R. Bhosale, N. I. Dhanshetti, S. R. Patil, Shraddha Prakashan, Solapur.
2. **Algebra and Geometry**, L. G. Kulkarni, Dr. B. P. Jadhav, Kubde, Phadke Prakashan, Kolhapur.
3. **Algebra and Complex variables**, H. V. Kumbhojkar, Dattar and Bapat, Nirali Prakashan.
- 4 **A Text Book of Algebra and Geometry**, J. D. Yadhav, S. A. Alandkar, N. I. Dhanshetti, Published by Shivaji University mathematics Society (SUMS), 2003.
5. **Differential Equations And Their Applications**, Zafar Ashan, Prentice Hall of India, New Delhi, 1999.
6. **Calculus and Differential equations for B.Sc. Part - I**, Dr. S. B. Kalyanshetti, Dr. S. D. Thikane, S. R. Bhosale, N. I. Dhanshetti, S. R. Patil, Shraddha Prakashan, Solapur.
7. **Calculus and Differential equations**, L. G. Kulkarni, Dr. B. P. Jadhav, Kubde, Phadke Prakashan, Kolhapur.
8. **Calculus and Differential equations**, H. V. Kumbhojkar, Dattar and Bapat, Nirali Prakashan.
9. **A Text Book of Calculus and Differential equations**, H. T. Dinde, A. D. Lokhande, published by Shivaji University Mathematics society, Kolhapur.
10. **A Hand Book of Mathematics laboratory**, S. P. Thorat, A. A. Basade, H. V. Patil, published by Shivaji University Mathematics society, Kolhapur.
11. **Work Experience in Computational Mathematics**, S. G. Baravkarr, A. L. Jadhav, S. P. Kilche, Metha Publishing House, Pune and Shivaji University Mathematics society, Kolhapur.

### **B.Sc. Part I Sem I Microbiology Fundamentals of Microbiology**

#### **Paper I**

#### **UNIT I**

**9**

#### **History and Scope of Microbiology :**

- A. Introduction of Microbiology.
- B. Prokaryotic and Eukaryotic cell structure.

- C. Introduction to types of Microorganisms – Bacteria, Algae, Fungi, Protozoa and Viruses.
- D. Controversy over spontaneous generation theory.
- E. Contributions of 1) Antony van Leeuwenhoek 2) Louis Pasteur 3) Robert Koch 4) Joseph Lister 5) Edward Jenner.
- F. Beneficial and harmful activities of microorganisms.
- G. Introduction to applied branches of Microbiology : a) Air, b) Water, c) Sewage, d) Soil, e) Dairy, f) Food, g) Medical, h) Industrial, i) Biotechnology and j) Geomicrobiology.

## UNIT II

9

### 1. Morphology and cytology of Bacteria

- A. Morphology of Bacteria – i) Size, ii) Shape, iii) Arrangements
- B. Cytology of Bacteria –
  - a) Structure and functions of :
    - i) Cell wall
    - ii) Cell membrane
    - iii) Capsule and slime layer
    - iv) Flagell
    - v) Pili
    - vi) Nuclear material
    - vii) Mesosome
    - viii) Ribosome

### 2. General Principles of bacterial nomenclature :

- i) Taxonomic ranks
- ii) Common or Vernacular name
- iii) Scientific or International name

## UNIT III

9

### Microbial nutrition

- A. Microbial Nutrition
  - 1) Nutritional requirements of microorganisms :
 

Water; Micronutriets; Macronutrients; Carbon, Energy source; Oxygen and Hydrogen; Nitrogen, Sulphur and Phosphorous and growth factors-auxotroph, prototroph and fastidious organisms.
  - 2) Nutritional types of microorganism based on carbon and energy sources.
    - a. Autotrophs b. Heterotrophs c. Phototrophs d. Chemotrophs
    - e. Photoautotrophs f. Chemoautorphos g. Pthoheterotrophs
    - h. Chemoheterotrophs.

## UNIT IV

9

### Culture media and pure culture techniques

- A. Common components of media and their functions
 

Peptone, Yeast extract, NaCl, Agar and Sugar
- B. Culture media
  - a) Living Media (Lab. animals, plants, bacteria, embryonated eggs, tissue cultures)



- b) Non living media – i) Natural, ii) Synthetic, iii) Semisynthetic, iv) Differential, v) Enriched, vi) Enrichment, vii) Selective.
- C. Methods for isolation of pure culture.
  - i) Streak plate    ii) Pour plate    iii) Spread plate

## **Paper II : Basic Microbial Techniques and Biochemistry**

### **UNIT I**

**10**

#### **1. Microscopy :**

- A. General Principles of Microscopy – Image formation, Magnification, Numerical aperture (uses of oil immersion objective), Resolving power and Working distance.
- B. Ray diagram, special features, applications and comparative study of –
  - i) Compound Microscope
  - ii) Electron Microscope

#### **2. Stains and staining procedures**

- A. Definition of dye and stain
- B. Classification of stains – Acidic, Basic and Neutral
- C. Principles, Procedure, Mechanism and application of staining procedures
  - i) Simple staining
  - ii) Negative staining
  - iii) Differential staining : Gram staining and Acid fast staining
- D. Special staining methods
  - i) Cell wall (Chance's method)
  - ii) Capsule (Maneval's method)
  - iii) Volutin granule (Albert's method)

