List of Subject for B.Sc.Part-I as per Semester System (Paper wise)

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

		Paper – IV Seed Production			
	B.Sc. Part-I Chemistry	**SEMESTER – I Paper – I (Physical and Inorganic Chemistry)**	40	10	50
		Paper – II (Organic and Inorganic Chemistry)	40	10	....
		SEMESTER – II Paper – I (Physical and Inorganic Chemistry)	40	10	....
		Paper – II (Organic and Inorganic Chemistry)	40	10	....
	B. Sc. I – Electronics	**SEMESTER – I** Paper I – Basic Electronics.	40	10	50
		SEMESTER – I Paper-II Electronic Devices	40	10	....
		SEMESTER – II Paper III – Digital Electronics-I	40	10	....
		SEMESTER – II Paper IV – Digital Electronics-II	40	10	....
	B.Sc .I Geography	Semester-I Paper-I :Physical Geography	40	10	50
		Semester-I Paper-II :Geomorphology	40	10	....
		Semester-II Paper-III :Climatology	40	10	....
		Semester-II Paper-IV :Oceanography	40	10	....
	B.Sc .I Geology	**Semester I Paper I –** General Geology	40	10	50

		Semester I **Paper II –** Mineral and Crystallography	40	10	....
		Semester II **Paper III –** Physical Geology	40	10	....
		Semester II **Paper IV –** Petrology	40	10	....
B.Sc.Part–I **MATHEMATICS**		(SEMESTER –I) **Paper – I** **(ALGEBRA**	40	10	50
		(SEMESTER –I) **Paper – II** **CALCULUS**	40	10	....
		SEMESTER–II **Paper – III** **GEOMETRY**	40	10	....
		Paper – IV **DIFFERENTIAL** **EQUATIONS**	40	10	....
	B.Sc.Part – I : Microbiology	**Semester I** **Paper I** **Fundamentals of** **Microbiology**	40	10	50
		Semester I **Paper II :** **Basic Microbial** **Techniques &** **Biochemistry**	40	10	....
		Semester II **Paper III**	40	10	....

		...al **Microbiology, Microbial Techniques and Bioinstrumentation.**			
		Semester II **Paper IV :** **Applied Microbiology**	40	10	....
	B.Sc.Part – I : Industrial Microbiology	**Semester I** **Paper I :** **Fundamentals of Industrial Microbiology**	40	10	50
		Semester I **Paper II :** **Basics of Fermentation.**	40	10	....
		Semester II **Paper III :** **Fermenter Design & Instrumentation**	40	10	....
		Semester II **Paper IV :** **Fermentation Techniques**	40	10	....
	B.Sc. Part-I Physics	**SEMESTER I** Paper I – Mechanics and Properties of matter	40	10	50
	.	**SEMESTER I** Paper- II - Oscillations, Waves and Optics	40	10	....
		SEMESTER II Paper III : Kinetic	40	10	....

		theory of gases, Heat and Thermodynamics.			
		SEMESTER II Paper IV : Electricity, Magnetism and Basic Electronics	40	10	....
B.Sc. Part-I **STATISTICS**		**SEMESTER-I PAPER-I DESCRIPTIVE STATISTICS-I**	40	10	50
		SEMESTER-I PAPER-II: ELEMENTARY PROBABITITY THEORY	40	10	....
		SEMESTER-II PAPER-III DESCRIPTIVE STATISTICS-II	40	10	....
B.Sc. I Zoology		Semester-I- Paper I - Animal Diversity-I	40	10	50
		Semester- I- Paper- II - Cell Biology, Genetics	40	10	....
		Semester-II- Paper I- Animal Diversity-II	40	10	....
		Semester-II-Paper-II- Ecology, Ethology, Evolution and Applied Zoology	40	10	....
B. Sc. Part-I BIOTECHNOLOGY (ENTIRE)		Semester- I- Physical and Inorganic Chemistry	40	10	....

		Semester- I- Basics in Physics	40	10	....
		Semester- I- Plant Science	40	10	....
		Semester- I- Mathematical Methods	40	10	....
		Semester- I- Biomolecules	40	10	....
		Semester- I- Basics in Cell Biology	40	10	....
		Semester- I- Basics in Microbiology			
		Semester- I- Computer Basics and Bioinformatics	40	10	....
		*Practical Techniques in Chemistry	....	....	50
		*Practical Laboratory Exercises in Microbiology	....	....	50
		*Practical Laboratory Exercises in Plant Science	....	....	50
		*Practical Methods in Mathematics and Statistics	....	....	50
		Semester- II- Organic and Inorganic Chemistry	40	10	....
		Semester- II- Applied Physics	40	10	....
		Semester- II- Animal Science	40	10	....
		Semester- II- Statistical Methods	40	10	....
		Semester- II- Proteins and Enzymes	40	10	....
		Semester- II- Advances in Cell Biology	40	10	....
		Semester- II- Techniques in Microbiology	40	10	....

		Semester- II- Computer Programming	40	10	....
		*Practical Techniques in Biochemistry	....	....	50
		*Practical Laboratory Exercises in Cell Biology	....	....	50
		*Practical Laboratory Exercises in Animal Science	....	....	50
		*Practical Computer Applications in Biology	....	....	50
	B. Sc. Part-I BIOTECHNOLOGY OPTIONAL/VOCATIONAL	Semester- I- Basics for Biotechnology	40	10	....
		Semester- I- Mathematics, Biostatistics and Computers	40	10	....
		Semester- II- Cell Biology and Genetics	40	10	....
		Semester- II- Microbiology	40	10	....
	B. Sc. I BIOINFORMATICS	Semester- I- Physical and Inorganic Chemistry	40	10	....
		Semester- I- Basics in Physics	40	10	....
		Semester- I- Plant Science	40	10	....
		Semester- I- Mathematical Methods	40	10	....
		Semester- I- Computer Fundamentals	40	10	....
		Semester- I- Basics in Cell Biology	40	10	....
		Semester- I- Basics in Microbiology	40	10	....

		Semester- I-Introduction to Bioinformatics	....	....	50
		Practical on Botany and Microbiology	....	....	50
		Practical on Chemistry	....	....	50
		Practical Bioinformatics practical	....	....	50
		Practical on Computer Science	....	....	50
		Semester- II- Organic and Inorganic Chemistry	40	10	....
		Semester- II- Applied Physics	40	10	....
		Semester- II- Animal Science	40	10	....
		Semester- II- Statistical Methods	40	10	....
		Semester- II- Proteins and Enzymes	40	10	....
		Semester- II- Database programming languages	40	10	....
		Semester- II- Techniques in Microbiology	40	10	....
		Semester- II- Programming concept and C-language	40	10	....
		Practical on Zoology and Microbiology	....	....	50
		Practical on Biochemistry.	....	....	50
		Biostatistics practical	....	....	50
		Practical on Mathematics	....	....	50
	B.Sc. I Computer Science	**Semester-I** **Paper-I** Modern Operating Environment	40	10	50

		Semester-I **Paper-II** Introduction to programming			
		Semester-II Paper-III Fundamentals of Databases	40	10	....
		Semester-II Paper-IV Procedure Oriented Programming through 'C'	40	10	....
	B.Sc. I Informatiion Technology Entire	**Semester-I** Modern Operating Environment-Part-I	40	10	....
		Semester-I Programming through 'C'-Part-I	40	10	....
		Semester-I File and data structure-Part-I	40	10	....
		Semester-I Digital Electronics Part-I	40	10	....
		Semester-I Foundation of Mathematics (Matrices & Calculus) Part-I	40	10	....
		Semester-I Business Communication Part-I	40	10	....
		Semester-II Modern Operating Environment-Part-II	40	10	....
		Semester-II Programming through 'C'-Part-II	40	10	....
		Semester-II File and data structure-Part-II	40	10	....
		Semester-II Digital Electronics Part-II	40	10	....
		Semester-II Foundation of Mathematics	40	10	....

		(Numerical Methods) Part-II			
		Semester-II Business Communication Part-II	40	10	....
		Practical Lab Course- Based on paper-1.1,1.2,2.1,2.2,and 3.1,3.2	....	....	100
		Practical Lab Course-IV- Project and Viva	....	....	100

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<div align="center">
B.Sc. Part I: ENGLISH (Compulsory)
English for Communication
(Syllabus for Semester Pattern from June, 2010)
SEMESTER: II
Section I :- Communication Skills
</div>

Unit 4   :   **Telephonic and E-mail communication.**
Unit 5   :   **Making Notes.**
Unit 6   :   **Information Transfer.**

<div align="center">
Section II :- Reading Comprehension Skill
</div>

Unit 11   :   **Public Attitude towards Science -Stephen Hawking**
Unit 12   :   **Smart Village : Hansdehar   -Archana Binbusar**
Unit 13   :   **Entertainment   -Nissim Ezekiel**
Unit 14   :   **Parachute   -Lenrie Peters**
Unit 15   :   **Argument with God   -Y. S. Chemba**

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Syllabus of B.Sc. - I - BOTANY

SEMESTER II
</div>

Paper I : Diversity and classification of Plants (Vascular Plants)   40

Unit – 1. Pteridophytes   13

    Sub-unit 1.1 Classification (as per G.M. Smith) and salient features.   02

    Sub-unit 1.2 Comparative study of following types with respect to

        external morphology, anatomy, reproduction and interrelationships   10

        a.Psilopsida : *Psilotum*

        b. Lycopsida : *Selaginella*

        c. Sphenopsida : *Equisetum*

        d. Pteropsida : *Pteris*

    Sub-unit 1.3 Heterospory and seed habit.   01

Unit – 2. Gymnosperms   **12**

    Sub-unit 2.1 Classification (as per Sporne, 1965), salient features and

        economic importance.   02

    Sub-unit 2.2 Evolutionary significance.   02

    Sub-unit 2.3 Comparative study of the following types with respect

        to external morphology, stem anatomy, reproduction

        and interrelationships :   08

          a. Cycadales – *Cycas*

          b. Coniferales – *Pinus*

          c. Gnetales - *Gnetum*

Unit – 3. Angiosperms   **15**

    Sub-unit 3.1 Salient features of Angiosperms   01

    Sub-unit 3.2 Primitive and Advanced Features of Flower.   02

    Sub-unit 3.3 Importance and Functions of taxonomy, study of Bentham

        and Hooker's system of classification: outline, up to order level

        merits and demerits.   03

    Sub-unit 3.4 Salient features of International Code of Botanical

        Nomenclature (ICBN).   02

    Sub-unit 3.5 General account of morphology of Root, Stem, Leaf,

        Inflorescence and Flower.   07

Paper II - Cell Biology   **40**

Unit 1 - The Cell and Cell Division.   **12**

    Sub-unit 1.1 Account of prokaryotic and eukaryotic cell.   02

    Sub-unit 1.2 Characteristics of archae bacteria and mycoplasma. 03

    Sub-unit 1.3 Meiosis - Various stages in progression, and significance. 03

    Sub-unit 1.4 Role of centromere (kinetochore) and spindle apparatus. 02

    Sub-unit 1.5 Mechanism of cell cycle and apoptosis.   02

Unit 2 - Nucleus and Ribosomes.   **10**

    Sub-unit 2.1 Ultrrastructure, nuclear envelope, nuclear pore complex,

        nuclear matrix and nucleoplasm.   03

Sub-unit 2.2 DNA and his tones, nucleosome and higher level of organization.   03

Sub-unit 2.3 Role of telomere.   01

Sub-unit 2.4 Structure of, prokaryotic and eukaryotic ribosomes and

      their functional significance.   03

Unit 3 - Mitochondria and chloroplast.   **06**

      Sub-unit 3.1 Mitochondria - Origin, structure, biogenesis and organization

        of macromolecular complexes, variation in size, shape and number.   03

      Sub-unit 3.2 Chloroplast - Origin, structure, biogenesis and organization

        of macromolecular complex, variation in size, shape and number,

        and types of plastids.   03

Unit 4 - Sub-cellular structures and Cell Membrane.   **12**

      Sub-unit 4.1 Golgi complex.   02

      Sub-unit 4.2 Endoplasmic Reticulum.   02

      Sub-unit 4.3 Lysosomes.   01

      Sub-unit 4.4 Microbodies - Peroxisomes and glyoxysomes and cytoskeleton.   04

      Sub-unit 4.5 Models of cell membrane organization.   03

Details of Practical Examination

A) Every candidate must produce a certificate- from Head of the Dept. in his ∕ her college, stating that he ∕ she has completed practical course in satisfactory manner as per guidelines laid down by Academic Council on the recommendations of Board of Studies in Botany. The student should record his ∕ her observations and report of each experiment should be written in the journal.

The journal is to be signed periodically by teacher in charge and certified by the Head of the Department at the end of year. Candidates have to produce their certificate journal and tour report at the time of practical examination. Candidate is not "allowed to appear" for the practical examination without a certified journal / a certificate from Head of the Botany Dept. regarding the same.

B) Practical Examination shall be of Five hours duration and shall test a candidate in respect of the following.

1. Practical study of external and internal structures of different plant types and their classification. Making temporary stained preparations and identification.

2. Identification and setting of physiological and biochemical experiments.

3. Study of plant families as per syllabus,

4. Spotting of the specimens as per syllabus.

Botanical Excursions

One teacher along with a batch not more than 20 students be taken for botanical excursion to places of Botanical interest, one in each term. If there are female students in a batch of twenty students, one additional lady teacher is permissible for excursion. Each excursion will not be more than three days during college working days. T.A. and D.A. for teachers and non-teaching staff participating in excursions should be paid as per rules. Tour report duly certified by teacher concerned and Head of the Department should be submitted at the time of practical examination.

Practical Course

B. Sc. I Botany Practical course is to be covered in twenty eight practicals. These practicals are to be performed by the students. Each practical is to be supplemented by permanent slides preserved / fresh specimens / materials, charts, herbarium sheets wherever necessary.

List of Practicals

Practicals based on Paper I and II of both the semesters

Study of prokaryotic organisms

1) Bacterial types (P. S.) or Mycoplasmal diseases

    Blue-green algae - *Nostoc* and *Oscillatoria.*

Study of Eucaryotic organisms.

2) Study of *Oedogonium*

3) Study of *Sargassum*

4) Study of *Polysiphonia*

5) Study of *Mucor* and *Aspergillus*

6) Study of *Puccinia* (only wheat rust) and *Cercospora.*

7) Study of *Riccia.*

8) Study of *Anthoceros* and *Funaria.*

9) Study of *Selaginella.*

10) Study of *Pteris and Equisetum*

11) Study of *Cycas.* (only morphology)

12) Study of *Pinus.* (only morphology)

13) Study of *Gnetum* (only morphology).

14) Study of different types of fossils.

15) Primitive *(Michelia/AnnonalLotus)* and advanced *(Sunflower/Ocimum/Clitoria/* Pea*)* characters of Flower

16) Study of Caesalpinaceae. (no floral diagram)

17) Study of Solanaceae. (no floral diagram)

18) Study of Euphorbiaceae. (no floral diagram)

19) Study of Amaryllidaceae. (no floral diagram)

20) Study of cell structure of Onion, *Hydrilla* and *Spirogyra.*

21) Study of plastids to examine pigment distribution in flower of *Cassia* and fruit of

Lycopersicum or *Capsicum.*

22) Study of electron micrographs of Eukaryotic cell with special reference to organelles.

23) Preparation of phosphate buffer, and measurement of pH of prepared buffer by any

suitable method.

24) Use of dialysis to separate smaller molecules from larger molecules.

25) Study of enzyme activity of Catalase, and Dehydrogenase.

26) Effect of pH and temperature on any suitable enzyme

27) Study of mitosis in onion root tips/ any other suitable plant material.

28) Separation of plant pigments by TLC.

Important Note : Major stress should be given on reproductive characters/features in respect of the plant types.

Distribution of Marks for B. Sc. I BOTANY Practicals

Sr. No.	Name of the Topic	Marks
1	Bacteria / MLO	2
2	Algae and Fungi	6
3	Bryophytes and Pteridophyes	6
4	Gymnosperms	4
5	Paleobotany	2
6	Cytology	7
7	Angiosperms	6
8	Physiology and biochemistry	7
9	Journal	5
10	Tour Report	5

Reference Books

Paper - I

A Hand book of Lichens -   D. D. Awasthi (2000)

A Text book of Algae -   Chopra G. L. (1969)

A Text book of Algae -   Kumar H. D., Singh H. N. (1977)

A Text book of Botany -   V. Singh, P. C. Pandey, Jain D. K. (1999)

A Text book of Botany Vol. I –   Pandey S. N., S. P. Misra, P. S. Trivedi (1.982)

A Text book of Pteridophyte –   S. N. Pandey, P. 5. Trivedi, S. P. Misra (1995)

A Treatise on Algae -   K. N. Bhatia (1980)

An Introduction to Embryophyta -   Parihar N. S. (1961)

An Introduction to Fungi -   Dube H. C. (1990

An Introduction to Pala!eobotany -   Andrews H. N. (1961)

An Introduction to Palaeobotany -   Arnold C. A. (1972)

An Introduction to Pteridophytes -   Rashid A. (1978)

An Introduction to Pteridophyta (Diversity and Differentiation) -A.Rashid (1976)

Algae -   Kumar H. D. and H. N. Singh (1991)

Algae -   Sharma O. P. (1986)

Algae -   Pandey B. P. (1994)

Anatomy of Seed Plants -   Esau K. (1964)

Biodiversity of Plants (Floristic Aspects) -   Rao R. R. (1980)

Biodiversity Principles and Conservation -   Kumar U. (2002)

Biology of Lichens -   Hale M. E. Jr. (1967)

College Botany -   S. Sundararajan (1999)

College Botany Vol. I -   Gangulee H. c., Dos K. S. and Datta C. T. (1991)

College Botany Vol. II -   Gangulee H. C., Ka:: A. K. (1999)

College Botany Vol. III   S. K. Mukarji (1990)

Cryptogamic Botany Vol. I-   G. M. Smith (1955)

Cryptogamic Botany Vol. I - Algae and Fungi -   G. M. Smith (1974)

Cryptogamic Botany: Bryophytes and Pteridophytes -   Smith G. C. (1955)

Evolution and Classification of Flowering Plants-   Cronquist A. (1968)

Flowering Plants and Their Evolution -   Ronold G. (2003)

Fundamentals of Phycology -   Khan M. (1970)

Fungi-   Vashishtha B. K. (1996)

Gymnosperms- Chamberlein (1966)

Illustrated Manual of Ferns of Assam -

S. K. Borthakur, P. Deka, K. K. Nath (2000)

Indian Gymnosperms in Time and Space - Ramanujan C. G. K. (1979)

Introduction to Bacteria - Cliffon A. (1985)

Introductory Botany - A. Bendre, Pandey P. C. (1999)

Introduction to Fungi - Sundrarajan (2001)

Introductory Mycology - C. J. Alexopoulos, C. W. Mims, M. Blackwell

Introduction to Plant Anatomy - Eames and Macdeniels

Introductory Phycology - Kumar N. D. (1990)

Manual of Phycology - An Introduction to the algae

and their biology – Smith G. M. (1994)

Morphology of Angiosperms - Eames A. J. (1961)

Morphology and Evolution of Vascular Plants –

Gifford E. M., Foster A. S. (1989)

Morophology of Gymnosperms - Sporne K. R. (1967)

Morphology of Gymnosperms - Coulter and Chamberlein (1978)

Morphology of Pteridophytes - Sporne K. R. (1966)

Origin and Evolution of Gymnosperms - Ed Charles B. Beck (2002)

Phylogeny and form in the plant Kingdom - H. C. Dittmer (1964)

Plant Diversity and Conservation in India – An Overview, H. J. Chowdhery, S K. Murti (2000)

Plant Groups H. Mukherji (1990)

Plant Taxonomy - Benson L. (1962)

Pteridophyta – Vascular Cryptogams - P. C. Vashishtha (1972)

Principles of Angiosperm Taxonomy – Davis P. H., Heywood V. M. (1963)

Structure and Reproduction in Gymnosperms – Chamberlein (1935)

Studies in Palaeobotany - Andrews H. H. (1961)

Taxonomy of Angiosperms - V. Singh, D. K. Jain (1987)

Taxonomy of Vasular Plants – Mcmillan N. Y., Lawerence G. H. M. (1951)

Text Book of Botany "Diversity of Microbes and Cryptogams –

V. Singh, P. C. Pandey, Jain D. K. (2003-04)

Text Book of Fungi - O. P. Sharma (2002)

Text Book of Fungi - J. S. Gupta (1981)

The Algae - Chapman V. J. (1970)

The Fungi -   Sharma P. D. (1998)

The Fungi – An Introduction -   B. S. Mehrotra (1992)

The Structure and Reproduction of the Algae – Vol. I –   F. E. Fritsch (1979)

Topics in Algae -   N. D. Kamat (1982)

Vikas Hand book of Botany –

Srivastava K. C., B. S. Dattatreya, A. B. Raizada (1977)

Paper – II

A Biologists Guide to Principles and Techniques of Practical Biochemistry. –

Wilson and Goulding (1996),

A Manual of Radiobiology -   Stewart. J.C. and D. M. Hawcrafl (1977)

Analytical Chemistry - G. L. Davida Krupadanam, D. Vijaya Prasad,

K.Varaprasadrao, K. L. N. Reddy, C. Sudhakar (1999)

An Introduction'to Practical Biochemistry -   D. T Plummen (1993)

An Introduction to Microbiology -   P Tauro, K. K. Kapoor, K. S. Yadav (1996)

Archaebacteria -   Kandler, 0. (1982)

Biochemistry -   C. B. Powar andG. R. Chatwal (1988)

Biochemistry - $(4/^h$ Ed.) - Stryer, L. (1995)

Biochemistry -   K. Trehan (1987)

Biochemistry -   D. L. Rawh (1989)

Biochemistry -   Campbell, M. K. (1999)

Biochemistry -   S. C. Rastogi (1993)

Biochemistry -   Zubay, G. (1993)

Biological Techniques -   H. S. Srivastava (1999)

Biophysical Chemistry -   Uppadhyay, Upadhyay (1997)

Biochemical Thermodynamics -   Jones, M. N. (1979)

Cell Biology -   S. C. Rastogi (1992)

Cell Biology -   C. B. Powar (2000)

Cell Biology, Genetics, Evolution and Ecology –

P S. Verma, V K. Agarwal (2001)

Cell Biology -   R. Dowben (1971)

Cell and Molecular Biology -   P K. Gupta (1999)

Cell and Molecular Biology (2001) –

E. D. P De Robertis & E. M. F De Robertis (Jr.)

College Botany VoL IV-   S, Sunder Rajan (1992)

Cytogenetics -   S Sunder Rajan (2000)

Essentials of Cell and Molecular Biology –

     E D, P. De Robertis, E. M. F De Robertis (1981)

Elements of Biochemistry -   H. S. Srivastava (1999)

Experimental Biochemistry -   Dryer R. L.and Lata, G. F (1989)

Fundamental Concepts of Cell Biology -   K G. Purohit (1982)

Fundamentals of Genetics -   B. D. Singh (2001)

Genetics -   P. K Gupta (1997)

Gene Action -   Hartman alld Suskind (1968)

Lehringer Principles of Biochemistry -   Nelson D. L. and M. M. Cox (2000)

Living Process, Book.2 Bioenergetics -   Ho. M. W (1995)

Molecular Cell Biology -   G. S. Sandhu (2002)

Molecular Cell Biology -   H. S. Bhamrah (1999)

Molecular and Cellular Biology -   Wolfe, S. (1993)

Molecular Cell Biology –

   Alberts, B., Bray, D.; Lewis, J.; Robert, K., Raff M. and J. D. Watson

Molecular Biology -   H. D. Kumar (1999)

Microbiology and Plant Pathology -   P. D. Sharma (1999)

Plant Biochemistry -   Ed. P. M. Dey and J. B. Harborne (2000)

Plant Biochemistry - Cell -   Stumpf, P. K and E. E. Conn. (1981)

Plant Cell Biology - A Practical Approach -   Harris, N. Oparka, K J. (1994)

Plant Cell Biology - Structure and function –

     Gt1l1nillg, B. E. S. alld M. W Steer (1996)

The Cell –   C. P. Swanson & P. L. Webster (1980)

Text Book of Cell and Molecular Biology –   Gupta, P. K. (1999)

Shivaji University, Kolhapur

Introduced from June, 2010

B.Sc. Part – I Seed Technology,

Semester – II Paper – III – Seed Physiology

Lectures -

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

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

Unit – 4 – Concept of advanced seed.

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

Total	**- 40**

Semester – II, Paper – IV

Seed Production

Lectures 40

Unit – 1 - Seed Quality concept.

1.1	Seed - definition, difference between seed and grain, seed as basic input in agriculture, role of high quality seeds in increasing crop production, seed quality concept and control, characteristics of sowing quality seeds	- 3
1.2	Classification of crop plants in relation to mode of reproduction and choice of method for seed production	- 4
1.3	Choice of area of seed production. Factor affecting the choice of area of seed production – soil types, climate, nutrition, weed status, insect pests and disease incidence	-3

Unit – 2 – Hybrid seed production

| 2.2 | Feasibility of hybrid seed production by use of hand emasculation, detasseling, male sterility, gametocides and self-incompatibility. | - 4 |
| 2.3 | System of breeding and testing of crop varieties and hybrids in self and cross pollinated crops. System of release and notification of varieties for general cultivation | - 4 |

Unit – 3 – Genetic purity of varieties.

3.1	Genetic purity of varieties – concept, factors responsible for their deterioration,	- 3
3.2	Methods of maintenance of genetic purity.	-3
3.3	System and methods of production of nucleus, breeder, foundation and certified seed.	-4

Unit – 4 – Seed production procedures

Seed production procedure of following crops with special reference to requirement, isolation, agronomic management, rouging, harvesting and threshing   - 10
1) Sunflower   2) Groundnut   3) Soybean   4)Mung
5) Wheat 6)Jowar 7) Rice 8) Maize
9) Potato and 10) Tomato

List of Practicals

1)	Study of family Fabaceae	- 1
2)	Study of family Brassicaceae	- 1
3)	Study of family Solanaceae	- 1
4)	Study of family Poaceae	- 1
5)	Morphology of seeds (Dicot) Castor, Groundnut	- 1
6)	Morphology of seeds (Monocot) Maize, Jowar	- 1
7)	Seedling morphology of monocot and dicot	- 1
8)	Adult plant morphology for the identification of any two varieties of the following crops – Soybean, Groundnut, Gram, Wheat.	- 1
9)	Cytological techniques for the study of chromosomes-	- 3

i) Preparation and use of pretreatment solution of PDB/Colchicine/8HQ.
ii) Fixatives and preservatives
iii) Stains- Acetocarmine / Acetoorcein / Propino-carmine / Feulgen
iv) Study of somatic chromosomes in root tips

10)	Study of Mitosis and Meiosis	- 4

Total	- 15

B.Sc. Part – I (Seed Technology)

Practical Course II

List of Practicals

1)	Phenol test (Wheat and Paddy) NaOH test (Any seed)	- 2
2)	Peroxidase and GA tests	- 2
3)	Seed pelleting and coating (artificial seed)	- 2
4)	Preparation of culture medium (MS)	- 1

7) Study of Pollen fertility   -1
8) Field visits to different seed farms. (at least two)   -2

Total	- 15

Shivaji University, Kolhapur

B.Sc. Part-I Chemistry

B.Sc. Part –I New Syllabus
SEMESTER SYSTEM
In force from June -2010

SEMESTER – II   PAPER – I

(Physical and Inorganic Chemistry)

Section – I   Physical Chemistry

IT - 1. General Concepts in Chemistry - - - -   **[5]**

1.1 Definitions of the terms: Solute, solvent, solution and dilute solution.

1.2 Concentration units: Normality, Molarity, Molality, Mole fraction, Weight

   fraction, Percentage composition by weight and by volume.

1.3 Concentrations of Bulk Solutions used in Laboratory and preparation of

   standard solutions from them (HCl, H_2SO_4, HNO_3 and Ammonia)

1.1 Numerical Problems.

IT - 2. Chemical Kinetics: - - - -   **[10]**

2.1 Introduction: Rate of reaction, Definition and units of rate constant, Factors

   affecting rate of reaction, Order and Molecularity of reaction,

2.2 First order reaction: Rate expression (Derivation not expected),

   Characteristics of first order reaction.

2.3 Pseudounimolecular reactions such as, (i) Hydrolysis of methyl acetate in

   presence of acid, (ii) Decomposition of hydrogen peroxide ($KMnO_4$ method).

2.4 Second order reaction: Derivation of rate constant for equal and unequal

(ii) Reaction between $K_2S_2O_8$ and KI.

2.5 Numerical problems.

IT - 3. Gaseous State : - - - -   **[10]**

3.1 (a) Ideal and Non – ideal gases.

   (b) Deviation from ideal behaviour. (only Boyle's law)

   (c) Causes of deviation, van der Waal's equation, Explanation of real gas

     behaviour by van der Waal's equation.

3.2 Critical Phenomena: PV-Isotherms of real gases (Andrew's isotherms),

   Continuity of state, Relationship between critical constants and van der Waal's

   constants.

3.3 The law of corresponding states and reduced equation of state.

3.4 Liquefaction of gases, Joule-Thomson effect.

3.5 Numerical Problems.

Section – II (Inorganic Chemistry)

IT –1 Covalent Bonding : Valence Bond Theory (VBT)   **- - - - (5)**

   1.1 Valence bond theory : Heitler–London theory and Pauling–Slater theory.

   1.2 Limitations of valence bond theory.

   1.3 Types of hybridisation and shapes of simple inorganic molecules –

     $BeCl_2$, BF_3, $SiCl_4$, PCl_5, SF_6, IF_7

   1.4 Valence Shell Electron Pair Repulsion (VSEPR) Theory with respect to NH_3,

     H_2O and ClF_3 molecules.

IT – 2 Covalent Bonding : Molecular Orbital Theory (MOT)   **- - - - - [7]**

2.1 Atomic & Molecular orbitals.

2.2 L. C. A. O. principle.

2.3 Bonding, Antibonding & Nonbonding Molecular Orbitals.

2.4 Conditions for successful overlap.

2.6 Energy level sequence of molecular orbitals for n = 1 and n = 2.

2.7 M. O. diagrams for homonuclear diatomic molecules such H_2, Li_2, Be_2, C_2, N_2 & O_2 and heteronuclear diatomic molec

such a CO and NO with respect to bond order, stability and magnetic properties.

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SEMESTER –II PAPER – II

(Organic Chemistry and Inorganic Chemistry)

Section – I   (Organic Chemistry)

IT – 1 Fundamentals of Organic reaction mechanism :   - - - - - [7]

.1 Meaning of reaction mechanism.

1.2 Curved arrow notation; drawing electron movements with arrows. Half headed and

double headed arrows.

1.3 Nature of fission – Homolytic and Heterolytic.

1.4 Types of reagents – Electrophiles and Nucleophiles.

1.5 Types and sub types of following organic reactions with definition and at least one

example of each.

(a) Substitution (b) Addition (c) Elimination (d) Rearrangement.

(Mechanism is not expected)

1.1 Reactive intermediates with examples – Carbocations, Carbanions, Free radicals,

Carbenes, Arynes and Nitrenes.

IT – 2 Aromaticity :   - - - - - [7]

2.1 Introduction.

2.2 (a) Kekule structure of benzene.

(b) Resonance structures of benzene.

(c) Molecular orbital picture of benzene.

(d) Representation of benzene ring.

2.3 Mechanism of electrophillic aromatic substitution in benzene w.r.t. Nitration, Sulphonation, Halogenation and Friedel-Cr

reaction. (Alkylation and Acylation)

2.4 Electrophilic substitution reactions of monosubstituted Benzene with special

reference to nitration of Nitrobenzene and nitration of Phenol.

IT – 3 Cycloalkanes, cycloalkenes and Alkadienes.   - - - - - [5]

.1Cycloalkanes: -   (1) Introduction.

(2) Method of formation.
    a) By addition of carbene to alkene
    b) Action of metallic sodium on dihaloalkane
    c) Diels – Alder reaction
    d) By reduction of aromatic compounds
(3) Chemical properties.
    a) Photohalogenation
    b) Catalytic halogenation
    c) Catalytic hydrogenation
    d) Effect of heat
    e) Reaction with hydrogen halide

.2 Cycloalkenes:- (1) Introduction
(2) Method of formation from cyclic compounds
(3) Chemical Properties
    a) Hydrogenation
    b) Addition of Halogens and halogen acids.
    c) Allylic halogenation

.3   Alkadienes : -   (1) Introduction
(2) Classification
(3) Buta-1,3-diene
    a) Structure
    b) Methods of formation
        i) From cyclohexane
        ii) From Butane by dehydrogenation
        iii) From acetylene
        iv) From Butane-1,3-diol
        v) From ethanol and acetaldehyde (Industrial method
(4) Chemical Properties
    a) Reaction with hydrogen halide
    b) Reaction with halogens
        i) With one molar equivalent of halogens(Cl_2 or Br_2)
        ii) With two molar equivalent of halogens(Cl_2 or Br_2)
    c) Diels- Alder reaction
    d) Reduction – hydrogenation
    e) Oxidation – Ozonolysis
    f) Polymerization

IT – 4 Diazonium salts   - - - - - [3]

.1 Introduction

.3 Reactions – formation of Benzene, formation of iodobenzene, reduction, Sand Meyer's reaction azo coupling – Synthesis of

methyl orange and congo red.

IT – 5 Petroleum: - - - - - **[3]**

.1 Origin of petroleum.

5.2 Constituents and refining of Petroleum.

5.3 Cracking.

5.4 Hydroforming.

5.5 Knocking.

5.6 Octane number.

5.7 Cetane number

Section – II (Inorganic Chemistry)

IT – 1   p – block elements :   - - - - - **[9]**

1.1 General electronic configuration

1.2 Comparative study of group 13, 14, 15, 16, 17 (IIIA, IVA, VA, VIA & VIIA) elements with respect to atomic & ionic radii,

oxidation states, ionisation potential, electronegativity and reactivity.

1.3 Study of compounds like oxides and halides of carbon and silicon w.r.t. preparation and properties of CO, CO_2, CCl_4, S

$SiCl_4$.

IT –2 Chemistry of Noble Gases   - - - - - **[4]**

2.1 Electronic configuration

2.2 Physical and chemical properties

2.3 Clathrate compounds

2.4 Structure and bonding of XeF_2, XeF_4 and XeF_6 (according to V.B.T.)

erence Books :

PHYSICAL CHEMISTRY

Mathematical preparation of Physical Chemistry : F. Daniel,

Mc-Graw Hill Book company.

Elements of Physical Chemistry : S. Glasstone and D. Lewis

Principles of Physical Chemistry : Maron – Prutton

University Chemistry : B. H. Mahan (Addision – Weseley Publ. Co.)