### **UNIT II**

**10**

#### **Control of Microorganisms**

- A. Definitions of - Sterilization, Disinfection, Antiseptic, Germicide, Microbiostasis, Antisepsis, Sanitization.
- B. Physical agent : i) Temperature – a) Dry heat, b) Moist heat, ii) Desiccation, iii) Osmotic pressure, iv) Radiations – U.V. Ray, Gamma rays, v) Filtration – Asbestos and Membrane filter
- C. Chemical Agents : Mode of action, application and advantages
  - i) Phenol and Phenolic compounds
  - ii) Alcohols (Ethyl alcohol)
  - iii) Halogen compounds (chlorine and iodine)
  - iv) Heavy metals (Cu and Hg)
- v) Gaseous Agents – Ethylene oxide, Beta-propiolactone and formal

### **UNIT III**

**10**

#### **Proteins, Enzymes and Nucleic acids :**

- A. Proteins :
  - i) General structure of amino acids
  - ii) Peptide bond

iii) Structural levels of proteins : primary, secondary, tertiary and quaternary.

B. Enzymes : i) Definition,

ii) Structure- Concept of apoenzyme, coenzyme, cofactor and active site.

iii) Types- Extracellular, Intracellular, Constitutive and Inducible.

C. Nucleic Acids :

i) DNA – structure and composition (Waston and Crick Model)

ii) RNAs – Types (m-RNA, t-RNA, r-RNA), structure and functions.

#### UNIT IV

06

#### Carbohydrates and lipids :

1. Carbohydrates : Definition, classification and brief account of

A) Monosaccharides :

Classification based on aldehyde and ketone groups ; structure of Ribose, Deoxyribose, Glucose, Galactose and Fructose.

B) Disaccharides : Glycosidic bond, structure of lactose and sucrose.

C) Polysaccharides : Structure and biological role of starch, glycogen and cellulose.

2. Lipids :

A. Simple lipids – Fats and oils, waxes.

B. Compound lipids – Phospholipid, Glycolipids

C. Derived lipids – Cholesterol

#### Books recommended for Theory

- 1) Microbiology by Pelczar, M.J.Jr., Chan E.C.S., Krieger, N.R. 5<sup>th</sup> edition, 1986 (McGraw Hills Publication).
- 2) Fundamental Principles of bacteriology by A. J. Salle, Tata McGraw Hill.
- 3) Fundamentals of Microbiology – by Frobisher, Hindsill, Crabtree, Good Heart, W.B. Saunders Company, 7<sup>th</sup> edition.
- 4) Medical Microbiology – Vol. I and II – by Cruick Shank R., Duguid J.P., Marmion B.P., Swain R.H.A., XII<sup>th</sup> edition, Churchill Livingstone, New York.
- 5) A textbook of Microbiology by Ananthnarayan – Orient Longman, Bombay
- 6) General Microbiology by Stanier R. Y. V<sup>th</sup> edition, McMillan, London.
- 7) General Microbiology – Vol I and II by Pawar and Dagainawala, Himalaya Publications.
- 8) Medical Bacteriology by Dey and Dey – Allied Agency, Calcutta.
- 9) Food Microbiology by W. C. Frazier.
- 10) Basic Experimental Microbiology by Ronald M. Atlas, Alfred E. Brown, Kenneth W. Dobra, Wenas Miller (1986) Prentice Hall.
- 11) General Microbiology by Robert F. Boyd (1984), Times, Mirror/Mosby College.
- 12) A Biologicals guide to principles, techniques of Practical Biochemistry by K. Wilson and K. H. Goulding, Edward Arnold Publication.
- 13) Introduction to practical Biochemistry by D. Plummer, J. Willey and Sons.
- 14) Microbiology by Prescott, Herley and Klein, II<sup>nd</sup> edition.
- 15) F. K. Baker – Bacteriological Techniques.
- 16) Gunasekaran – Introduction to Microbial Technique
- 17) Sadasivam & Manickam – Biochemical methods.

**B.Sc Part – I : (Sem.-I)**  
**Industrial Microbiology**

**FUNDAMENTALS OF INDUSTRIAL MICROBIOLOGY**  
**PAPER I**

**A) THEORY**

	No. of lectures
<b>Unit Introduction to Industrial Microbiology:</b>	
<b>I.</b> a) Definition, basic concepts of fermentation	
b) Development and scope of Industrial Microbiology	
i) Traditional fermentations– wine, beer, fermented milk products- curd and lassi, pickles.	9
ii) Contemporary fermentations – organic acids-vinegar and citric acid, antibiotics, enzymes, vitamins.	