Chemistry – Principle & Applications : P. W. Atkins, M. J. Clugsto,

M. J. Fiazer, R. A. Y. Jone (Longman)

Physical Chemistry : G. M. Barrow (Tata Mc-Graw Hill)

Essentials of Physical Chemistry : B. S. Bahl & G. D. Tuli (S. Chand)

Physical Chemistry : A. J. Mee

Physical Chemistry : Daniels – Alberty.

Principles of Physical Chemistry : Puri – Sharma (S. Nagin)

Text Book of Physical Chemistry : Soni – Dharmarha.

University General Chemistry : CNR. Rao (McMillan)

Chemistry : Sienko – Plane (Recent Edn.)

Basic Chemical Thermodynamics : V. V. Rao.

Physical Chemistry through Problems : Dogra and Dogra (Wiley Eastern Ltd.)

Physical Chemistry : S. Glasstone.

A Text Book of Physical Chemistry: A.S. Negi and S.C. Anand (New Age International (P) Ltd.)

A Text Book of Quantitative Inorganic Analysis Including Elementary Instrumental Analysis: A.I. Vogel (Third Ed.)   (ELBS)

ORGANIC CHEMISTRY

Organic Chemistry : Hendrickson, Cram, Hammond.

Organic Chemistry : Morrison and Boyd.

Organic Chemistry : Volume I & II. I. L. Finar.

Organic Chemistry : Pine

Advanced Organic Chemistry : Sachin Kumar Ghosh.

Advanced Organic Chemistry : B. S. Bahl & Arun Bahl.

A Guide book to Mechanism in Organic Chemistry : Peter Sykes.

Stereochemistry of Organic Compounds : Kalsi.

Stereochemistry of Carbon Compounds : Eliel.

Text Book of Organic Chemistry : P. L. Soni.

Practical Organic Chemistry : By A. I. Vogel.

Advanced Organic Chemistry - Reactions, Mechanism & Structure : Jerry March.

Organic Chemistry : M. R. Jain.

Organic Chemistry : J. M. Shaigel.

INORGANIC CHEMISTRY

Basic Inorganic Chemistry – F. A. Cotton, G. Wilkinson and P. L. Gaus Wiley.

Concise Inorganic Chemistry – J. D. Lee. ELBS 4th Edn.

Concepts and Models of Inorganic Chemistry – B. Dauglas, D. McDaniel and J.Alexander. John Wiley.

Inorganic Chemistry – D. E. Shriver, P. W. Atkins and C. H. Langford. Oxford.

Inorganic Chemistry – W.W. Porter field. Addision–Wesley.

Inorganic Chemistry – A. G. Sharpe. ELBS.

Inorganic Chemistry – G. L. Miessler and D. A. Tarr. Prentice Hall.

Inorganic Chemistry – G. S. Manku. Tata Mc Graw Hill.

Advanced Inorganic Chemistry – Satyaprakash, Tuli, Basu. (S.Chand & Co.)

Inorganic Chemistry – Puri and Sharma. (S.Chand & Co.)

Environmental Pollution Analysis – S. M. Khopkar. (Willey Estern Ltd.)

Environmental Chemistry – A. K. De. (Willey Estern Ltd.)

Text Book of Environmental Chemistry – O. D. Tyagi and M. Mehra.

Air Pollutin : Origin and Control – Wark and Werner.

Progressive Inorganic Chemistry - Thatte and Pandit.

Basic concepts of Analytical Chemistry – S. M. Khopkar.

University General Chemistry – CNR Rao. (McMillan)

Text book of Inorganic Chemistry – P.L.Soni

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Laboratory Course (Practicals)

.: (i) Use of analytical or chainometric or. Digital balance with 1mg sensitivity is allowed.

Physical Chemistry

Determination of viscosity of given liquids A and B. (Density data of liquids, viscosity of water to be given) [Any two liquids from

tone, CCl$_4$, Chloroform, Ethyl alcohol. Benzyl alcohol, Ehylene glycol and n-propyl alcohol.]

Determination of equivalent weight of Mg by Eudiometer.

Study of specific reaction rate of hydrolysis of methyl acetate in presence of HCl.

Study of reaction between K$_2$S$_2$O$_8$ and KI (Equal concentrations).

Determination of heat of ionization of weak acid by using polythene bottle.

Preparation and standardization of HCl and H$_2$SO$_4$ solutions from bulk.

Organic Chemistry

Estimations :

1.1 Estimation of aniline.

1.2 Estimation of acetamide.

Organic Qualitative analysis :

Identification of at least **Six** organic compounds with reactions including **one** from acids, **one** from phenols, **one** from bases and **three** from neutrals from the list of compounds given below :

2.1 Acids : Oxalic acid, Benzoic acid and Cinnamic acid.

2.2 Phenols : β-Naphthol, Resorcinol.

2.3 Bases : Aniline, p-Toluidine.

2.4 Neutrals : Acetone, Ethyl acetate, Glucose, Chloroform, Chlorobenzene, m-Dinitrobenzene, Thiourea.

Note : A systematic study of an organic compound involves the following operations which should be taught in details with reaction

The detection of elements and functional group.

Preliminary tests and Physical examination.

Physical constant.

Detection of Elements.

Detection of Functional group.

A Search into the literature.

Special Test.

Summary.

Result.

Inorganic Chemistry

Inorganic Quantitative Analysis :

Determination of amount of acetic acid in commercial vinegar using NaOH..

Water analysis :

    To determine alkalinity of water sample by using phenolphthalein and

methyl orange indicator. Standard HCl solution to be supplied.

Volumetric Analysis :

and Kg/dm3.

To prepare standard solution of Potassium dichromate and

determine strength of Ferrous Ammonium Sulphate solution in

terms of normality and Kg/dm3. (Use internal indicator)

Qualitative Analysis :

) Spot Tests :

Detection of following cations using spot tests : Cu^{2+}, Co^{2+}, Ni^{2+}, Fe^{3+},

Zn^{2+}, Mg^{2+}, Al^{3+}, Pb^{2+}, Mn^{2+} and Hg^{2+}.

) Chromatography :

Separation and identification of cations by Paper Chromatographic

technique from the following mixtures :

a) Ni^{2+} + Cu^{2+}

b) Ni^{2+} + Co^{2+}

c) Cu^{2+} + Co^{2+}

erence Books:

PHYSICAL CHEMISTRY

ractical book of Physical Chemistry: Nadkarni, Kothari & Lawande.

xperimental Physical Chemistry: A. Findlay.

ystematic Experimental Physical Chemistry: S. W. Rajbhoj, Chondhekar. (Anjali Publ.)

xperiments in Physical Chemistry: R. C. Das and B. Behra. (Tata Mc Graw Hill)

dvanced Practical Physical Chemistry: J. B. Yadav (Goel Publishing House.)

ractical Physical Chemistry: B. D. Khosala. (R. Chand & Sons)

xperiments in Chemistry: D. V. Jagirdar.

 Text Book of Quantitative Inorganic Analysis Including Elementary Instrumental Analysis: A.I. Vogel (Third Ed.)   (ELBS)

ORGANIC CHEMISTRY

Vogel's Text Book of Quantitative Chemical Analysis. (Longmann) ELBS Edition.

Vogel's Text Book of Qualitative Chemical Analysis. (Longmann) ELBS Edition.

Hand book of Organic Qualitative Analysis : Clarke.

Comprehensive Practical Organic Chemistry – Qualitative Analysis by V. K. Ahluwalia, Sunita Dhingra. University Pr

Distributor – Orient Longman Ltd.

INORGANIC CHEMISTRY

Vogel's Text Book of Quantitative Chemical Analysis

(Longman ELBS Edition).

Vogel's Text Book of Qualitative Chemical Analysis

(Longman ELBS Edition)

Basic Concepts in Analytical Chemistry (Wiley Eastern Ltd.) : S. M. Khopkar.

B. Sc. I – Sem II Electronics

B. Sc. I – Electronics
Semester II
Paper III – Digital Electronics-I (Total Marks 50)

UNIT:1   Number systems: -   9

Binary Numbers,   Binary to Decimal and Decimal to Binary conversion, 1's and 2's
complement of Binary Numbers.
Binary Arithmetic: - Addition, Subtraction, Multiplication and Division.
Octal Numbers: - Conversion Octal to Binary, octal to decimal, Binary to octal and
decimal to octal.

Binary codes: -

8421 code, Excess 3 code, Gray code, The parity Bit,   Alphanumeric codes ASCII and
EBCDIC code.

Basic Gates: -

Introduction to logic gates with IC's,   7400, 7402, 7404, 7408, 7432, and 7486,Positive
and Negative Logic systems DeMorgan's Theorems, The universality of NAND & NOR
gate, TTL NAND gate Specification of TTL logic family, current sinking & current
sourcing logic, open collector TTL, CMOS Family(NAND)

UNIT: 3 Boolean Algebra: -   9

Rules and Laws of Boolean Algebra, Boolean expressions for gate networks,
Simplification of Boolean expressions,Sum of product and Product of sum method
 The Karnaugh Map (K-Map) for 2,3 and 4 variables, use of K-Map for reduction of
Boolean expression.

9

UNIT:4   Arithmetic Circuits: -   9
i) Arithmetic Circuits: -
Ex-OR gate and Controlled invertors, half adder, Full adder, Parallel Binary adder, 8421
Adder, Excess 3 adder, half and full sub tractor
ii) Computer organization, I/O devices, Key board, Monitor, Types of Printers.
computer. Specification(Mention only Processor,speed,size of HDD,Size of memory)

B. Sc. I – Electronics
Semester II
Paper IV – Digital Electronics-II (Total Marks 50)

UNIT:5   .Flip-Flop: -   9

R S flip-flop, T & RST flip-flop, Clocked RS and D-flip-flop, Edge Triggered flip- flop.
   Positive and negative edge triggered D and JK flip flop, Race around condition, Pulse
triggered (Master Slave) JK flip-flop, operating characteristics of flip-flop, Study of IC
7474, 7475 and 7476.
   Applications of flip-flop: Parallel data storage, Data transfer and frequency division.
UNIT:6   Counter Techniques: -   9
Counter Techniques: -
 Basic counter operations,
 Asynchronous Counter: 3Bit Binary counter(Binary Ripple Counter), Asynchronous
decade counter, four bit binary counter 7493.
   Synchronous or parallel counter: - 3-bit and 4-bit binary synchronous counter,
   synchronous decade counter, Study IC 74160
   Series parallel combination counter Mod-3, Mod-5, and Mod-7 counter Study of IC's
   7490, 7492, 74193, 74194.
   UNIT:7   Shift Resister,Buffer and Latches -   9
     Shift resister operation, Types of Shift Resisters: SISO, SIPO, PISO and PIPO shift
resisters, Bi-directional shift resister.
   Shift resister counters: - Ring counter, Johnson counter, up- down counter, Digital Clock
   Study of IC 7495, 74190.
   *Unidirectional Buffer,Bidirectional buffer,Tristate buffer ,Study of IC'S
   74LS 244,74 LS 245,Latch 74 LS 373
         *Ref.:Microprocessor By R.S.Gaonkar

12

UNIT:8   Decoders, Encoders, Multiplexer and Demultiplexer: -   9
  Basic Binary decoder, 2 to 4 line, 3 to 8 line and 4 to 16 line decoders, BCD in decimal decoder, BCD to seven-segment decoder driver, IC 74138, IC 7447.
    Encoder, Decimal to BCD Encoder, Priority Encoder, Study of IC 74147.
    Multiplexer: - 2 to 1, 4 to 1, 8 to 1 and 16 to 1 MUX, 1 line – 4 line, 1 line to 8 line and 1 line to 16 line Mux –Tree.
    Demultiplexer: - 1 to 4 line, 1 to 8 line & 1 to 16 line DEMUX, Demux Tree.
    Study of IC's 74150, 74154.

Books
- Digital Fundamentals   Floyd.
- Digital Principles and Applications   A.P.Malvino & D.P.Leach (TMH).
- Modern digital Electronics (2nd Edn.)   R.P.Jain.
- Fundamentals of Computer   V.Rajaraman.

Group A

1.i) Identification of active and passive components
  ii) Study of relay (By connecting it to transistor switch)
  iii) LED indicator (Calculation of series resistor for 5V,6V,12V)
   2 Verification of Kirchhoff's Laws
   3. Verification f Thevenins & Super Position Theorems
   4. Use of CRO (Amplitude,Frequency, Phase measurement)
   5. Graphical Determination of . and °
   6.   Study of diode Characteristics (For Si and Point contact diodes)
   7. Study of zener diode (Characteristic and Temperature effect)
   8. Study of FET   Characteristic
   9.   Study of Transistor Biasing (Potential divider)
   10. Transformer Designing and winding
   11. PCB designing and etching

GROUP B

12. Study of Logic Gates
13. Study of Universal Gates (NAND/NOR)
14. Verification of De Morgan's Theorems
15. Study of half and Full Adder
16. Study of RS,D,JK fliop-flop
17. Study of counter (Divided by 2,5,10 using 7490)
18. Study of shift register(Left,Right Shift,Ring and Johnsons counter)
19. Study of Multiplexer
20. Study of single digit counter (using 7490,7447,seven segment display)
21. Identification of computer I/O Devices, Preparing own Biodata using MS-WORD)
22. Internet Browsing

B.Sc. – I Geography
Semester - II Paper – IV
Oceanography

Marks-50

Unit.I) Introduction to Oceanography   No of Periods
     a) Definition and importance of Oceanography.
     b) Major ocean bodies of the world.

c) Surface configuration of ocean floors.
(10)

Unit.II) Salinity and Temperature of Ocean Water
 a) Factors affecting the Salinity of Ocean Water.
 b) Distribution of Salinity in the world.
 c) Factors affecting the temperature of Ocean Water.
 d) Distribution of temperature in oceans and seas.
 (10)

Unit.III) Circulation of Ocean Water
 a) Oceanic waves.
 b) Oceanic tides – high and low tide.
 c) Ocean currents – Major ocean currents in the world.
  (10)

Unit.IV) Deposits and Coral reefs.
 a) Ocean deposits – shallow sea deposits.
 b) Deep sea deposits.
 c) Types of corals.
 d) Theories of coral formation.
  (8)

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.(4th Edition 2003)

B Sc. I
Geography
Practical

Marks 50   **No of Periods**

I) Scales: Definition and methods of expression of scales, Plane Scale, time and   distance scale and diagonal scale. (Metric System only)
(20)

II) Representation of slope by contours, relief by contours-Hill, plateau, valley, Gorge, Cliffs, waterfall, Methods of expression of slope by Gradient, degree & percentage. Profiles- Drawings of longitudinal profile and intervisibility   (20)

III) Indexing of toposheets, signs and symbols used in toposheet, Identification of
landforms from given toposheets.
(20)

IV) Representation of climatic data by graphs. Line graphs, Bargraphs, wind
rose, Climograph and Hythergraph.
(20)

V) Signs & Symbols used in I.M.D. charts, Isobaric patterns. Interpretation of Minimum Two I.M.D.Charts.
           (24)

VI) Introduction to GIS and GPS
(12)

Reference Books

1) Misra R P. and Ramesh: A fundamentals of cartography,
   Mcmillen comp Mew-Delhi 1986.

2) Monkhouse F.J.: Maps and Diagrams.

3) Robinson A.H.: Elements of cartography. John waley and
   sons, USA 1995.

4) Singh R.L and Dutt P.K.: Elements of practical Geography,
   Kalani Publishers, New Delhi.

5) Singh and Kanoujia.: Practical Geography.

6) Barrett E. C. and Curtis E. C.: Fundamentals of Remote
    sensing and Air Photo interpretation, Mcmillen, Newyork 1992.

7) Combell J.: Introduction to Remote sensing, Guilford Newyork, 1989.

8) Curran Paul J.: Principles of Remote sensing, Longman, London, 1985.

9) Barrete E.C.: Introduction to remote sensing.

10) Sabnis: Remote sensing.

11) Introduction to G.I.S. and G.P.S.

Shivaji University, Kolhapur

Revised Syllabus For
B. Sc. I **Bachelor of Science in Geology**

Detailed syllabus of B. Sc. 1(Sem II) Geology
Paper III
Physical Geology

arks 50
(Total

Periods 40)
Unit I –Weathering (10 Periods)
  1. Definition; Types; Agents and factors controlling weathering.
  2. Weathering Processes- Mechanical Weathering; Chemical Weathering; Biological
    Weathering.
  3. Product of Weathering – Tors, Cliffs, Talus and Scree, Regolith and Murrum; Soil
    and soil formation, Soil Profiles.

Unit II – Geological work of Stream (10 Periods)

1. Hydrological cycle, Genetic Classification of Streams
2. Headward, Downward and Lateral Erosion by stream. Erosional Features – River piracy, water falls, rapids, cascades, potholes, river terraces, meanders and ox bow

lake, graded profile and base level of Erosion.
3. Transportation and deposition by streams, Depositional Features – point bar, natural levees, alluvial fans and cones, delta and their types
4. Drainage Patterns – Dendritic, Trellis, Rectangular, Annular and Radial.
5. Concept of Watershed in brief.

Unit III – Geological work of Ocean / Sea   (8 Periods)
1. Movement of sea water- waves, tides, currents, tsunamis; Generation of oceanic currents and global oceanic conveyor systems.
2. Erosion features- wave cut terrace, sea notch, sea caves, blowholes, cove and headland, stacks, sea arch.
3. Transportation and Depositional features developed by oceans- beaches and barriers, wave built terrace spits, bars, hooks and Lagoon**s**

Unit IV-Geological work of glacier and wind   (12 Periods)
1. Defecation and origin of glaciers, Snowcaps, snow lines; Types of glaciers, movement of glaciers; Surface features of glaciers.
2. Glacial erosion; Erosional features like striations, grooves and polished surfaces; U and V shaped valley, Hanging Valley, Cirque, Aretes, Mountain horns, Fjords.
3. Glacial and Glaciofluvial Deposition. Depositional features like Boulder clays, Erratics, Moraines, Drumlins, Eskers, Kames and Kettle Holes, Out wash plains and

Varves.
4. Transportation and Erosion by wind- Deflation, Abrasion and Attrition; Erosional features produced by wind – Deflation basins and hollows, Deflation armours, Deflation pavements, Ventifacts, Yardangs, Pedestal rocks and Balanced stone, Mushroom rock, Striated and Grooved rocks, Earthpillers.
5. Causes of wind deposition, Depositional features like- Sand dunes and their types,
Loess. Deserts- kinds of deserts. Playas, Bajadas and Pediments.

Paper IV
Petrology

Marks 50
(Total
Periods 40)
Unit I –Introduction to Petrology   (7
Periods)
1. Introduction of Petrology; Definition of Rocks; Major sub-divisions of Petrology;
2. The rock cycle.

Unit II – Igneous petrology   (11
Periods)
1. Definition, composition and origin of magma and lava; Concept of Primary Magma.

2. Pyrogenetic minerals; Primary – Essential and Accessory minerals; Secondary Minerals.
3. Intrusive and Extrusive forms of Igneous Rocks; Concordant and Discordant Intrusions- Sills, Dykes, Ring Dykes, Cone Sheets, Composite and Multiple Intrusions, Laccoliths, Lopoliths, Phaccoliths, Batholiths (Stock, Boss, Roof Pendant) and Volcanic Plug.
4. Megascopic Structure - Vesicular, Amygdaloidal, Ropy, Block, Flow and Pillow Structures, Columnar Structure; Textures- Granitic texture, Porphyritic texture, Graphic texture and Glassy texture

Unit III –Sedimentary Petrology   (11 Periods)
1. Formation of secondary rocks; Erosion, transportation, Deposition, Consolidation and Cementation of sediments;
2. Source of material for secondary rocks; Classification of secondary rocks;
3. Sedimentary structures – Bedding and lamination, Current Bedding, Graded Bedding, Stratification, Lamination, Ripple Marks, Rain Prints, Mud cracks (Sun cracks), Concretionary and Nodular, Stalactitic and stalagmite, Oolitic and Pisolitic Structures.

Unit IV- Metamorphic petrology   (11 Periods)
1. Definition of metamorphism; Agents and Types of Metamorphism; Depth zones – epizone, mesozone and katazone, stress and antistress minerals
2. Types of metamorphism – Thermal or Contact metamorphism, Cataclastic metamorphism, Dynamothermal metamorphism, Regional and Plutonic Metamorphism;.
3. Megascopic structures in metamorphic rocks- Slaty cleavage, Granulose structure, Schistose structure, Gneissose structure, Augen Structure, Banded Structure.

Recommended books - Sem. I and Sem. II
1. **Textbook of Mineralogy – E. S. Dana**
2. **Rutley's elements of Mineralogy – H. H. Read**
3. **Principles of Petrology – G. W. Tyrrell**
4. **Igneous and metamorphic petrology (IInd Edition) – F. J. Turner and J Verhoogan**
5. **Sedimetantary Petrology (IIIrd edition) – F. J. Pettijohn**
6. **Igneous petrology – Mihir K Bose**
7. **Metamorphic petrology – C B Rao**
8. **Sedimentary rocks – R. K. Sukhatankar**
9. **Concepts in Geology – Dr. A. B. Chakaranarayan, Dr. U. B. Kulkarni & others.**

Practical
Detailed Syllabus of a Practical Course in B.Sc. Part – I (Geology)

There are in all 24 practicals. 1 practical is of 4 periods. The practical course is based on
the theory papers, practical experiments and field training. The practical course is sub divided in to five units as follows. Each unit carries 10 marks. Thus the practical course is of 50 marks.

Unit I: General Geology and Physical Geology 10 **Marks.**
1. Study of important and common geomorphological models
2. Reading of Toposheets: Introduction of toposheets, Definition and Function of Contours, Contour interval, Map symbols, Scales.
* Identification of natural physical features like- Hill, Hill Range, Mountains, Peaks, Cliffs, Divides, Bench Marks, Streams and Stream Patterns, Catchment Areas of Streams, Basins, Lakes, Slopes, Flood Plains, Islands in River courses, Rocky and Sandy Beaches, Deltas and Distributaries, Sand dunes, Deserts, Marshy lands Marine Transgression Areas with their Latitudes and Longitudes.
* Identification of Man- Made Features: Settlements, Roads, Railways, Canals, Transmission Lines, Dams and Reservoirs, Tanks, Aerodromes, Post Offices, Temples, Mosques and Church etc. With their Latitudes and Longitudes.
3. Drainage Analysis: Stream Ordering (Strahler's Method), Stream Numbers, Stream Lengths, Bifurcation Ratio, Basin Area, Drainage Density with identification of order of the basin and Drainage Pattern.

Unit II: Mineralogy (Megascopic) 10 **marks**
1. The study of Physical properties of Minerals- Form, Colour, Streak, Lustre, Transparency, Cleavage,Fracture, Hardness. Determination of Specific Gravity by Walker's steelyard balance.
2. The study of individual minerals: Quartz, Rock Crystal, Amethyst, Flint, Agate, Chalcedony, Chert, Jasper, Opal, Natrolite, Stilbite, Apophyllite, Muscovite, Biotite, Orthoclase, Microcline, Plagioclase, Hornblende, Hypersthene, Olivine, Beryl, Barytes, Tourmaline, Fluorite, Corundum, Calcite, Garnet, Talc and Kyanite.

Unit III: Crystallography 10 **marks**
Crystal System Type Dana's Crystal Number

1. Isometric/Cubic Galena Type 110,111,112,114,121,122,128,129,131 and 139. (10)
2. Hexagonal Beryl Type 238,240.242,244,875,876,1009,1015, 1016 and 1017 (10)
3. Tetragonal Zircon Type 58, 59,188,190,191,192,193,198,201 and 205   (10)
4. Orthorhombic Barytes Type 316,317,323,325,328,330,331,333,887 and 1040 (10)
5. Monoclinic Gypsum Type 353,354,358,868 and 985 (5)
6. Triclinic Axinite Type 379,383, 827,860 and 938 (5)

Unit IV: Petrology   **10 Marks**

Identification, description and classification of hand specimen of following rocks on the basis of their megascopic texture, structure, mineral composition.
Igneous Rocks:
Structures and Textures: Vesicular, Amygdaloidal, Flow Banding, Ropy, Pillow, Granular, Columnar Structures, Granitic texture, Porphyritic texture, Graphic texture and Glassy texture.
Megascopic Identification: Granite, Diorite, Gabbro, Dunite, Pegmatite, Pitchstone, Rhyolite, Obsidian, Trachyte and Basalt.
Secondary Rocks:
Structures: Porous, Oolitic, Pisolitic, Lamination, Bedding, Graded Bedding, Current Bedding, Ripple Marks, Mud cracks, Clastic structure.
Megascopic Identification: Laterite, Bauxite, Breccia, Conglomerate, Grit, Sandstone and its varieties, Shale, Limestone and its varieties.
Metamorphic Rocks:
Structures: Slaty, Schistose, Granulose, Gneissose, Augen, Banded .
Megascopic Identification: Slate, Phyllite, Mica-Garnet- Schist, Hornblende Schist, Granite Gneiss, Hornblende Gneiss, Quartzite, and Marble.

Unit V: Fieldwork and Practical Records: **10 Marks**

1. Fieldwork Report or Study Tour Report- Study tour to places of geological importance for about three days. The Study Tour is compulsory for every student. Field trips to near by quarries and mines are to be conducted to get acquainted with field conditions. Submission of Study Tour Report is compulsory. 5 Marks
2. A Journal (Laboratory Record) is Compulsory. 5 Marks

Note:
        To appear for the practical examination a certified journal and a certified Field Report or Study Tour Report is compulsory.

B.Sc. Part- I Geology (Practical)

One practical of 50 Marks
        Unit I: General Geology and Physical Geology   10
        Unit II: Mineralogy   10
        Unit III: Crystallography   10
        Unit IV: Petrology   10
        Unit V: Fieldwork Report and Practical Record   10
        (Fieldwork Report 5 Marks, Journal 5 Marks) _____
                                        Total Marks 50

B.Sc. Part I Geology (Practical)

The Practical examination will last for one day. The examination will be of total 50 marks. The practical will be divided into five units and will be conducted in two sessions of three hours each.

Session I   **Marks**
       Unit I : Mineralogy   10
       Unit II : Crystallography   10
                               Total Marks   20

Session II
       Unit III : Petrology   10
       Unit IV : General and Physical Geology   10
       Unit V : Fieldwork report and Practical record   10
                               Total Marks   30

REVISED SYLLABUS OF B.Sc. Part – I (SEMESTER–II)

(MATHEMATICS)

Implemented from June – 2010

Paper – III (GEOMETRY)

UNIT – 1:   **CHANGE OF AXIS**   9 lectures

     1.1 Translation.

     1.2 Rotation.

     1.3 Translation and Rotation.

     1.4 Rotation and then Translation.

     1.5 Invariants, Basic Theorems.

UNIT – 2:   **POLAR COORDINATES**   10 lectures

     2.1 Relation between Cartesian and Polar coordinates.

     2.2 Distance formula and area of a triangle.

2.3 Polar equations of a straight line :

   2.3.1 Joining two lines.

   2.3.2 Normal form.

   2.3.3 Line parallel and perpendicular to the initial line.

   2.3.4 General equation.

 2.4 Polar equations of a circle :

   2.4.1 Centre – Radius form.

   2.4.2 Centre at the pole.

   2.4.3 Passing through the pole and touching the polar axis at the

       pole.

   2.4.4 Passing through the pole and with centre on the initial line.

   2.4.5 Passing through the pole and the diameter through pole

       making   an angle α with initial line.

   2.5 Equation of chord, tangent and normal to the circle r = 2a cos θ.

   2.6 Polar equations of a conic in the form $\dfrac{l}{r}$ = 1 $\pm$ e cos θ.

   2.7 Polar equations of a conic in the form $\dfrac{l}{r}$ = 1 + e cos (θ − α).

   2.8 Chord, Tangent and normal of a conic.

UNIT – 3:   **THE SPHERE**   10 lectures

   3.1 Equations in different forms.

   3.1.1 Centre – Radius form.

   3.1.2 General form.

   3.1.3 Diameter form.

   3.1.4 Intercept form.

  3.2 Intersection of a sphere with straight line and a plane.

  3.3 Power of a point and radical plane.

  3.4 Tangent plane and condition of tangency.

  3.5 Equations of a circle.

  3.6 Intersection of (i) two sphere, (ii) a sphere and plane.

  3.7 Orthogonality of two spheres

UNIT– 4: **<u>CONE</u>**   9 lectures

  4.1 Definitions of Cone, Vertex, Generator.

  4.2 Equation of a Cone with vertex at a point (x_1, y_1, z_1).

  4.3 Equation of a Cone with vertex at origin.

  4.4 Right circular cone and equation of a right circular cone.

  4.5 Enveloping cone and equation of an enveloping cone.

  4.6 Equation of a tangent plane.

  4.7 Condition of tangency.

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

Paper – IV (DIFFERENTIAL EQUATIONS)

UNIT – 1: <u>**EQUATIONS OF FIRST ORDER AND FIRST DEGRE**</u>

9

lectures

1.1 Introduction.

1.2 Exact differential equations.

   1.2.1 Necessary and sufficient condition for exactness.

1.3 Integration factors with Rules.

1.4 Linear Equation $\frac{dy}{dx}$ **+ Py = Q.**

1.4 Bernoulli′s Equation $\frac{dy}{dx}$ **+ Py = Qy^n .**

UNIT – 2: <u>**LINEAR DIFFERENTIAL EQUATIONS WITH CONSTANT**</u>
         <u>**COEFFICIENTS**</u>   **f (D) y = X**   17
lectures

2.1 Introduction f (D) y = X.

2.2 General (Complete) Solution of f(D) y = X.

2.3 Solution of f(D) y = 0.

2.4 Solution of Auxiliary equation with real and non – repeated
roots.

2.5 Solution of Auxiliary equation with real and repeated roots.

2.6 Solution of Auxiliary equation with imaginary (non –
repeated   **&**
    repeated) roots.

2.7 Solution of f(D) y = X , where X is of the form.

2.7.1 e^{ax}, **a is constant.**

2.7.2 sinax and cosax.

2.7.3 x^m, m is positive integer.

2.7.4 $e^{ax}.V$, V is a function of x.

2.7.5 xV, V is a function of x.

UNIT – 3:   <u>**EQUATIONS OF FIRST ORDER BUT NOT OF FIRST
        DEGREE**</u>

                                                                    5
lectures

3.1 Equations that can be factorized.

3.1.1 Equations solvable for p.

3.2 Equations that can not be factorized.

3.2.1 Equations solvable for y.

3.2.2 Equations solvable for y.

UNIT – 4:   <u>**CLAIRAUT′S EQUATION**</u>   6
lectures

4.1 Clairaut′s form.

4.2 Method of solution.

4.3 Equations reducible to Clairaut′s form.

4.4 Special forms reducible to Clairaut′s form.

                                        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 Equations, Diwan & Agashe.

MATHEMATICS PRACTICAL

Computational Mathematics Laboratory – I (CML – I)

Sr.No.	Topic	No. Of Practicals
1	Inverse of a matrix by Cayley Hamilton Method.	1
2	Eigen values and Eigen vectors of a matrix.	1
3	(a) Solution of system of m linear homogeneous equations in n unknowns. (b) Solution of system of m linear non- homogeneous equations in n unknowns.	1
4	Solution of cubic equations by Cardon method.	1
5	Solution of cubic equations by Ferrari method.	1
6	Radius of curvature for Cartesian equations.	1
7	Radius of curvature for Parametric	1

	equations.	
8	**Radius of curvature for Polar equations.**	1
9	**Successive Differentiation**	1
10	**Expansion of a determinant in terms of minor of any order by Laplace's method.**	1
11	**Applications of differential equations − Orthogonal trajectories (Cartesian co-ordinates).**	1
12	**Applications of differential equations − Orthogonal trajectories (Polar co-ordinates).**	1
Sr.No.	**Topic**	**No. Of Practicals**
13	**Applications of differential equations (Mechanical Applications).**	1
14	**Applications of differential equations (Electrical Applications).**	1
15	**Applications of differential equations (Biological Growth)**	1
16	**Translation and rotation**	1
17	**Cartesian and Polar Coordinates, Distance formula , Area of Triangle**	1
18	**Polar equation of a circle in different forms. Centre and Radius of circle.**	1
19	**Equations of sphere in different**	1

	forms – (a) Centre – Radius form. (b) General form. (c) Diameter form. (d) Intercept form.	
20	Touching spheres	1

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.

* Note : 4 hours per week per batch (Batch as a whole class).

Work - Load

   (i) Total teaching periods for Paper – I , II, III, IV are **5**

   (Five) per week.

   (ii) Total teaching periods for CML- I,

   4 hours per week per batch (Batch as a whole class)

DETAILS OF SYLLABI

(Semester – I & II)

(1) **COMPUTATIONAL MATHEMATICS LABORATRY - I**

This carries **50** marks.

Examination : 40 Marks

Journal   : 05 Marks
Viva Voce   : 05 Marks

* Certified Journal carries 05 marks .
 * For viva- voce : Max. Marks 5.
 Note : - Question 1 and Question 2 will be on practical no. 1 to 10
and Question 3 and Question 4 will be on practical no. 11 to 20

Equipments-

        Calculators   20

SHIVAJI UNIVERSITY, KOLHAPUR

Revised syllabus – Introduced from June 2010

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B.Sc. Part I Sem-II: Microbiology
_____

Paper IV : Applied Microbiology

UNIT I   10

Food Microbiology :

   a) Principles of microbial spoilage of food

   b) Spoilage of fruits, bread and meat.

   c) General principles and methods of food preservation.

      i) Asepsis

      ii) Removal of microorganisms - trimming, filtration, centrifugation.

      iii) Dehydration methods.

      iv) Use of heat – low temperature and high temperature.

      v) Irradication

      vi) Anaerobiosis

Use of preservative chemicals – Na-benzoate, NaCl, Vinegar, Sugar.

UNIT II

10

Milk Microbiology

   a) General Composition of Milk.

   b) Sources of Contamination in milk.

   c) Microbiological examination of Milk – SPC and dye reduction test :

      i) MBRT test, ii) Resazurin test

   d) Spoilage of milk - Colour, flavour curdling, ropiness

   e) Pasteurization (definition, types of methods used) –

     vii) LTH (Low Temperature Holding)

     viii) HTST (High Temperature Short Time)

     ix) UHT (Ultra High Temperature)

Efficiency of Pasteurisation – Phosphatase test (Qualitative)

UNIT III

10

Water Microbiology :

    a) Sources of microorganisms in water.

    b) Fecal pollution of water.

    c) Indictors of fecal pollution – *E. coli*

    d) Routine Bacteriological analysis of water.

        1) SPC

        2) Tests for Coliforms

           i) Qualitative -Detection of coliforms- Presumptive test, Confirmed Test,

                  Completed test,

                  -Differentiation of coliforms- IMViC test, Eijeckman test.

         ii) Quantitative – MPN, Membrane filter technique

    e) Muncipal water purification process and it's significance.