<b>Unit Study of Industrially Important Microorganisms-</b>	
<b>II.</b> General characteristics and industrial importance of :	
a) Bacteria	
b) Fungi ( yeast & Mold)	9
c) Actinomycetes	
d) Algae	

<b>Unit Microbial Growth :</b>	
<b>III.</b> a) Phases of growth and measurement of growth	
b) Batch cultures & Continuous cultures – characteristics and maintenance	9
c) Diauxic, synchronous and fed batch cultures	

<b>Unit Effect of environmental factors on growth of microorganisms:</b>	
<b>IV.</b> Temperature, osmotic pressure, hydrostatic pressure, surface tension, UV light, pH and heavy metals	9

**PAPER-II: Basics of Fermentation**

	No. of lectures
<b>Unit 1. Screening of industrial microorganisms –</b>	
<b>I</b> a) Primary Screening of - i. Antibiotic producers	
ii. Organic Acid producers	9
iii. Amylase producers	
b) Secondary screening	
2. Methods of Stock Culture Maintenance	
<b>Unit 1.Fermentation media –</b>	
<b>II.</b> a) Basic components – water, sources of energy, carbon, nitrogen, minerals	9
b) Special ingredients – growth factors, buffers, precursors, inhibitors, inducers, antifoam agents, oxygen requirements, redox potential	
d) Types of media used- synthetic,natural–industrial and agricultural wastes	
<b>Unit 1. Inoculum Preparation.</b>	9
<b>III</b> 2. Concepts of axenic and mixed cultures in fermentations	
3. Types of Fermentations- Batch and continuous fermentations, Dual and multiple fermentations	

## **Unit Sterilisation Techniques in Fermentation Industry-**

### **IV**

- a) Introduction
- b) Principles of Sterilization
- c) Sterilization of Equipments
- d) Sterilization of Production Media
- e) Sterilization of Air by Filtration.

9

## **List of books for Theory and Practicals**

1. General Microbiology – R. Y. Stanier and others. Macmillan Press Ltd.
2. Principles of Fermentation Technology – Stanbury and Whitaker. Pergamon Press.
3. Industrial Microbiology – L. E. Casida Jr. John Wiley and Sons.
4. Microbial Technology, Volumes I & II – H. J. Peppler. Academic Press
5. A Compendium of Good Practices in Biotechnology – Biotol Series
6. Experimental Microbiology – R. J. Patel and K. R. Patel, Aditya Publishers, Ahmedabad
7. Isolation Methods for Microbiologists, Volumes I & II – Gibbs and Shapton. Academic Press
8. Quantitative Bioassay – D. Hancroft, T. Hector and F. Rowell. John Wiley & Sons for Analytical Chemistry by Opening Learning (ACOL) series.
1. Industrial Microbiology by A.H.Patel
2. Microbiology by Pelczar, Reid & Chan.

## **Semester : I**

### **Subject: Physics-Paper- I (Mechanics and Properties of matter)**

#### **UNIT-I**

- 1) Rotational motion : (5)  
Analogy of rotational motion with translational motion, Moment of inertia of a spherical shell, solid cylinder (only about axis of symmetry), Motion of spherical Shell and solid cylinder rolling down an inclined plane.
- 2) Pendulum : (4)  
Compound pendulum, Kater's pendulum, Bessel's formula, Bifilar pendulum.

#### **UNIT-II**

- 1) Motion under central force : (4)  
Newton's law of gravitation, Gravitational field and potential due to spherical shell and solid sphere.
- 2) Elasticity : (5)  
Bending of beam, Bending moment, Cantilever (without considering weight of cantilever), Beam supported at both the ends (without considering weight of beam).

#### **UNIT-III**

- Surface Tension : (9)  
Surface tension, Angle of contact and wettability, Relation between surface tension, excess of pressure and radius of curvature, Experimental determination of surface tension by Jaeger's method, Factors affecting surface tension, Applications of surface tension.

#### **UNIT-IV**

- 1) Fluid Dynamics : (4)

General concepts of fluid flow, Streamline and turbulent flow, the equation of continuity, Bernoulli's equation, its application to Venturimeter & thrust on a rocket.

2) Viscosity : (5)

Viscous fluids, Flow of liquid through capillary tube, Poiseuille's equation, Experimental determination of coefficient of viscosity of liquid by Poiseuille's method, effect of temperature and pressure on viscosity of liquid.

## Semester I

### Subject: Physics-Paper- II (Oscillations, Waves and Optics)

#### UNIT-I

Oscillations : (9)

Damped oscillations, case i) Overdamped ii) Critically damped and iii) Damped, forced oscillations, amplitude resonance and Q factor (statement only).

#### UNIT-II

1) Waves : (5)

Types of waves, Differential equation of progressive wave, Speed of longitudinal waves in a fluid, Group velocity and phase velocity.

2) Ultrasonic waves : (4)

Ultrasonics, Piezo-electric effect, Production- Piezo-electric method, Detection and applications.

#### UNIT-III

1) Geometrical optics : (6)

Aberration in images, Chromatic aberration, achromatic combination of two thin lenses separated by finite distance, Spherical aberration, methods to minimize it.

2) Optical instruments : (3)

Entrance and exit pupils, Common types of eyepieces, Huygen's eyepiece and Ramsden's eyepiece.

#### UNIT-IV

1) Interference : (6)

Interference in thin parallel films (reflected light only), Wedge shaped films, Newton's rings, its application for determination of wavelength of light.

2) Diffraction : (3)

Types of diffraction, Elementary theory of plane diffraction grating (qualitative treatment only).

#### Reference Books :

1. Physics – S.G. Starling and Woodal Longmans and Green Co. Ltd.
2. Elements of properties of matter – D.S. Mathur, Shamlal Charitable trust New Delhi.
3. A text Book of properties of matter – N.S. Khare and S. Kumar. Atmaram and sons New Delhi.
4. Physics Vol. I and Vol. II – David Halliday and Robert Resnik, Willey eastern Ltd, New Delhi.
5. Lectures in Physics Vol. I, II and III – Feynman, Leighton, Sands. B.I. publications, New Delhi.
6. Acoustics, Waves and Oscillations – S.N. Sen, Willey eastern Ltd, New Delhi.
7. Oscillations and Waves – D.P. Khandelwal.
8. Optics – B.K. Mathur.
9. Optics – Hecht, Zajak Addison, Wesley Publishing Company, London.
10. Sound by Khanna and Bedi. Atmaram and sons, New Delhi.