UNIT IV

06

Air Microbiology :

    a) Sources of microorganisms in air.

    b) Definitions of - i) Infectious dust, ii) Droplets, iii) Droplet nuclei

    c) Sampling methods for microbial examination of air

            i) Solid impaction - Sieve device

            ii) Liquid Impingement – Bead-bubbler device

Practical Course

___

1) Use, care and study of compound Microscope.

2) Demonstration of Laboratory equipments

   i) Incubator

   ii) Autoclave

   iii) Hot air oven

   iv) Centrifuge

   v) Colorimeter

vi) Seitz's filter

vii) pH meter

viii) Colony Counter

ix) Water bath

x) Distilled water plant

xi) U. V. Chamber

3) Cleaning (using chromic acid & disinfectants) & sterilization of Glassware

4) Microscopic examination of Bacteria

i) Monochrome staining   ii) Negative staining

iii) Gram staining   iv) Hanging drop technique of mortility

5) Staining of –

i) Cell wall (Chance's method)

ii) Capsule (Meneval's method)

iii) Volutin granules (Albert's method)

6) Mounting and identification of molds –

i) *Aspergillus*   ii) *Penicillium*

iii) *Mucor*   iv) *Rhizopus*

7) Preparation of culture media –

i) Peptone water   ii) Nutrient broth

iii) Nutrient agar   iv) Mac Conkey's agar

v) Sabouraud's agar   vi) Starch agar

vii) Milk agar

8) Isolation, Colony characteristics, Gram staining and mortility of –

i) *Escherichia coli*

ii) *Bacillus species*

iii) *Staphylococcus aureus*

9) Study of following biochemical tests -

i) IMViC test

ii) Sugar fermentation – glucose and lactose

iii) H_2S production

iv) MBRT

10) Detection of enzyme activity -

i) Amylase   ii) Catalase

iii) Caseinase

11) Enumeration of bacterial numbers by serial dilution and plating from milk.

12) Paper Chromatography (separation of amino acids from a mixture – determination of number of amino acids)

Books recommended for Theory

1) Microbiology by Pelczar, M.J.Jr., Chan E.C.S., Krieq, N.R. 5th edition,1986 (McGraw Hills Publication).
2) Fundamental Principles of bacteriology by A. J. Salle, Tata McGraw Hill.
3) Fundamentals of Micribiology – by Frobisher, Hindsdill, Crabtree, Good Heart, W.B. Saunders Company, 7th edition.
4) Medical Microbiology – Vol. I and II – by Cruick Shank R., Duguid J.P., Marmion B.P., Swain R.H.A., XIIth edition, Churchill Livingston, New York.
5) A textbook of Microbiology by Ananthnarayan – Orient Longman, Bombay
6) General Microbiology by Stanier R. Y. Vth edition, McMilan, London.
7) General Microbiology – Vol I and II by Pawar and Daginawala, Himalaya Publications.
8) Medical Bacteriology by Dey and Dey – Allied Agency, Calcutta.
9) Food Microbiology by W. C. Frazier.
10) Basic Experimental Microbiology by Ronal M. Atlas, Alfred E. Brown, Kenneth W. Dobra, Wonas Miller (1986) Pren-tice Hall.
11) General Microbiology by Robert F. Boyd (1984), Times, Mirror/Mosby College.
12) A Biologics 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, IInd edition.
15) F. K. Baker – Becteriological Techniques.
16) Gunasekaran – Introduction to Microbial Technique
17) Sadsivam & Manickam – Biochemical methods.

Books recommended for Practical

1) Medical Microbiology by Cruickshank Vol. II.
2) Stains and Staining procedures by Desai and Desai.
3) Introduction to Practical Biochemistry by D. Plummer, J Wiley and Sons.
4) Bacteriological techniques by F. J. Baker.
5) Introduction to Microbial techniques by Gunasekaran.

6) Biochemical methods by Sadashivan and D. Manickam.

7) Laboratory methods in Biochemistry by J. Jayaraman.

8) Experimental Microbiology – Patel & Patel

List of minimum equipments

_____

1) Hot air oven   -   1

2) Incubator   -   1

3) Autoclave   -   1

4) Refrigerator   -   1

5) Medical microscopes   -   10 nos. for one batch

6) Chemical balance   -   2

7) pH meter   -   1

8) Seitz filter   -   1

9) Centrifuge   -   1

10) Colorimeter   -   1

11) Distilled Water Plant   -   1

12) Arrangements for gas supply and fitting of two burners per table.

13) One working table of 6' x 2½' for two students.

14) One separate sterilization room attach to the laboratory (10' x 15')

15) At least one wash basin for a group of five students

16) Colony counter

17) Water bath

18) One separate instrument room attached to lab (10' x 15')

19) One laboratory for one batch including working tables (6' x 2½') per two students
for one batch

20) Store room (10' x 15')

Shivaji University, Kolhapur
Revised Syllabus For Bachelor of Science Part – I : (Sem.- II)
PAPER – III: FERMENTOR DESIGN AND INSTRUMENTATION

		No. of lectures

Unit I.	**1.Basic Fermentor design:** Parts and their functions of Conventional stirred tank fermentor
	
	2. Fermentor Configurations –
	  a. Airlift Fermentor
	  b. Fluidised bed fermentor
	  c. Packed bed fermentor
		9

Unit II	**Instrumentation and control:** a) Basic concepts of control systems b) Designs and working principles of instruments and systems for control of – temperature, pressure, foam, pH, redox potential, oxygen tension (DO), exit gas analysis, medium composition analysis	9
Unit III	**Principle , Working and Applications of Instruments in Process Control-** a. pH meter b. Spectrophotometer c. Polarimeter	9

Unit IV	**Computers-**
	a. Introduction
	
	b. Applications of computers in fermentation technology – data logging,
	
	  data analysis, process control
	
	c. Practical implementation of basic computer control strategies for
	
	  enzyme production.
		9

PAPER IV : FERMENTATION TECHNIQUES

		No. of lectures
Unit I	**Microbial Fermentations :** 1. Concept of Primary and Secondary Metabolite 2. Industrial Production of – a. Baker's Yeast	9

b. Alcohol

c. Penicillin

Unit II	**Methods of recovery and purification of fermentation products** a) Precipitation, filtration and centrifugation b) Cell disruption c) Liquid-liquid extraction and solvent recovery e) Chromatography – adsorption, ion exchange, gel, affinity. f) Distillation g) Crystallisation	9
Unit III	**Detection and Assay of fermentation products-** a) Physical and Chemical assays b) Biological assay of Vitamins and Antibiotics.	9
Unit IV	**Fermentation Economics-** Fermentation economics with respect to raw material, production process, recovery process and product economics.	9

B) PRACTICAL COURSE FOR B. Sc. I INDUSTRIAL MICROBIOLOGY

1. Study of laboratory equipments:
   a) Optical compound microscope   b) Incubator
   c) Hot air oven   d) Autoclave
   e) Centrifuge   f) Seitz filter
   g) Spectrophotometer   h) pH meter

2. Preparation and sterilization of media suitable for the growth of:
   a) Bacteria – Nutrient agar/soil extract agar/soybean casein digest agar
   b) Molds – Potato dextrose agar/Czapek Dox agar
   c) Yeasts – Glucose yeast extract agar/ Sabouraud's agar
   d) Actinomycetes – Glycerol Asparagine agar/coconut water agar
   e) Lactic acid bacteria – Neutral red chalk lactose (NRCL) agar/atypical peptone tryptone (APT) agar
   f) Algae – Geitler's medium

3. Isolation and cultivation of microorganisms from appropriate sources on the media described above and their microscopic examination.
   a) Bacteria – From soil, monochrome and Gram staining
   b) Fungi – *Aspergillus* and *Penicillium* from soil, lactophenol mounting
   c) Yeasts – *Saccharomyces cerevisiae,* monochrome staining
   d) Actinomycetes – from soil and cultivation using coverslip/slide/agar cylinder methods and direct microscopic observation
   e) Lactic acid bacteria – from curd or buttermilk, gram staining

f) Algae – from appropriate sources, direct microscopic observation
4. Primary screening of:
   a) Amylase producers   b) Organic acid producers   c) Antibiotic producers
5. Demonstration of antimicrobial activity of actinomycetes by the Giant Colony technique
6. Effect of temperature, pH and osmotic pressure on growth of bacteria.
7. Separation of amino acids, sugars, organic acids by paper and thin layer chromatography.

PRACTICAL EXAMINATION

A) The practical examination will be conducted on two consecutive days for not less than

three hours and fifteen minutes on each day of practical examination.

B) Each candidate must produce a certificate from the Head of the Department in his/her college, stating that he/she has completed in a satisfactory manner the practical course on lines laid down from time to time by Academic council on the recommendations of Board of Studies and that the journal has been properly maintained. Every candidate must have recorded his/her observations in the laboratory journal and have written a report on each exercise performed. Every journal is to be checked and signed periodically by a member of teaching staff and certified by the Head of the Department at the end of the year. Candidates must produce their journals at the time of practical examinations.

Nature of the question paper and distribution of marks for B.Sc.I Industrial
 Microbiology.

Q.1 Isolation of Bacteria/ Yeast on suitable media , colony characters
   and Gram staining.   15

Q.2 Effect of environmental factors on growth of microorganisms.   10

Q.3 Mounting of Fungi / Algae   05

Q.4 Screening of Amylase producers/ Organic acid producers/ Antibiotic producers   10

Q.5 Spotting

                                                                          05

Q.6 Journal   05

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.

8.   Industrial Microbiology by A.H.Patel

9.   Microbiology by Pelczar, Reid & Chan.

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. Part-I Physics

SEMESTER II

Paper III : Kinetic theory of gases, Heat and Thermodynamics.

Paper IV : Electricity, Magnetism and Basic Electronics.

Shivaji University, Kolhapur.
B.Sc. Part-I – Physics Syllabus with effect from June 2010
Semester II
Subject – Physics Paper III
(Kinetic theory of gases, Heat and Thermodynamics)

UNIT-I
1) Ideal and Real gas :
       (6)
       Interpretation of temperature, Degree of freedom, Maxwell's law of equipartition of energy. Andrew's curve, critical constants, Relation between critical constants and Vander Waal's constants, reduced equation of state.
2) Thermometry :
       (3)
       Principle of thermometry, Mercury thermometer, Platinum resistance thermometer.

UNIT-II
Transport Phenomena :
       (9)
       Molecular collisions, mean free path and collision cross-section, Estimation of molecular diameter and mean free path (Elementary method), Clausius and Maxwell's equation for mean free path (without derivation) Transport of momentum (viscosity), energy (thermal conduction), mass (diffusion).

UNIT-III

Thermodynamics-I :
 (9)
Thermodynamical state, Thermodynamic equilibrium, Zeroth law of thermodynamics, First law of thermodynamics, reversible and irreversible changes, isothermal and adiabatic changes, Adiabatic relations, Work done during isothermal and adiabatic changes.

UNIT-IV
Thermodynamics-II :
 (9)
Carnot's reversible engine, Carnot cycle, Efficiency of Carnot's engine Carnot's theorem, Second law of thermodynamics (different statements), Entropy, principle of increase of entropy in natural processes (conduction and free expansion of gas), Third law of thermodynamics.

Semester II
Subject – Physics Paper IV
(Electricity, Magnetism and basic electronics)

UNIT-I
1) Dielectrics :
 (4)
Polarisation of dielectrics and polarisation vector, Displacement vector, Electric vector, Relation between E, P and D vectors, Electric susceptibility of dielectrics.
2) A.C. Circuits :
 (5)
Complex numbers and their application in solving a.c. series LCR circuit, complex impedance, Reactance, Admittance, and Susceptance, Resonance in series circuit, Sharpness of resonance (qualitative treatment only),Q-factor (definition only), A.C.Bridge- Owen's Bridge.

UNIT-II
1) Ballistic Galvanometer :
 (4)

Ballistic galvanometer, construction, theory, Damping correction, constants of B.G. (definitions only).

2) Magnetostatics :

(5)

Statement of Biot and Savert's law, Ampere's theorem, Magnetic induction due to straight solenoid and toroid.

UNIT-III

1) Network Theorems :

(3)

Thevenin's theorem, Nortan's theorem, Application to simple networks with D.C. sources.

2) Semiconductor Diodes :

(6)

Qualitative discussion of circuit action of Bridge rectifier, Pi-filter, Clippers and Clampers, Photo diode.

UNIT-IV

Transistors (BJT) :

(9)

Configuration of transistor, Transistor characteristics in CE, CB and CC mode, Transistor as an amplifier in CE mode, Comparative study of CE, CB and CC configurations.

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 9th edition – Young and Freedman.

B.Sc. Part I
Physics Practical (w.e.f. June 2010)

Group A
1. Moment of inertia of a disc using auxiliary annular ring.
2. Bifilar Pendulum – Determination of M.I. of a rod.
3. Kater's Pendulum.
4. Poission ratio for rubber using rubber tube.
5. Y - by uniform bending.
6. Surface Tension of Liquid by Jaeger's method.
7. Viscosity of a liquid by Poiseuille's method.
8. Temperature coefficient of resistance.
9. Frequency of a.c. mains by sonometer.

10. Exponential decay of amplitude of simple pendulum.

Group B
11. Calibration of Spectrometer – unknown wavelength measurement.
12. Newton's rings – measurement of wavelength.
13. Plane diffraction grating.
14. Verification of Kirchhoff's laws.
15. Impedance of series LCR circuit.
16. Bridge rectifier with Pi filter.
17. Zener diode as voltage regulator.
18. Output characteristics of transistor – CE mode
19. Liquid lens.
20. Thevenin's theorem.

Note: Students should perform at least eight experiments from each group.

Reference Books
1. College Practical Physics – Khanna and Gulati (S. Chand and Co. Ltd, Delhi).
2. Practical Physics – Gupta and Kumar (Pragati Prakation Meerat)
3. Advanced Level Practical Physics – J.M. Nelcon, J.M. Ogloom (EIBS).
4. Advanced Practical Physics – Worsnop and Flint.
5. A Text Book of Practical Physics - Shrinivasan and Balasubramanyam.
6. A Text Book of Practical Physics – Indu Prakashan and Ramkrishna.

Scheme of Theory Examination for B.Sc. part –I

1. Two theory papers for each semester.
2. Each paper is of two hour duration and of 50 marks.

Scheme of Practical Examination for B.Sc.Part-I

1. Practical Examination will be conducted for one day per batch at the end of second semester.
2. The Examination will be conducted in two sessions and each session will be of three hours duration.
3. Every candidate should perform one experiment from each group (total two experiments).
4. At least eighty percent practicals should be completed by the student.
5. The marks distribution for practical is as below.

Group A :	1. Experiment -	21 Marks.
	2.Certified Laboratory Journal -	08 Marks
Group B :	Experiment -	21 Marks.
	Total-	50 Marks.

SHIVAJI UNIVERSITY, KOLHAPUR
REVISED SYLLABUS FOR F. Y. B. Sc. STATISTICS
(w.e. from June, 2010)

SEMESTER-II
PAPER-III
DESCRIPTIVE STATISTICS-II

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 correlation coefficient, interpret its value and use in regression analysis
1) To analyze data pertaining to attributes and to interpret the results.
2) To compute and interpret some measures of mortality, fertility and reproduction
   rates.

Unit-1. Correlation:
(11)

1.1: Bivariate Data.

1.2: Concept of correlation between two variables, Types of correlation.

1.3: Scatter diagram, its utility.

1.4: Covariance: Definition, Effect of change of origin and scale.

1.5: Karl Pearson's coefficient of correlation (r): Definition, Computation for ungrouped
    and grouped data,
    Properties (with proof): i) $-1 \leq r \leq 1$, ii) Effect of change of origin and scale.

1.6: Interpretation when $r = -1, 0, 1$.

1.7: Spearman's rank correlation coefficient: Definition, Computation (for with and
    without ties). Derivation of the formula for without ties and Modification of the
    formula for with ties.

1.8: Illustrative examples.

Unit-2. Regression:
(11)

2.1: Concept of regression, Lines of regression, Fitting of lines of regression by the
    least square method.

2.2: Regression coefficients (b_{xy}, b_{yx}) and their geometric interpretations,
    Properties: i) $b_{xy} \times b_{yx} = r^2$,   ii) $b_{xy} \times b_{yx} \leq 1$,   iii) $(b_{xy} + b_{yx}) / 2 \geq r$,
                iv) Effect of change of origin and scale on regression coefficients.

2.3: The point of intersection of two regression lines.

2.4: Derivation of acute angle between the two lines of regression.

2.5: Illustrative examples.

Unit-3. Theory of Attributes:
(12)

3.1: Attributes: Notation, dichotomy, class frequency, order of class, positive and
    negative class frequency, ultimate class frequency, fundamental set of class
    frequency, relationships among different class frequencies (up to three attributes).

3.2: Concept of Consistency, conditions of consistency (up to three attributes).

3.3: Concept of Independence and Association of two attributes.
3.4: Yule's coefficient of association (Q): Definition, interpretation.
3.5: Coefficient of colligation (Y): Definition, interpretation.
3.6: Relation between Q and Y: $Q = 2Y/(1+Y^2)$, $|Q| \geq |Y|$.
3.7: Illustrative examples.

Unit-4. Elements of Demography:
(11)
4.1: Introduction and need of vital statistics.
4.2: Mortality rates: Crude Death Rate (CDR), Specific Death Rate (SDR), Standardized
     Death Rate (STDR).
4.3: Fertility rates: Crude Birth Rate (CBR), General Fertility Rate (GFR), Age Specific
     Fertility Rate (ASFR), Total Fertility Rate (TFR).
4.4: Reproduction rate: Gross Reproduction Rate (GRR), Net Reproduction Rate (NRR).
4.5: 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, Lowa State University Press.
6. Waiker and Lev.: Elementary Statistical Methods.
7. Srivastav D. S.: A text book of Demography.

8. Speigelman: Demography.

9. Thigale T. K and Dixit P. G. (2007): A Book of Paper-I for B. Sc.-I, Nirali Publication, Pune.

10. Gputa V.K. & Kapoor S.C. Fundamentals of Mathematical

Statistics.- Sultan &   Chand

SEMESTR-II

PAPER-IV

DISCRETE PROBABILITY DISTRIBUTIONS

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).

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

1) To apply discrete probability distributions studied in this course in different
   situations.

Unit-1. Univariate Probability Distributions (Defined on finite and countably
     infinite sample space):
(10)
1.1: Definition of discrete random variable.

1.2: Probability mass function (p.m.f.) and cumulative distribution function (c.d.f.) F (.)

    of a discrete random variable, Properties of c.d.f. (statements only).

1.3: Probability distribution of function of random variable.

1.4: Median and Mode of a univariate discrete probability distribution.

1.5: Examples.

Unit-2. Mathematical expectation (Univariate random variable): (10)

2.1: Definition of expectation of a random variable, expectation of a function of a random
    variable.

2.2: Results on expectation, i) $E(c) = c$, where c is a constant,
                      ii) $E(aX + b) = a E(X) + b$, where a and b are constants.

2.3: Definitions of mean, variance of univariate distributions. Effect of change of origin
    and scale on mean and variance.

2.4: Definition of raw, central moments. Pearson's coefficient of skewness, kurtosis.

2.5: Definition of probability generating function (p.g.f.) of a random variable. Effect of
    change of origin and scale. p.g.f. of sum of two independent r.v.s is the product of   p.g.f.s (statement only). Definition of mean and variance by using p.g.f.

2.6: Examples.

Unit-3. Some Standard Discrete Probability Distributions: (Defined on finite sample
        space):
(13)

3.1: Idea of **one point**, **two point** distributions and their mean and variances.

3.2: **Bernoulli Distribution**: p.m.f., mean, variance, distribution of sum of
    independent and identically distributed Bernoulli variables.

3.3: **Discrete Uniform Distribution**: p.m.f., mean and variance.

3.4: **Binomial Distribution**: p.m.f., $P(x) = {}^{n}C_{x}\ p^{x}\ q^{n-x}$, x = 0,1,2,3, ….., n.

                                      $0 \le p \le 1, q = 1-p.$

                        $= 0$, o. w.

    Notation: X ~ B (n, p), Recurrence relation for successive probabilities, Computation

of probabilities of different events, p.g.f. and hence mean and variance, Additive
  property of binomial variates. Examples.

3.5: **Hypergeometric Distribution**: p.m.f.,

$$P(x) = \frac{{}^{M}C_x \; {}^{N-M}C_{n-x}}{{}^{N}C_n} \quad , \textbf{x = max [0, n - (N-M)],…………, min (n, M).}$$

$$= 0 \qquad \text{, o.w.}$$

  Notation: X ~ H (N, M, n).
   Computation of probability of different events, Recurrence relation for successive
   probabilities, mean and variance of distribution assuming n ≤ N-M ≤ M, Binomial
   approximation to Hypergeometric. Examples.

Unit-4. Some Standard Discrete Probability Distributions (Defined on countably
        infinite sample space):
(12)

4.1: **Poisson Distribution**: p.m.f., $P(x) = \dfrac{e^{-\lambda} \lambda^x}{x!}$, x = 0, 1, 2, ...…….., λ > 0.

$$= 0 \qquad \text{, o.w.}$$

   Notation: X ~ P (λ), mean, variance, p.g.f., Recurrence relation for successive
   Probabilities, Additive property of Poisson distribution. Poisson distribution as a
   limiting case of Binomial distribution. Examples.

4.2: **Geometric Distribution**: p.m.f., P(x) = p q^x , x = 0, 1, 2, 3, ..., 0< p ≤ 1, q = 1- p

$$= 0 \qquad \text{, o. w.}$$

   Notation: X ~ G (P). Mean, Variance, distribution function, p.g.f., Lack of memory
    property. Examples and problems.

4.3: **Negative Binomial Distribution**: p.m.f., P(x) = $^{x+k-1}C_x \, p^k \, q^x$, x = 0, 1, 2, ...

$$k > 0, 0 < p \leq 1, q = 1 - p$$

$$= 0 \qquad , o. w.$$

Notation: $X \sim NB(k, p)$. Geometric distribution is a particular case of Negative

Binomial distribution, Mean, Variance, p.g.f., Recurrence relation for successive

probabilities. 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, Addision
   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%.

Practical Paper-I

Pre requisites: Knowledge of the topics in the theory papers.

Objectives: At the end of this course students are expected to be able-
  1. To represent statistical data diagrammatically and graphically.
  2. To compute various measures of central tendency, dispersion, moments, skewness
     and kurtosis.
  3. To compute correlation coefficient, regression coefficients.
  4. To analyze data pertaining to discrete & continuous variables & to interpret the
     results.
  5. To understand Consistency, Association and Independence of Attributes.
  6. To compute Mortality, Fertility and Reproduction rates.
  7. To interpret summary Statistics of computer output.
  8. To know applications of some standard discrete probability

  distributions.

List of Practicals:

  1. Graphical presentation of the frequency distribution (Histogram, frequency polygon,
     frequency curve, Location of Mode, Ogive curves, Location of Partition values).
  2. Measures of Central tendency – I (ungrouped data).
  3. Measures of Central tendency – II (grouped data).
  4. Measures of the Dispersion – I (ungrouped data).
  5. Measures of the Dispersion – II (grouped data).
  6. Moments, Skewness & Kurtosis-I (ungrouped data).
  7. Moments, Skewness & Kurtosis-II (grouped data).
  8. Correlation coefficient and Spearman's Rank correlation: ungrouped data.
  9. Correlation coefficient: grouped data.
10. Regression-I (ungrouped data).
11. Regression-II (grouped data).
12. Attributes: Missing frequencies & consistency, Association & Independence.
13. Applications of Binomial Distribution.
14. Applications of Hypergeometric Distribution.
15. Applications of Poisson Distribution.
16. Applications of Geometric and Negative Binomial distribution.
17. Demography-I (Mortality rates).

18. Demography-II (Fertility and Reproduction rates).
19. Using MS-EXCEL: Diagrammatic and Graphical presentation, Compute A.M., G.M.,
    H.M., Variance, C.V., M.D.
20. Using MS-EXCEL: Moments, Correlation and Regression (ungrouped data).

Notes:
  i) Elementary statistical analysis using MS-Excel: Numerical computations and
    computations using library functions.

  ii) Knowledge of MS-EXCEL Spreadsheet should be tested on computers at the
    time of Viva-Voce.

 iii) Student must complete all the practicals to the satisfaction of the teacher

concerned.

 iv) Students must produce laboratory journal along with completion certificate
    signed by Head of the Department, at the time of practical examination.

Laboratory Requirements:

        Laboratory should be well equipped with sufficient number of electronic calculators and computers along with necessary Software's, UPS and Printers.

Nature of Practical Question Paper of Statistics, B.Sc. –I

a) In the practical question paper there shall be four questions each of twenty marks,

a student has to attempt any two questions. In only one of the four questions there
  shall be a sub-question of about 5 marks based on MS-EXCEL.

b) Evaluation of the MS-EXCEL based questions will be online and should be
  demonstrated to examiner.

c) 5 marks are reserved for the journal and 5 marks for the oral examination.

d) Practical examination be of four hours duration which includes viva examination
  and on line demonstration.

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SHIVAJI UNIVERSITY, KOLHAPUR
Bachelor of Science in Zoology
(Subject to the modifications to be made from time to time)
(Syllabus of B.Sc.I to be implemented from June 2010 onwards which is based on semester system)

Syllabus – (As per U.G.C. guidelines) for B.Sc. I Zoology to be submitted to

the Shivaji University, Kolhapur (To be implemented from June 2010)

Semester System

Revised Syllabus for
B.Sc. Part – I
SemesterII
(Introduced from June 2010 onwards)
Paper –I
TITLE OF PAPER - (Animal Diversity –II,)

C) Lectures / Contact hours per unit - 10
D) Contact hours per practical – 04

UNIT – I
 1) Classification - Salient features and classification of chordates up to order of the

following with suitable examples –Urochordata, Cephalochordata, Agnatha, Pisces and Amphibia.   5

UNIT – II
1) Cephalochordata – Type Study – Amphioxus   6
a) Morphology
b) Digestive system and feeding mechanism
c) Circulatory system
d) Excretory system
2) Cyclostomata – General Characters   1
3) Pisces – a) Scales in fishes   4
b) Fins in fishes
c) Structure of gills in cartilaginous and bony fish

UNIT – III
1) Amphibia – Type Study – Frog   11
a) Morphology
b) Digestive system and physiology of digestion
c) Respiratory system and mechanism of respiration
d) Blood vascular system
i) Structure and working of heart
ii) Arterial system
iii) Venous system
iv) Blood – Composition, function and clotting of blood.

UNIT – IV
 1) Amphibia – Type Study – Frog   11
e) Excretory system and physiology of urine formation
f) Reproductive system
g) Nervous system – Brain and spinal cord
h) Sense organs – Eye and Ear

Total periods: 38

Revised Syllabus for
B.Sc. Part – I
(Introduced from June 2010 onwards)
SemesterII
Paper –II
TITLE OF PAPER - (Ecology, Ethology, Evolution and Applied Zoology)

UNIT – I
1) Ecology   16
a) Biotic and Abiotic factors and their influence on Ecosystem
b) Brief idea of species, community, Niche, Ecosystem Biome and Biosphere
c) Food chain, Ecological pyramids and energy flow with reference to pond and grass

land ecosystem

UNIT – II
1) Ethology   7
a) Mimicry in monarch butterfly and in stick insect. Camouflage in chameleon
b) Courtship behavior in Scorpion and weaver bird
c) Social behavior in Honey bees

UNIT – III
1) Evolution   7
a) Formation and dating of fossils
b) Connecting link- Peripatus and Archaeopteryx
c) Living fossil – King crab (limulus and Sphenodon)

UNIT – IV
1) Applied Zoology – Sericulture   7
a) Types of silk moth
b) Morphology of mulberry silk moth
c) Life Cycle
d) Rearing of silk moth
e) Economic importance

Total Periods: 37

List of Recommended Books:

1) Evolution & Biostatistics – by N. Arumugam & R. P. Meyyan.
2) Environmental Studies – Based on UGC syllabus – N. Arumugam & V.
   Kumaresan
3) Organic Evolution – N. Arumugam
4) Chordate Zoology – A. Thangamani, S. Prasanna Kumar, N. Arumugam, L. M.
   Narayanan
5) Ecology – By E. P. Odum
6) The Protochordates – by S. H. Bhamrah and Kavita Juneja – Anmol Publications,
   New Delhi
7) Introduction to Protochordata – S. H. Bhamrah and Kavita Juneja – Anmol
   Publications, New Delhi
8) Chordate Zoology – S. Chand Company, New Delhi
9) Text Book of Zoology – Vertebrates, Vol. II – T. J. Parker and W. A. Haswell
    Edited by Marshall and Williams, CBS Publications and Distributors, New Delhi.
10) E. L. Jordan – Chordate Zoology, S. Chand and Company, New Delhi.

11) Odum – Ecology (Amerind)
12) Fundamentals of Ecology – Odum – (Saunders)
13) Ecology – Rickelfs (W.H. Freeman)
14) Immelamann – Introduction of Ethology (Plenum Press)
15) The Foundations of Ethology (Spinger Verlog)
16) Economic Zoology – Shukla and Upadhyaya – Rastogi Publications
17) Economic Zoology – Venkitraman (Sudarshana Publishers)
18) A Text Book of Chordates – A. Thangamani, L. M. Narayan, S. Prasannakumar, N. Arumugam
19) R. L. Kotpal – Modern Text Book of Zoology, Vertebrates
20) A. Arumugam, J. Johnson Rajeshwar, S. Arumuam, R. Ram Prabhu – Applied Zoology

Practical Course in Zoology for B. Sc. I

Annual Pattern

UNIT – I

I.
1) Classification of Nonchordates up to classes
a) Protista – Amoeba, Paramoecium, Euglena, Plasmodium.
b) Porifera – Sycon, Spongilla, Hyalonema / Euplectella.
c) Coelenterata – Hydra, obelia, Aurelia, Sea anemone, Gorgonia
d) Platyhelminthes – Planaria, Liverfluke, Tapeworm
e) Nemathelminthes – Ascaris
f) Annelida – Nereis, Earthworm, Leech.

II.
1) Earthworm
    Dissection of – i) Heart & longitudinal blood vessels
                    ii) Nervous system
2) Mounting of Earthworm -

i) Blood glands

ii) Septal nephridium

3) Mounting of Sponges

i) Sponge spicules

ii) Spongin fibres

UNIT – II

I.

1) Study of following

a) Paramoecium - Binary fission and conjugation

b) Sycon - T.S. / L. S. of Sycon

c) Hydra - W.M. with bud, T.S. of hydra through ovary, T. S. of hydra through testis

d) Ascaris - male, female

II.

1) Examples in Genetics – Examples based on Monohybrid cross, Dihybrid cross and Multiple Alleles (At least 10 examples must be solved)

_____

Practical Course in Zoology for B. Sc. I

Annual   Pattern

UNIT – I

I)

2) Classification of Chordates up to order

a) Urochordata - Herdmania, Salpa, Doliolum

b) Cephalochordata - Amphioxus

c) Cyclostomata – Petromyzon, Myxine

d) Pisces – Dog fish, Hammer headed fish, Sting ray, Electric ray, Labeo, Flying fish, Sea horse, Eel fish

e) Amphibia – Ichthyophis, Frog, Toad, Salamander

II)

1) Study of following

a) Amphioxus – T.S. through pharynx, T.S. through intestine, T.S. through tail

b) i) Various types of fins in fishes

ii) Homocercal & Heterocercal tail in fishes

iii) Gills of cartilaginous and bony fishes

III)
Mounting of Fish scales
      i) Placoid
      ii) Cycloid

IV)
Mounting of any vertebrate blood.

UNIT – II
I)
2) Frog - Demonstration of Heart, Digestive system, Lungs, Kidneys, Ovaries, Testis,
   Blood and Brain Axial and Appendicular skeleton

II)
Cytological Preparations.:
      1) Mitochondria – Stained preparation of mitochondria from onion peeling /
        Hydrilla leaf / Oral mucosa by using Janus Green B.
      2) Polytene Chromosome – Stained preparation of Polytene chromosome in
        chironomous larva/ Drosophila larva.

III)
Study of following :
      1) Mimicry in stick insect, Camouflage in chameleon
      2) Honey bee - Observation of Queen, Drone, Worker bees and Bee hive.
      3) Sericulture - Life cycle of mulberry silk worm. Egg, larva, cocoon, adult (male
        & female)

IV)
 Study Tour – Visit to sea shore or any other suitable place to
         study Ecosystem, Animal Diversity, Animal behavior etc.

Shivaji University , Kolhapur
B.Sc- Part-I
Skeleton Paper for Practical Examination.
(To be implemented from June 2010)
      Maximum Marks: 50

Q.1 Dissection of Earthworm   **12**

Q.2 Temporary stained preparation /Mounting   **05**

Q.3 Cytogical Stained preparation   **07**

Q.4 Example in Genetics   **06**

Q.5 Spotting/Identification(10 spots)   **10**

1. Identify and classify giving reasons
2. Identify and describe
3. Identify and mention the morphological peculiarities
4. Identify and classify giving reasons
5. Identify, Sketch and label the parts.
6. Identify and describe
7. Identify and describe the morphological peculiarities
8. Identify, Sketch and label the parts.
9. Identify and give the functions
10. Identify and describe its ethological peculiarities

Q.6 Journal   **05**

Q.7 Study Tour Report   **05**

Syllabus for B. Sc. Sem-II, Biotechnology (Entire)

BTE 201- Paper-X
Organic and Inorganic Chemistry

Topic No.		Lectures 45
	Unit- I	
1.	*Mechanistic Basis of Organic Reactions*	13
	1.1 SN^1 and SN^2 mechanisms (Hydrolysis of t-butyl halide and primary alkyl halide) with energy profile diagram.	
	1.2 Elimination reactions- E1 and E2 mechanisms (Dehydration of alcohol), Hoffman's and Saytzeff's rules- statements and justifications.	
	1.3 Addition reactions- Electrophilic addition reactions in alkenes (Markovnikoff and anti-Markovnikoff additions), nucleophilic addition reactions of carbonyl compounds (cyanohydrin formation).	
	1.4 Concept of an aromaticity.	
	1.5 Mechanism of SE reactions in benzene- Nitration,	

		sulphonation, halogenation, diazotization, Friedel-Craft's alkylation and acylation reactions. 1.6 Orientation effects as exemplified by various functional groups. (Nitro and –OH group) *1.7 Structure- reactivity correlation w.r.t. inductive, mesomeric, and steric effects.* *1.8 Tautomerism.*	
		Unit-II	10
2.		*Stereochemistry*	
3.		2.1 Geometrical isomerism in alkenes. 2.2 Optical activity-Polarimeter, specific rotation. 2.3 Chirality- Chiral molecules, symmetry elements, asymmetric carbon, compounds with one and two chiral centers, diastereomers. 2.4 E-Z and R-S nomenclatures. 2.5 Stereospecific and stereoselective reactions with example of an enzymatic reaction. 2.6 Numerical Problems	
		Unit- III	
		Chemistry of Natural Products	05
4.		3.1 **Terpenoids**-Isoprene rule, structure determinations of citral. 3.2 **Natural Pigments**- Carotenoids and their functions in Plants, structural details of chlorophyll**.** 3.3 **Alkaloids**- Basic structure, classification with suitable examples..	
		Chromatography	06
		4.1 Introduction- Definition, classification. 4.2 Principle, Technique and application of paper chromatography and TLC.	