#### Reference Books :

1. Treaties on Heat – Saha and Shrivastav.
2. Kinetic Theory of gases – V.N. Kelkar.

3. Heat and Thermodynamics – Brijlal and Subramanyam S. Chand and Co. Ltd, Delhi.
4. University Physics -. Mechanics of particles – Anwar Kamal, New age International Ltd., Delhi.
5. Principles of Electronics by V.K. Mehata.
6. Electronic Principles by Malvino (T.MH. Publication).
7. Basic Electronics and Linear Circuits – Bhargava, Kurshrestha and Gupta, (T.MH. Publication).
8. Electricity and Magnetism – Khare and Shrivastav.
9. Foundations of Electromagnetic Theory – Rritz and Milford.
10. Electronic Devices and Circuits – Allan Mottershed.
11. University Physics 9<sup>th</sup> edition – Young and Freedman.

## **B.Sc Part -I SEMESTER-I**

### **PAPER-I**

### **DESCRIPTIVE STATISTICS-I**

#### **OBJECTIVES:**

The main objective of this course is to acquaint students with some basic concepts in statistics. They will be introduced to some elementary statistical methods of analysis of data and at the end of this course students are expected to be able,

- 1) To compute various measures of central tendencies, dispersion, moments, skewness, kurtosis and to interpret them.

#### **CONTENTS:**

##### **Unit-1. Introduction to Statistics and Nature of Data:**

**(10)**

- 1.1: Meaning of the word Statistics.
- 1.2: Scope of Statistics: In industry, Biological and Medical Sciences, Economics, Social and Management Sciences.
- 1.3: Statistical Organizations in India and their functions: CSO, NSS and ISI (Indian Statistical Institute).
- 1.4: Indian Statisticians and their contributions.
- 1.5: Meaning of primary and secondary data.
- 1.6: Qualitative data (Attributes): nominal scale and ordinal scale.  
Quantitative data (Variables): Interval scale and ratio scale, discrete and continuous variables, raw data.
- 1.7: Illustrative Examples.

##### **Unit-2. Measures of Central Tendency:**

**(12)**

- 2.1: Concept of central tendency of statistical data, Statistical average, Requirements of good statistical average.
- 2.2: **Arithmetic Mean (A.M)**: Definition, Effect of change of origin and scale, Deviation of observations from A.M., Mean of pooled data, Weighted A.M.
- 2.3: **Geometric Mean (G.M)**: Definition (for discrete data),  
Properties: i) G.M. of pooled data (for two groups),  
ii) G.M.of ratio of two series, is the ratio of their G.M<sup>s</sup>.
- 2.4: **Harmonic Mean (H.M.)**: Definition (for discrete data).
- 2.5: Relation:  $A.M. \geq G.M. \geq H.M.$  (proof for  $n=2$  positive observations).
- 2.6: **Median**: Definition, Derivation of formula for grouped frequency distribution.
- 2.7: **Mode**: Definition, Derivation of formula for grouped frequency distribution.
- 2.8: Empirical relation between Mean, Median and Mode.
- 2.9: Graphical method of determination of Median and Mode.
- 2.10: **Partition values**: Quartiles, Deciles and Percentiles, Graphical method of

determination of Partition values, Stem and leaf chart (plot).

2.11: Comparison between averages in accordance with requirements of good average.

2.12: Situations where one kind of average is preferable to others.

2.13: Examples to illustrate the concept.

### **Unit-3. Measures of Dispersion:**

**(12)**

3.1: Concept of dispersion, Absolute and Relative measures of dispersion, Requirements

of a good measure of dispersion.

3.2: **Range:** Definition, Coefficient of range.

3.3: **Quartile Deviation** (Semi-interquartile range): Definition, Coefficient of Q.D.

3.4: **Mean Deviation:** Definition, Coefficient of M.D., Minimal property of M.D.

3.5: **Mean Square Deviation:** Definition, Minimal property of M.S.D.

3.6: **Variance and Standard Deviation:** Definition, Effect of change of origin and scale,

S.D. of pooled data (proof for two groups).

3.7: **Coefficient of Variation:** Definition and use.

3.8: Comparison of S.D. with other measures.

3.9: Examples to illustrate the concept.

### **Unit-4. Moments, Skewness and Kurtosis:**

**(11)**

4.1: **Moments:** Raw moments ( $\mu_r'$ ) and Central moments ( $\mu_r$ ) for ungrouped and grouped data.

4.2: Effect of change of origin and scale on central moments, relation between central

moments and raw moments (up to 4<sup>th</sup> order).

4.3: Sheppard's corrections.

4.4: **Skewness:** Concept of skewness of a frequency distribution, Types of skewness.

4.5: Bowley's coefficient of skewness, Karl Pearson's coefficient of skewness, Measure

of skewness based on moments.

4.6: **Kurtosis:** Concept of kurtosis of a frequency distribution, Types of kurtosis.

4.7: Measure of kurtosis based on moments.