		Unit- IV	
5.		**UV-Visible Spectroscopy** 5.1 Introduction. 5.2 Electronic Transitions and designation of UV-bands. 5.3 General applications, spectrum, isolated double bonds, conjugated dienes, carbonyl compounds, aromatics. 5.4 Analytical uses. 5.5 Lambert-Beer's law 5.6 Instrumentation with respect to colorimeter and single beam spectrophotometer. 5.7 Applications of UV and Visible spectroscopy.	11

References-(Use recent Editions)

Topic No.	SECTION–I Topics	Lectures 45
	Unit-I	
1	**Optics correlated with microscopy:** Concept of interference and diffraction, Diffraction gratin (Description only), concept of polarization and plane polarized light, production of polarized light by absorption, reflection, refraction and scattering, Nicol prism, definition of optical activity,	**10**

1) University General Chemistry - C. N. R. Rao, Macmillan.
2) Physical Chemistry - R. A. Alberty, Wiley Eastern Ltd.
3) Quantum Chemistry Including Molecular Spectroscopy- B. K. Sen.
4) Organic Chemistry - D. J. Cram and G. S. Hammond (Mcgraw-Hill).
5) A Guide-book to Mechanism of Organic Chemistry-Peter Sykes-6th Edition.
6) Theoretical Principles of Inorganic Chemistry- G.S. Manku
7) Physical Chemistry by Sharma and Puri
8) Instrumental methods of chemical analysis- Chatwal & Anand
9) Instrumental methods of chemical analysis- B. K. Sharma
10) Organic Chemistry VOL-II 5th Edition- I. L. Finar
11) An introduction to electrochemistry- Samuel Glassstone
12) The elements of physical chemistry – P.W. Atkins.
13) Essential of physical chemistry- B .S. Bahel. & G. D.Tuli.
14) Principels of Physical Chemistry – S.H Maron & Pruton
15) Concisein Inorganic chemistry – J.D. Lee
16) Organic Chemistry – Morrison & Boyd.

BTE 202 – Paper-XI
Applied Physics

	LASER- LASER action (Energy level diagram), properties of LASER, applications of LASER.	
2	**Unit- II** **Bioelectricity** Introduction, electricity observed in living systems-examples, origin of bioelectricity, resting potential and action potential, Nernst equation, conduction velocity, origin of compound action potential, Electrocardiogram (ECG), Electroencephalogram (EEG), Electromyogram (EMG), Electroculogram(EOG),	13
3	**Unit- III** **Semiconductor Devices and Digital Electronics** Light Emitting Diode (LED), seven segment display, photodiode, optocoupler, spectral distribution of solar energy, solar cell-construction, working efficiency and fill factor, applications of solar cell. Binary and BCD number system, Basic logic gates OR, NOR, AND, NANA and NOT, Demorgans theorem, various waveforms used in electronics- square wave, sine wave, triangular wave, saw tooth wave and stairs case.	10
4	**Unit- IV** **Atomic structures and X-rays** Introduction, J. J. Thomson atomic model, Rutheford atomic model and Bohr model, Limitations of Bohr atomic model, Energy level diagram of Hydrogen atom,, Quantum numbers, Nuclear models and forces(Liquid drop modem and shell model), production of x-rays and its properties, Continuous and characteristics X-ray spectrum, Brags law, Applications of X-rays	12

References:

1. Physics by Devid Hallday Roberet Resnik, (Vol-I and Vol-II) Wiley Eastern limited
2. Fundamental of Mechanics, S.K.Saxena,Himalaya Publications
3. Perspectives of modern physics, Aurthur Beiser, McGrawHill Publication
4. Heat and Thermodynamics,Zemansky, McGrawHill Publication
5. Fundamentals of optics,Jenkins white, McGrawHill Publication

6. Text book of optics, N.Subrahmanyan Brijlal, S.chand and Company Limited
7. Optics by Ajoy Ghatak ,Tata McGrawHill   Publication
8. Properties of Matter, D.S.Mathur,Sha,alal Charetible trust
9. Solar Energy, Suhas Sukatme,Tata McGrawHill Publication
10. Principle of electronics, V.K.Mehta, S.chand and Company Limited
11. Digital Principles and application, Malvino and Leach,Tata McGrawHill
    Publication
12. Elements of Spectroscopy, Gupta,Kumar,Sharma, Pragati Prakashan
13. Introduction to Atomic spectra, H.E.White ,McGrawHill Publication
14. Biophysics, Vastala Piramal, Dominent Publishers and Distributor

BTE 203 – Paper-XII
Animal Science

Topic No.		Lectures 45
1.	**Unit- I**	**12**
	1.1. General classification of animal kingdom.	02
	1.2. Non-chordates –Study of phylum Porifera, Ceolenterata, Platyhelmenthes, Nemathelmenthes, Arthropoda, Mollusca & Echinodermata – General characters with representative examples-	06
	Sycon, Hydra, Liver fluke/ Taenia, Earthwarm / Nereis, Cockroach,	04

	Pearl oister / Pila, Starfish 1.3. Chordates:- Study of class Pisces, Amphibia, Reptilia & Mammalia – General characters with representative examples – Lebeo, Frog, Cobra, Alligator, Fowl and Rat	
	Unit- II	**11**
2.	**Host Parasite Relationship**	
	2.1 Protozoan parasite- Plasmodium	02
	2.2 Nematode parasite- Ascaris	03
	2.3 Platehelminthes parasite- Liver fluke, & Tape worm- Teania solium	06
.	**Unit- III**	**12**
3.	3.1 Tissues i) Epithelial ii) Muscular iii) Nervous iv) Connective tissue- Blood (Plasma, Serum, Clotting), Bone, Cartilage.	05
	3.2. Histological Architecture i) Skin ii) Tooth iii) Liver iv) Kidney v) Uterus	07
	Unit- IV	**10**
4.	**Applied zoology**	
	8.1 Vermiculture	02
	8.2 Apiculture	02
	8.3 Sericulture	02
	8.4 Pearl culture	02
	8.5 Pisci culture	02

Reference Books :

1. Kotpal – Invertebrates
2. Kotpal – Chordates
3. Shukla and U. Pandey- Applied Zoology.

BTE204 – Paper-XIII
Statistical methods

	SECTION II	**Lectures 45**

1	**Unit- I** **Introduction to statistics and collection of data.** 1.1 Meaning of statistics 1.2 Scope of statistics in Biological and medical sciences 1.3 Primary and Secondary data 1.4 Classification of data, Inclusive and Exclusive methods, Discrete and Continuous frequency distribution. 1.5 Cumulative frequencies 1.6 Graphical representation :- Histogram and ogive curves	**09**
2	**Unit- II** **Measures of central tendency and measures of dispersion** 2.1 Concept of measures of central tendency 2.2 Definitions of A.M., Median, Mode, Quartiles, Weighted mean, Examples on ungrouped and grouped data. 2.3 Properties of A.M. (statement only) 2.4 Methods of obtaining mean & quartiles graphically 2.5 Concept of measures of dispersion . Absolute and Relative measures of dispersion. 2.6 Definitions of Range, Q.D, S.D and variance , coefficient of variation. Examples on grouped and ungrouped data	**13**

3	**Unit- III**
	 Correlation and Regression
	 3.1 Concept of correlation between two variables and types of correlation.
	 3.2 Method of obtaining correlation (i) by scattar diagram method
	         ii) By Karl Pearson Correlation coefficient
	         iii) By Spearman's Rank correlation coefficient with and without tie.
	         Properties of correlation coefficient.
	 3.3 Examples on ungrouped data
	 3.4 Concept of regression, Lines of regression Regression coefficients and properties without proof.
	 3.5 Examples on ungrouped data.
	 3.6 Idea of multiple and partial correlation
		10

4	**Unit- IV** **Probability and Sampling** 4.1 Definition of sample space, Outcomes, events, exhaustive events, Mutually exclusive events, Equally likely events, certain events impossible events. 4.2 Definition of probability, Limits of probability.	**13**

	Probability of complementary event, Additive law of probability. Simple illustrative examples.	
4.3	Definition of conditional probability, Multiplicative law of probability, Independent events, Simple illustrative examples.	
4.4	Idea of population and sample. Simple Random Sampling and Stratified Random sampling. Advantages and disadvantages of both the methods.	
4.5	Testing of hypothesis Simple and composite hypothesis, Null and alternative hypothesis, types of errors, Critical region, Acceptance region, level of significance.	
4.6	Tests of significance: Chi square tests, t tests and F test.	

Recommended books for statistics:

1) Goon A. M., Gupta M. K. and Dasgupta B.:
   Fundamentals of mathematical statistics vol. I & II. World Press, Calcutta.
2) Gupta & Kapoor: Fundamental of mathematical statistics.
3) Thingale T. K. and Dixit P. G. (2003): A text book of paper- I for B.Sc. I, Nirali Publication, Pune.
4) Waiker and Lev: Elementary Statistical methods.
5) Rohatgi V. K. and Sauh A. K. Md E. (2002)
   An Introduction to probability and statistics (John Wiley & Sons-Asia).
6) Thigale T. K. and Dixit P. G. (2003): A text book Of paper II for B.Sc. I.
7) Meyer P. L. (1970): Introductoryto probability and statistical Application. Addision wesly.
8) Cochran, W.G.: Sampling Techiniques, Wiley Estern Ltd., New Delhi.
9) Des Raj : Sampling theory

BTE 205 – Paper-XIV
Proteins and Enzymes

		Lectures 45
1	**Unit- I** **Protein:** Amino acid classification (Side chain, nature of R group, incorporation in proteins), structure & properties of amino acids, acid base behavior and reactions, zwitterions, peptide bond, Determination of primary structure (Sanger's method, Edman's method, Dansyl	13

	chloride, Dabsyl chloride), Forces stabilizing secondary structure, Ramchandran plot, Tertiary structure (Describe different bonds) Quaternary structure Hb & antibody)	
2	**Unit- II** **Protein purification :** Method of cell disruption (Blenders, grinding with abrasives, presses, enzymatic method, sonication); Salt participation- Salting in, salting out, organic solvent precipitation, dialysis, ultra filtration, paper electrophoresis, centrifugation (Basics, Principal, Svedberg's constant)	**10**
3	**Unit- III** **Enzymes:** Introduction, IUB classification, active site, energy of activation, transition state hypothesis, lock and key hypothesis, induced fit hypothesis, allosteric enzymes, enzyme inhibition, MM equation, Line weaver- Burk plot, Eadie-Hofstee plot.	**12**
4	**Unit- IV** **Co-enzymes:** Thiamine, riboflavin, niacin, pyridoxol phosphate, lipoic acid, panthothenic acid, folic acid. (Introduction, structure, chemistry, sources, daily requirement, deficiency, biological functions)	**10**

References:-
1) Biochemistry – Nelson & Cox
2) Biochemistry - Stryer
3) Enzymes - Trevor Palmer
4) Biochemistry - Voiet & Voiet
5) Biochemistry - J.L.Jain
6) Basic Biophysics- M. Daniel
7) Biochemistry -   Powar and Chatwal
8) Protein Purification- Harris and Angel
9) Practical biochemistry – Keith Wilson And Walker
10) Principles of Biochemistry - T. N. Pattabriraman.
11) Biochemistry 3rd Edition – Hames & Hopper.
12) General Biochemistry – J. H. Well.
13) Biochemistry – J. H. Ottaway & D. K. Apps
14) Biochemistry – Trchan
15) Text Book of Biochemistry- R.A. Joshi.
16) Biochemistry – U. Satyanarayanan
17) Biochemistry a Functional Approach – Robert W McGilvery & Goldstein
18) Text Book of Biochemistry – A.V.S.S. Rama Rao
19) Clinical Biochemistry –Praful B. Godkar.

BTE 206- Paper-XV

Advances in Cell Biology

		Lectures **45**
1	**Unit- I** **Secretary pathway and protein trafficking** 1.1 secretary pathway-ER associated ribosomal translation, co translational vectoral transport of nascent polypeptide chain to ER lumen 1.2 Transport to Golgi apparatus, secretary granules 1.3 Transport of proteins to- mitochondria, chloroplast, peroxisomes, nucleus	**13**
2	**Unit-II** **Cell signaling** 2.1 Introduction, general principles of cell signaling 2.2 Types of cell signaling-contact dependent signaling, autocrine, paracrine, synaptic, endocrine, gap junctions, combinatorial signaling 2.3 cell surface receptor proteins , Ion channel linked receptors, G-protein linked receptors, enzyme linked receptors , 2.4 signaling through G-protein linked receptors.	**10**
3	**Unit- III** **Cell division cycle** 3.1 Introduction, definition, phases of cell cycle 3.2 Control of cell cycle 3.3 Molecular events of cell cycle-CDK and cyclins, s-phase, CDK cyclins complex, M-phase CDK cyclins complex, anaphase promoting complex. 3.4 programmed cell death 3.5 Cancer -types, characteristics of cancer cells, causes of cancer, tumour suppressor genes, p 53	**12**
4	**Unit- IV** **Mechanism of cell division** 4.1 Introduction types of cell division-amitosis, mitosis and meiosis 4.3 Mitosis-history, steps involved in mitosis, factors affecting mitosis, unique features of M-phase 4.4 Meiosis -history, steps involved in meiosis, significance 4.5 Role of spindle fibres in chromosome separation. 4.6 Condensation of chromosome. 4.7 Synaptonemal complex.	**10**

References:-
20) Molecular biology of cell-Albert

21) Molecular biology & cell biology – Loddish et al
22) Cell biology –De Robertis
23) Cell biology-Genetics, molecular biology-P.S. Warma & Agarwal
24) Genes- Lewin
25) Cell biology –Geral karp
26) Practical biochemistry – Keith Wilson and Walker

BTE 207- Paper-XVI
Techniques in Microbiology

Topic No.		Lectures 45
1	**Unit- I** **Microbial growth:** Definition of growth, phases & growth curve a] Continuous culture b] Synchronous growth c] Diauxic growth Effect of environmental factors on growth-temperature, pH., osmotic pressure, hydrostatic pressure, surface tension, heavy metals, ultra violet light.	11
2	**Unit- II** **Microscopy** a] general priciples of microscopy (concept of optics, resolving power of microscope working distance.) b] study of compound microscope & electron microscope **Stains & staining procedures** a] definition of dye & stain b] classification of stains- acidic, basic, neutral c] theories, procedures & mechanism of simple staining, negative staining, differential staining-Gram staining. **Microbial nutrition** a] nutritional requirements b] classification on the basis of C & energy source c] bacteriological media-natural, syenthetic, semisythetic, differential, enriched, enrichment, selective, living media	**12**

		Lectures 45

3	**Unit- III**
	Techniques in microbiology
	Principle, working & application of
	    a) Laminar air flow
	    b) Outline of lypholization technique
	Techniques in microbial filtration, vacuum filtration, gravity, membrane, micro, nano, reverse osmosis
		11

4	**Unit- IV** **Soil microbiology** Definition of soil, layers, Soil micro flora, humus formation **Milk microbiology** Definition and composition, sources of microbes	**11**

References:

1) General microbiology-Stanier
2) Introduction to microbiology-Ingraham
3) Brock biology of microorganisms-Madigan etal
4) Fundamentals of microbiology-Frobisher
5) Microbiology-Pelczar
6) General microbiology -Pawar&Daginawala
7) Text book of microbiology-Ananthanarayan

BTE 208 – Paper-XVII
Computer Programming

		Lectures **45**
1	**Unit- I** **Introduction to Programming** Algorithm, Flowchart, Pseudocode	**10**
2	**Unit- II** **Fundamentals of C** Character set, keywords, identifiers, data types, constants, symbolic constants, escape sequences, variables. arithmetic, relational & logical operators, type conversions in expressions.	**10**
3	**Unit- III** **Input/output** Printf(), scanf(), getchar(), putchar(), gets(), puts(), enum, sizeof() operator Formatting input/output.	**10**
4	**Unit- IV** **Control Structures & Array** If, if..else, nested if, switch statement, while loop , do.. while loop , for	**15**

loop, continue & break statement
Array- declaration, initialization of One dimensional & two dimensional array, character array, strlen(), strcpy(), strcmp(), strcat().