4.8: Illustrative Examples.

### **Books Recommended**

1. Bhat B. R., Srivenkatramana T. and Madhava Rao K. S. (1996): Statistics: A Beginner's Text, Vol. 1, New Age International (P) Ltd.
2. Croxton F. E., Cowden D.J. and Kelin S. (1973): Applied General Statistics, Prentice Hall of India.
3. Goon A.M., Gupta M.K., and Dasgupta B.: Fundamentals of Statistics Vol. I and II, World Press, Calcutta.
4. Gupta S. P. (2002): Statistical Methods, Sultan Chand and Sons, New Delhi.
5. Snedecor G.W. and Cochran W. G. (1967): Statistical Methods, Iowa State University Press.
6. Waiker and Lev.: Elementary Statistical Methods.
7. Thigale T. K and Dixit P. G. (2007): A Book of Paper-I for B. Sc.-I, Nirali Publication, Pune.

**B.Sc Part -I SEMESTER-I  
PAPER - II  
ELEMENTARY PROBABILITY THEORY**

**OBJECTIVES:**

The main objective of this course is to acquaint students with some basic concepts of probability, axiomatic theory of probability, concept of random variable, probability distribution (univariate and bivariate).

By the end of this course students are expected to be able,

- 1) To distinguish between random and non-random experiments.
- 2) To find the probabilities of the events.

**CONTENTS:**

**Unit-1. Sample space and Events:**

**(12)**

1.1: Concepts of experiments and random experiments.

1.2: Definitions: Sample space, Discrete sample space (finite and countably infinite),

Event, Elementary event, Compound event.

1.3: Algebra of events (Union, Intersection, Complementation).

1.4: Definitions of Mutually exclusive events, Exhaustive events, Impossible events,

Certain events.

1.5: Power set  $|P(\Omega)$  (sample space consisting at most 3 sample points).

1.6: Symbolic representation of given events and description of events in symbolic form.

1.7: Illustrative examples.

**Unit-2. Probability:**

**(13)**

2.1: Equally likely outcomes (events), apriori (classical) definition of probability of an

event. Equiprobable sample space, simple examples of computation of probability of

the events based on Permutations and Combinations.

2.2: Axiomatic definition of probability with reference to a finite and countably infinite

sample space.

2.3: Proof of the results:

i)  $P(\Phi) = 0$ ,

ii)  $P(A^c) = 1 - P(A)$ ,

iii)  $P(A \cup B) = P(A) + P(B) - P(A \cap B)$  (with proof) and its generalization (Statement only).

iv) If  $A \subset B$ ,  $P(A) \leq P(B)$ , v)  $0 \leq P(A \cap B) \leq P(A) \leq P(A \cup B) \leq P(A) + P(B)$ .

2.4: Illustrative examples based on results in (2.3) above.



### **Unit-3. Conditional Probability:**

**(10)**

- 3.1: Definition of conditional probability of an event.
- 3.2: Multiplication theorem for two events,  $P(A \cap B) = P(A) P(B / A)$ .
- 3.3: Partition of sample space.
- 3.4: Idea of Posteriori probability, Statement and proof of Baye's theorem, examples on Baye's theorem.
- 3.5: Elementary examples.

### **Unit-4. Independence of events:**

**(10)**

- 4.1: Concept of Independence of two events.
- 4.2: Proof of the result that if A and B are independent then, i) A and  $B^c$ , ii)  $A^c$  and B  
iii)  $A^c$  and  $B^c$  are independent.
- 4.3: Pairwise and Mutual Independence for three events.
- 4.4: Elementary examples.

### **Books Recommended:**

1. Bhat B. R., Srivenkatramana T and Madhava Rao K. S. (1997): Statistics: a Beginner's Text, Vol. II, New Age International (P) Ltd.
2. Edward P. J., Ford J. S. and Lin (1974): Probability for Statistical Decision-Making, Prentice Hall.
3. Goon A. M., Gupta M. K., Das Gupta B. (1999): Fundamentals of Statistics, Vol.II, World Press, Calcutta.
4. Mood A. m., Graybill F. A. and Boes D. C. (1974): Introduction to the Theory of Statistics, McGraw Hill.
5. Hogg R. V. and Crag R. G.: Introduction to Mathematical Statistics Ed.4.
6. Hoel P. G. (1971): Introduction to Mathematical Statistics, Asia Publishing House.
7. Meyer P. L. (1970): Introductory Probability and Statistical Applications, Addison Wesley.
8. Thigale T. K. and Dixit P.G. (2007): A Book of Paper-II for B. Sc.-I.
9. Rohatgi V. K. and Saleh A. K. Md. E. (2002): An Introduction to probability and statistics. John wiley & Sons (Asia)
10. Gputa V.K. & Kapoor S.C. Fundamentals of Mathematical Statistics.- Sultan & Chand

**Notes:** 1. In theory examination, the weightage to the numerical problems should not exceed 30%.

## **Books Recommended:**

1. Bhat B. R., Srivenkatramana T and Madhava Rao K. S. (1997): Statistics: a Beginner's Text, Vol. II, New Age International (P) Ltd.
2. Edward P. J., Ford J. S. and Lin (1974): Probability for Statistical Decision-Making, Prentice Hall.
3. Goon A. M., Gupta M. K., Das Gupta B. (1999): Fundamentals of Statistics, Vol.II, World Press, Calcutta.
4. Mood A. m., Graybill F. A. and Boes D. C. (1974): Introduction to the Theory of Statistics, McGraw Hill.
5. Hogg R. V. and Crag R. G.: Introduction to Mathematical Statistics Ed.4.
6. Hoel P. G. (1971): Introduction to Mathematical Statistics, Asia Publishing House.
7. Meyer P. L. (1970): Introductory Probability and Statistical Applications, Addison Wesley.
8. Thigale T. K. and Dixit P.G. (2007): A Book of Paper-II for B. Sc.-I.
9. Rohatgi V. K. and Saleh A. K. Md. E. (2002): An Introduction to probability and statistics. John wiley & Sons (Asia)

**Notes:** 1. In theory examination, the weightage to the numerical problems should not exceed 30%.

## **B.Sc Part -I SEMESTER-I Zoology**

### **Paper –I**

#### **TITLE OF PAPER - (Animal Diversity –I)**

**A) Lectures / Contact hours per unit – 10**

**B) Contact hours per practical – 04**

#### **UNIT – I**

1) Principles of Classification (Five Kingdom Method) Salient features and classification up to classes with suitable examples of Kingdom Protista and Kingdom Animalia with reference to Phyla –Porifera, Coelenterata, Platyhelminthes, Nematelminthes and Annelida. 5

2) Protista – Type Study – Paramecium 7

a) Morphology

b) Locomotion

c) Nutrition

d) Osmoregulation

e) Reproduction (Binary fission and conjugation)

#### **UNIT – II**

1) Porifera – Type Study – Sycon 4

a) Morphology

b) Cell types

c) Canal System	
2) Coelenterata – Type Study – Hydra	5
a) Morphology	
b) Locomotion	
c) Nutrition	
d) Reproduction	
<b>UNIT – III</b>	
1) Platyhelminthes – I) Type Study – Tape worm	2
a) Morphology	
b) Parasitic adaptations	
II) Type Study – Ascaris	7
a) Morphology	
b) Digestive system	
c) Excretory system	
d) Reproductive system	
e) Life cycle	
f) Parasitic adaptations	
<b>UNIT – IV</b>	
2) Annelida – Type study – Earthworm	8
a) Coelom	
b) Circulatory system	
c) Excretory system	
d) Nervous system	

**Total Periods: 38**

**B.Sc Part -I SEMESTER-I**  
**Paper –II**  
**Cell Biology and Genetics**

<b>UNIT – I</b>	
1) Cell theory and diversity in cell size and shape	2
2) Methods in Cell Biology –	2
a) Light microscopy, b) Electron microscopy	
3) Nuclear and extra nuclear organization of the cell.	
a) Nucleus with reference to Nuclear membrane, Nucleoplasm, Chromatin and nucleolus.	4
b) Chromosome with reference to Morphology and organization (solenoid model) Polytene Chromosomes.	2
<b>UNIT – II</b>	
1) Ultra structure and functions of the following.	
i) Plasma membrane (Fluid Mosaic Model)	2
ii) Mitochondria	2
iii) Endoplasmic reticulum	2
iv) Golgi complex	2
v) Lysosome	2
<b>UNIT – III</b>	
1) Ultra structure and functions of the following.	
vi) Cyto-skeleton – Microtubules	1
vii) Ribosomes	2
viii) Peroxisomes	1
ix) Annuulated lamellae	1
2) Mendelian Principles	4
a) Principle of unit characters	
b) Principle of dominance (Monohybrid cross)	
c) Principle of segregation (Monohybrid cross)	
d) Principle of independent assortment (Dihybrid cross)	
<b>UNIT –IV</b>	
1) Co-dominance and Incomplete Dominance	3

- 2) Multiple alleles - Coat colour in Rabbit and ABO blood group system 3  
 3) Human genetics 3  
 a) Phenylketonuria  
 b) Genetic counseling

**Total Periods: 38**

**List of Recommended Books:**

- 1) Hyman, L. H. – The invertebrates, Vol. I (McGraw Hill)
- 2) Hyman L.H. – The invertebrates, Vo. II (McGraw Hill)
- 3) Barnes R. D. – Invertebrate Zoology (W.B. Saunders Co.)
- 4) Pearse / Buchschaum – Living invertebrates, Blackwell Scientific Publications, California
- 5) Parker and Haswell – A Text Book of Zoology – Invertebrates Vol. I Edited by Marshall and Williams, C.B.S. Publishers and Distributors, New Delhi.
- 6) P. S. Dhami and J.K. Dhami – Invertebrates, S. Chand and Company. New Delhi
- 7) De Robertis EDP and De Robertis EME – Cell and Molecular Biology
- 8) C.B. Powar – Cell Biology, Himalaya Pub. House
- 9) Verma P. S. and Agarwal V. K. – Genetics, S. Chand and Company
- 10) Strickberger – Genetics. C Millian Publications
- 11) Winchester – Genetics, Oxford Publication
- 12) Cell Biology – Dr. N. Arumugam
- 13) Genetics by P.P. Meyyan
- 14) A Text Book of Invertebrates – N. C. Nair, N. Soundara Pandian, S. Leelavathy, T. Murugan
- 15) R. L. Kotpal – Modern Text Book of Zoology, Invertebrates
- 16) E. L. Jordan & P. S. Varma – Invertebrate Zoology
- 17) P. S. Varma & V. K. Agarwal – Cell Biology, Genetics, Molecular Biology, Evolution and Ecology
- 18) R. P. Meyyan, N, Arumugam – Genetics & Evolution
- 19) P. K. Gupta – Cell and Molecular Biology

**B.Sc Part -I SEMESTER-I  
 , Biotechnology (Optional/Vocational)**

**BTO-101 (Paper-I)  
 Basics for Biotechnology**

<b>Topic No.</b>		<b>Lectures 45</b>
<b>1</b>	<b>Unit-I</b> <b>Biotechnology an overview:-</b> Origin & definition, historical background, scope & importance of biotechnology, branches of biotechnology, biotechnology in India <b>Chemistry of living cell:-</b> Cell & its components, Various classes of biological molecules& functions, chemicals inside the cell-large & small molecules.	<b>11</b>
<b>2</b>	<b>Unit- II</b> <b>Origin of life:-</b> Origin of amino acids, nucleotides, Urey Miller’s experiment, unicellular organisms, multicellular organisms, concept of biomolecules, polymerization, formation of polymer (Protein), molecular interactions of biological functions. <b>Amino acid &amp; Protein:-</b> Structural classification of amino acids based on R side chain, structural levels of proteins, classification of proteins based on composition, functions of proteins.	<b>11</b>

<b>3</b>	<b>Unit- III</b> <b>Carbohydrates:-</b> General classification of carbohydrates, structural classification of monosaccharides, ring formation in monosaccharides, mutarotation , oligosaccharide glycosidic bond, disaccharides (sucrose, maltose, lactose), polysaccharides (e.g. starch, glycogen, cellulose, heparin, pectin), biological functions of carbohydrates. <b>Molecules involved in generation of Mechanical Stability:-</b> Peptidoglycan, Polysaccharide ( Cellulose in plant) , Membrane lipid, Defination of lipid. Examples of membrane lipids Phospholipids, Sphingolipid.	<b>12</b>
<b>4</b>	<b>Unit- IV</b> <b>Microscopes:-</b> Concepts, resolving power, chromatic and achromatic aberrations construction & working of compound light microscope & electron microscope. <b>Spectroscopy:-</b> Lambert-Beer's law principle, construction & working of colorimeter, spectrophotometer. <b>Physical methods to find out molecular structure:-</b> NMR & X-ray crystallography.	<b>11</b>

**Reference Books:-**

- 1) Text book of biotechnology- Pradip parihar student ed. Jodpur (2004)
- 2) Biotechnology expanding horizons- B. D. Singh, Kalyani Publisher
- 3) Elements of biotechnology- P. K. Gupta, Rastogi publications.
- 4) Biotechnology- V. Kumarsan, Saras publication.
- 5) A text book of biological chemistry- M. S.Yadav, Dominant publishers.
- 6) Biophysics- Pattabhi & Gautam Narosa publishing house
- 7) Outline of biochemistry- Conn & Stumph
- 8) Principles of Biochemistry- Jeffory, Zubey
- 9) Biochemistry- Lubert Stryer

**BTO-102 (Paper-II)**  
**Mathematics, Biostatistics and Computers**

<b>Topic. No.</b>		<b>Lectures 45</b>
<b>1</b>	<b>Unit –I</b> <b>Maths:-</b> <b>Sets:-</b> Definition, subset, union, intersection, Venn Diagrams, complement of a set, universal set, distributive laws & De Morgan's law (Verification by simple examples no proof is expected product of sets) <b>Functions:-</b> Definition graphs of 1) linear function 2) power function 3) quadratic function 4) periodic function 5) exponential function. Use of logarithms for simple problems (Without log tables). Binomial theorem (Without proof) – Simple examples.	<b>11</b>
<b>2</b>	<b>Unit- II</b> <b>Limits of a function:-</b> Concept of limit, limit of function at a point, simple algebraic limits. <b>Derivative/Differentiation-</b> Derivative of simple algebraic functions. Derivatives of standard trigonometric & logarithmic functions (without proof), addition rules, subtraction rules, product rule (Treatments only) <b>Integration:-</b> Integration as antidifferentiation, problems involving simple polynomial functions.	<b>11</b>
	<b>Unit- III</b>	

3	<p><b>Biostatistics:-</b>  <b>Probability:-</b> Random experiment, sample space, event, probability of an event, axioms of probability.  <b>Measures of central tendencies:-</b> Mean, calculation of mean of ungrouped &amp; grouped data, mode &amp; median of ungrouped data. Measures of deviation, mean deviation &amp; standard deviation (For ungrouped data)  <b>Sampling:-</b> Types of sampling- purposive sampling, random sampling, simple sampling &amp; stratified sampling.</p>	12
4	<p><b>Unit- IV</b></p> <p><b>Computers:-</b>  <b>General introduction:-</b> Organization of computers, digital &amp; analogue computers.  <b>Computer algorithm</b>  <b>Fundamentals of Computer Operations</b>  i) Basic operations ii) Preliminary study of M. S. Office.  <b>Fundamentals of Control Systems</b>  i) Off-line control  ii) On-line control  iii) Sensing of system parameters.  iv) Control systems parameters using computers.  <b>Applications</b> of computers in co-ordinations of solute concentration, pH, temperature etc. of a fermenter in operation.</p> <p><b>Introduction to Bioinformatics.</b></p>	11

**Reference Books:-**

- 1) Introduction to mathematics for life science- E. Batschelet, Narosa publishing house New Delhi, 1975 (IIInd Edition)
- 2) Fundamentals of mathematical statistics- S. C. Gupta & V. K. Kapur, S. Chand Publication
- 3) Fundamentals of control systems- Ogata
- 4) Bioinformatics- A Beginner's guide- Jean Michel Claverie
- 5) Introduction to bioinformatics- T.K. Attwood.
- 6) Organisation of computer -Zacks

**B.Sc Part -I SEMESTER-I**  
**Computer Science. Semester-I**  
**Modern Operating Environment**  
**Paper –I**

Unit-I Introduction	10
Characteristics of computer , Generations , Basic computer organization Number systems-Decimal Binary , Octal , Hexa decimal , computer codes. Memory- Primary storage , Rom , Ram , PROM , EPROM Secondary storage – Floppy , Hard Disk , Cd's Input-Output Devices – Scanner , Plotter , printers , Computer Languages- Machine , Assembly , High-Level language , Compiler , Interpreter.	
Unit-II Operating System	10
Definition , Features of OS, Components of the OS software Types of Operating system –Single user , multi user , multitasking and background processing. DOS commands , Difference between DOS and Windows Operating system.	
Unit-III Graphical User Interface ( GUI)	10

Windows Operating system, Basic components of GUI system - Desktop, Windows , Menu Bar , Menu option , Dialog Boxes , List box , Text box.  
Examples – Windows NT , Unix/Linux , OS/2  
Starting Windows – Desktop, icons, Start button , Windows Explorer , Copying , Moving , Deleting files and folders, Taskbar, Exit from Window  
Introduction to MS-WORD and MS-EXCEL.

Unit-IV Computer Networks 10

Network topologies –star , ring , completely connected , hybrid, multipoint local area network and Wide Area network, Communication protocol , OSI model, Layering OSI.

#### Reference Books-

Computer Fundamentals – P. K. Sinha

Computer fundamentals - Rajaraman

Windows reference book- Microsoft

Introduction to Computer and Data Processing- Pawar, Lad, Shinde, Patil (Dreamtech)

#### Practical Based On Paper-I

1. Use of DOS commands – Internal- Dir , copy , rename , erase , date , time etc. External- Chkdsk , format , edlin etc
2. Starting Windows , Crating a new folder , change name of the folder, Creating text files in note pad and store in appropriate folder, copy ,move , delete files.
3. Getting information of Hard disk space in terms of free space and occupied space , find a file , setting the desktops background , Handling Recycle bin- restore files and folders , emptying .
4. Task bar- Getting time on taskbar , open number of applications on the taskbar and switching between applications
5. Creating , saving and printing the documents using MS-WORD
6. Creating simple worksheets using MS-EXCEL>

### **Paper-II Introduction to Programming**

Unit-I Problem Solving On Computer (7)

- a. Formulation of the problem- input, output, processing steps
- b. Algorithm – Definition , characteristics , Developing algorithm
- c. Flowchart – Definition , flowchart symbols , Drawing flowcharts
- d. Program development and execution of a program- What is coding , Role of an algorithm and flowcharts in program development , Process of execution , debug , syntactical and executional errors.

Unit-II Introduction to 'C' (8)

- a. History of 'C' , Importance of 'C' , Basic structure of 'C' program character set , keywords , identifiers , constants , variables , data types symbolic constants
- b. Operators-Arithmetic, logical, assignment , increment and decrement , conditional , bit wise , special.
- c. Input-output operations – Formatted ( scanf(), printf() ) and Unformatted – reading and writing characters..

Unit-III Branching and Looping (12)

- a. Conditional Branching - if , if-else . switch statement
  - b. Unconditional Branching- Forward and back word jump using goto statement
- a. Looping-while , do while , for , nested loops
  - b. Breaking control statements – break , continue , goto , exit statement.

Unit-IV Arrays (13)

- a. Definition and use of array, declaration and initialization of one dimensional array, handling one dimensional array.
- b. Multidimensional array- Declaration and initializing two dimensional array
- c. Character arrays and strings –Declaration and initializing string variables, reading and writing strings – gets , puts , string handling functions , Table of string.

Reference Books-

Programming in ANSI C 4E E Balagurusamy McGraw-HILL

Let Us C – Yashwant Kanetkar

Programing in C – Schuam outline Series

Programming with C by D Ravichandran.

Introduction to Programming Using C- A. J Pawar, R. A. Lad, S. S. Shinde, D. R. Patil(Wiley-Dreamtech)

Practicals Based on Paper-II

1. Writing the algorithms and Developing flowcharts
2. Simple programs ( Using Scanf() , Printf() , Use of various format specifiers and non graphic characters for formatted outputs).
3. Program demonstrating conditional branching ( Using if , switch )
4. Programs on loops ( while , do while , for )
- 5 . Programs based on breaking control statements and unconditional branching .  
( Use of break , continue and go to )
6. Programs based on one dimensional ( Searching ,  
and sorting )
7. Programs on string handling ( Use of gets() , puts() , strlen() , strrev() , strcat())
- 8 . Demonstration of declaration , initializing and use of pointers.
9. Programs on Pointer to array
10. Program to demonstrate use of Two dimensional arrays ( Matrix handling).