Reference Books

1) Computer Fundamentals by P. K. Sinha
2) C Application programs and Projects by Pramod Vasambekar
3) Use of Computer from Vision Publication
4) Let Us C by Kanetkar
5) Ansi C by Balgurusami

BTE 111 -Techniques in Chemistry

Sr. No.	Name of the Practical	Practicals
1.	**Conductometry- (Any one)** 1.1 Determination of dissociation constant of a weak acid and study of effect of substituent on dissociation constant of weak acid. 1.2 Verification of Onsager equation and to determine μ of strong electrolyte.	01 01
2.	**Chemical Kinetics** 2.1 Acid catalyzed hydrolysis of methyl acetate. 2.2 Activation energy for an acid catalyzed hydrolysis of methyl acetate.	01 01
3.	**pH – metry** 3.1 Determination of pH of fruit juice and soil sample. 3.2 Verification of Henderson equation by using acidic buffers.	01
4.	**Thermo chemistry** – Determination of heat of ionization of a weak acid.	01
5.	**Organic Preparations-(Any Two)** 5.1 m-dinitrobenzene 5.2 Methyl salicylate 5.3 Nitro salicylic acid	01
6.	**Organic Estimations- (Any three)** 6.1 **Polarimeter** – Determination of specific rotation of sucrose sample and hence Determination of unknown	03

	sucrose concentration from the sample. 6.2 Estimation of sap value of given oil sample. 6.3 Estimation of amount of sucrose from sample using Fehling reagent. 6.4 Estimation of acid value of oil sample	
7.	**Standardization of solutions** 7.1 Preparation of standard potassium dichromate solution and determination of its normality using oxalic acid. 7.2 Preparation of dilute solution from given stock solution.	02
8.	**Inorganic preparations (Any one)** 8.1 Tetraammino copper (II) sulphate 8.2 Potassium trioxalato aluminate (III)	01
9.	**Inorganic Estimation :-** Estimation of amount of magnesium from talcum powder by complexometric titration.	01
10.	Verification of Beer-Lambert's Law using copper-ammonia complex.	01

Reference:- Chemistry
Text book of practical organic chemistry (4th Edition, Longman) – A .I. Vogel

BTE - 112 Laboratory Exercises in Microbiology

Sr. No.	Name of the Practical	Practicals 15
1.	Use , care and study of compound microscopy.	01

2.	Demonstration (Principle, working, constriction, & application) of
	    1. Hot air oven
	    2. Autoclave
	    3. Incubator
	    4. pH meter
	    5. Calorimeter
	    6. Seitz filter/syringe filter
	    7. Laminar air flow
	    8. Quebec colony counter
		01

3.	3.1 Microscopic examination of bacteria
	    a. Monochrome staining.
	    b. Gram staining
		04

	c. Negative staining.
	d. Capsule staining.
	e. Cell wall staining.
	3.2 Mounting and identification of Mold.
	   a. *Aspergillus*
	   b. *Penicillin*
	   c. *Mucor*
	   d. *Rizopus*	

4.	Preparation of culture media.
	   a. Bacterial-
	      i) Peptone water.
	      ii) Nutrient broth.
	      iii) Nutrient agar.
	      iv) Mac Conkey's agar.
	   b. Fungal-
	      i) Sabouraud's agar
	      ii) PDA
		02

5.	Isolation & enumeration of bacteria
	   a. Streak plate technique.
	   b. Spread plate technique
	   Pour plate technique
		02

6.	Observation of motility by hanging drop techniques.	01
7.	To study growth curve of bacteria.	01
8.	Isolation, colony character, Gram staining & motility of *E. coli, Bacillus*.	02
9.	Visit to dairy industry	01

BTE 113- Laboratory Exercises in Plant Science

Sr. No.	Name of the Practical	Practicals 15
1.	Study of algae (*Nostoc, Sargassum, Spirulina*) & fungi (*Yeast, Puccinia,Tricoderma)*	02
2.	Study of bryophyte (*Funaria, Riccia, Anthoceros*) & pteridophyte (*Selaginella*)	02
3.	Study of gymnosperms (Pinus) & angiosperms (*Sunflower, Maize*)	02
4.	Plant anatomy – Dicot and monocot root, stem, leaf.	02
5.	Study of apical meristem (Stem and root)	01
6.	Study of typical flower & inflorescence	01
7.	Study of fruit types as per theory and seeds (Monocot & dicot)	01
8.	Breaking of seed dormancy	01
9.	Detection of seed viability and vigour.	01
10.	Bioassay of IAA, GA and cytokinines	02

BTE 114 - Methods in Mathematics and Statistics

Sr. No.	Name of the Practical	Practicals 15
	(Mathematics)	
1.	Applications of differential equation i) Growth & decay ii) Newton's law of cooling iii)	02
2.	Eigen values & Eigen vectors	02
3.	Complex numbers: Geometrical representation of complex numbers (Argand's diagram) Graphical representation of $$\overline{Z}, Z_1 + Z_2, Z_1 - Z_2, Z_1.Z_2, \frac{Z_1}{Z_2}$$ $$\left| Z - a \right| = b.$$	02
	(Statistics)	
4.	Frequency distribution – Graphical, Histogram, ogive curve [less & greater than].	02

5.	Measures of central tendency (Grouped and ungrouped) A. M., Median, Mode.	02
6.	Measures of Dispersion – Range, s. d., C. V. combined s. d.	01
7.	Correlation, Regression. Scattered diagram, Karl Pearson's correlation coefficient, eq^n of Regression line.	02
8.	Testing of Hypothesis: 　　　　Large sample test: Normal, proportion. 　　　　Small sample test.: x2, t, f.	02

Nature of question paper:
Practical Examination

A) Every candidate must produce a certificate from the Head of the Department in his college, stating that he has completed in a satisfactory manner a practical course on the lines laid down from time to time by the Academic Council on the recommendations of the Board of Studies and that the laboratory Journal has been properly maintained. Every candidate must have recorded his/her observations in the Laboratory journal and written a report on each exercise performed. Every journal is to be signed periodically by a member of the teaching staff and certified by the Head of the Department at the end of the year. Candidates are to produce their journals at the practical examination and such journals will be taken into account by the examiners in assigning marks.

B) The practical examination will be of 6 hours duration and will be conducted on two successive days (3 hours per day)

Distribution of Marks for Practical Examination:

1. Biochemical Techniques:
   One major experiment　　　　　10 marks

   One minor experiment　　　　　05 marks

2. Microbiological Techniques:
   One major experiment　　　　　10 marks

One minor experiment	05 marks
3. Biophysics/Biostat/computer	10 marks
4. Oral on Practicals	05 marks
5. Journal	05 marks
Total Marks:	50 marks

Note: Experiments may be arranged as per convenience of the examiner.

BTE 211 -Techniques in Biochemistry

Sr. No.	Name of the Practical	Practicals
1.	Preparation of buffers (Phosphate buffer, acetate buffer) and determination of pH with pH meter	01
2.	General test for carbohydrates and ditection of unknown carbohydrate (Glucose, fructose, maltose, sucrose, xylose and starch)	03
3.	Estimation of reducing sugar from apple juice by Benedict's Method.	01
4.	Spot test for amino acids (Arginine, methionine, cystine, tyrosine, histidine, proline, tryptophan)	02
5.	Quantitative method for amino acid by Ninhydrin method.	01
6.	Protein estimation (Biuret method)	01
7.	Estimation of cholesterol (Iron reagent).	01
8.	Isolation and characterization of casein from milk.	01

	.	
9.	Qualitative assay of α amylase using starch as substrate.	01
10.	Isolation and characterization of starch from potatoes.	01
11.	Estimation of Glucose by 3,5 Dinitro salicylic acid method	01
12	Formal titration for estimation of aminoacids	01

Reference:- Chemistry
Text book of practical organic chemistry (4th Edition, Longman) –
A. I. Vogel

Reference:- Biochemistry
1. Practical biochemistry   - J. Jayaraman
2. Practical Biochemistry   - David Plummer
3. Medical Microbiology   - Cruickshank vol. II
4. Stains and staning   - Desai & Desai

BTE - 212 Laboratory Exercises in Cell Biology

Sr. No.	Name of the Practical	Practicals 14
1.	Study of prokaryotic cells structures using photographs and slide preparation.	01.
2.	Study of eukaryotic cells structures using photographs and slide preparation.	01.
3.	Isolation of nucleus.	01.
4	Isolation of chloroplast.	01.
5.	Isolation of mitochondria.	01.
6.	Isolation of giant chromosomes using *Drosophila*/ *Chironomous* larvae.	01.
7.	Use of dialysis to separate smaller molecules than larger molecules.	01.
8.	Study of methodology of cell lysis.	01.
9	Effect of temperature/ organic sol vent on membrane permeability of cells.	01.
10.	Demonstration of Golgi apparatus by silver nitrate method.	01.
11.	Demonstration of lysosomes.	01.
12.	Study of Mitosis.	01.

13.	Study of Meiosis	02.
14.	Study of plasmolysis.	01.

BTE 213- Laboratory Exercises in Animal Science

Sr. No.	Name of the Practical	Practicals 15
1.	Classification and Identification of Non-chordates & Chordates. (One animal each). Non- chordates- Sycon, Hydra, Liver fluke/ Taenia, Earthwarm / Nereis, Cockroach, Pearl oister/Pila, Starfish/ Chordates- Lebeo, Frog, Cobra, Alligator, Fowl and Rat.	02
2	Dissection of Labeo- Visceral organs like Gill, Digestive tract, Heart, Kidney, air bladder.	02
3.	Rat Dissection (Only Demonstration) Visceral organs- Heart, Liver, Stomach, Duodenum, Intestine, Kidney, Testis, Ovary, Pancreas, Salivary gland.	01
4.	Study of Plasmodium, Ascaris, Liver Fluke, Taenia- Salium.	01
5	Blood slide Preparation and Identification of Blood cells.	01

6.	a) Blood Cell Count.
	    i) Differential count of W. B. Cs.
	    ii) Total count of W. B. Cs and R. B. Cs.
	b) Preparation of Haemin Crystals
	c) study of Bone Marrow cells
		03

7.	Histology of Skin, Tooth, Liver, Kidney, Uterus.	01

8.	Demonstration of –
	    i) Vermiculture Technique
	    ii) Bee Keeping- Study of Instruments
		02

	iii) Sericulture - Study of different Stages. Pisciculture - Study of Instruments	
9.	**Study Tour** (Biodiversity/Sericulture/ Apiculture/ Vermicomposting process/ Microbial industry/ Tissue culture.)	02

BTE 214 – Computer applications in Biology

		15
1.	Study of commands of word.	01
2.	Creation of worksheet with graphs.	01
3.	Power Point presentation.	02
4.	Write program to convert temperature in Celsius into Fahrenheit.	01
5.	Write program to find area of circle.	01
6	Write program to find given number is even or odd.	01
7.	Write program to display Fibonacci series.	01
8.	Write program to find class from given marks of subject.	01
9.	Write program to print sum of 1 to n numbers.	01
10.	Write program to display number, square & cube upto given number.	01
11.	Write program to sort elements of array.	01
12.	Write program for addition of two matrix.	02
13	Introduction to biological database.	01

Nature of question paper:

<div align="center">**Practical Examination**</div>

C) Every candidate must produce a certificate from the Head of the Department in his college, stating that he has completed in a satisfactory manner a practical course on the lines laid down from time to time by the Academic Council on the recommendations of the Board of Studies and that the laboratory Journal has been properly maintained. Every candidate must have recorded his/her observations in the Laboratory journal and written a report on each exercise performed. Every journal is to be signed periodically by a member of the teaching staff and certified by the Head of the Department at the end of the year. Candidates are to produce their journals at the practical examination and such journals will be taken into account by the examiners in assigning marks.

D) The practical examination will be of 6 hours duration and will be conducted on two successive days (3 hours per day)

Distribution of Marks for Practical Examination:

1. Biochemical Techniques:
   One major experiment   10 marks

   One minor experiment   05 marks

2. Microbiological Techniques:
   One major experiment   10 marks

   One minor experiment   05 marks

3. Biophysics/Biostat/computer   10 marks

4. Oral on Practicals   05 marks

5. Journal   05 marks

   Total Marks: 50 marks

Note: Experiments may be arranged as per convenience of the examiner.

Syllabus for B. Sc. Semester-II Biotechnology (Optional/Vocational)

BTO-201 Paper-III
Cell Biology and Genetics

Topic. No.		Lectures 45
1	**Unit-I** **History of cell biology:-** Cell biology before 19th century, cell biology in 19th century- formulation cell theory, protoplasm theory, germplasm theory, cell biology in 20th century- organismal theory, scope of cell biology. **Cell types:-** Prokaryotic & eukaryotic cells classification of cell types with an organisms- cell, tissue , organ & organisms of otherwise genetically similar cells.	11
2	**Unit- II** **Structure & Function of cell organelles:-** Ultra structure of cell membrane, cytosoles, golgibodies, endoplasmic reticulum (Rough & smooth), ribosomes, cytoskeleton: structure (Actin, microtubules etc), mitochndria, chloroplast, lysosomes, peroxisomes, nucleus, nuclear membrane, nucleoplasm, nucleolus, chromatin.	11
3	**Unit-III** **Cell division & cell cycle:-** (including cell synchrony & it's applications) i) Mitosis ii) Cell cycle- a) interphase b) G1 Phase c) G2 Phase d) Mitosis iii) Meiosis **Cell locomotion in animal cells:-**Amoeboid, flagellar & cilliary, working of muscle & nerve cells. **Cell differentiation in plants & animals:-** General characteristics of cell differentiation & types**.** Nucleocytoplasmic interactions. Molecular mechanism of cell differentiation. Cell signaling.	12
4	**Unit-IV** Definition of gene, genotype, phenotype, cistron, muton, concept of genetic code. **Mutations**:- Definition, chemical basis (base substitution, insertion, deletion mutations), Mutagen (definition, examples of chemical & physical mutagens), Types of mutation (Spontaneous & induced). **Chromosomes**:- chemical composition, structural organization of chromatids, centromeres, telomeres, chromatin, nucleosome organization, eu & heterochromatin, special chromosomes (e.g. polytene & lampbrush chromosomes) banding pattern in human chromosomes. Extrachromosomal inheritance, plasmidial, mitochondrial & chloroplast genetic systems.	11

BTO-202 Paper-IV
Microbiology

Topic. No.		Lectures 45
1	## Unit I **Bacterial Taxonomy:-** i) General principles of bacterial nomenucleature. ii) Criteria for bacterial classification- morphological, cultural, biochemical & serological characters. iii) Concept of bacterial species & strain. **Nutritional classification of Microorganisms.** **Stains & staining procedures-** Definition of dye and stain, classification of stain (acidic, basic & neutral stains), principle, procedure, mechanisms & application of staining procedures. i) Simple staining ii) negative staining iii) Gram's staining.	**11**
2	## Unit-II **Concept of Sterilization:-** Methods of sterilization- a) Physical agents: i) temperature-dry heat, moist heat ii) Radiation- U.V, Gamma radiation iii) Filterations. b) Chemical agents:- Phenol & phenolic compounds (chlorine & iodine) c) Gaseous agents- Ethelyne oxide, Beta propiolactone, formaldehyde. **Pure culture technique-** Definition of culture media, types: non living media- natural, synthetic, semi-synthetic & differential, enriched, enrichment & selective, living media. Methods for isolation of pure cultures:- Streak plate, pour plate, spreading plate.	**11**
3	## Unit-III **Microbes in extreme environments**:- Thermophiles & alkalophiles Definition of infection, disease, pathogen, virulence, host's defense, immunity, vaccine**.** Introduction to nonspecific defense mechanism and specific defense mechanism (Antibody production) against pathogenic organisms. Microbial fermentation:- Definition of fermentation, survey of fermentation products from microorganisms (enzymes, antibiotics, vitamins, organic acids, alcohol). Introduction to screening of industrially important microorganisms. Basics of fermentation process (with the example of ethanol fermentation) – organism selection, inoculum preparation, inoculation into fermentation medium, running of fermentation, extraction of product.	**12**
4	## Unit –IV **Morphology of bacteria-** Size, shape arrangement, cytology of bacteria- structure of typical bacterial cell, structure & function of	**11**

	– cell wall, cell membrane, capsule, slime layer, flagella, pilli, nuclear material, mesosomes, ribosomes. **General characteristics of viruses**	

Reference books:-
1. Cell and molecular biology- Arumugham
2. Cell and molecular biology- De Robertis
3. Cytology genetics and evolution- Agrwal and varma
4. Cell biology- C. B. Pawar
5. Fundamentals of microbiology- Frobisher
6. Microbiology-Pelczar.
7. General microbiology- Stanier.
8. Text book of microbiology- Ananthnarayan
9. Gene- Benjamini Lewin.
10. Genetics. Strickberger M.W.
11. Genetics - Goodenough U.
12. Genes IV- Lewin B.

BTO 2O3- Laboratory Exercises in Basic Biotechnology

Sr. No.	Name of the Practical	Practicals 20 L
	(Microbial Techniques)	
1	Awareness of microbe handling, preparation of culture media (Peptone water, nutrient agar, starch agar, sugar fermentation medium) cotton plugging and sterilization, personal hygiene.	
2	Use of some laboratory equipments:- Autoclave, hot-air oven, incubator, laminar air flow, Seitz filter.	
3	Isolation of microorganisms from air (Solid impingement technique), water and soil samples (Dilution and pour plate), colony purification.	
4	Enumeration of microorganisms by total viable count	
5	Monochrome & negative staining for observation of bacteria.	
6	Characterization of isolated bacteria Gram's staining other staining (Spore, capsule). Metabolic characterization (Sugar fermentation test)	
7	Culture from body fluids-e.g.- urine	
8	Isolation & cultivation of yeast and molds(Penicillium, Aspergillus)	
9	Test for antibodies against given bacteria (Widal- qualitative)	
10	Screening of amylase producing microorganisms.	
11	Antibiotic sensitivity of microbes, use of antibiotics discs.	
12	Alcohol fermentation (ethyl alcohol) (Demonstration)	

Recommended Books:-

1. An introduction to Practical biochemistry- David Plummer

2. Laboratory manual in biochemistry- Jayraman

3. Medical microbiology- Cruickshank, vol. II

4. Stains and stainning procedures- Desai & Desai

5. Experimental microbiology, vol I & II, Rakesh Patel

6. Industrial microbiology – Prescott & Dunn

Distribution of Marks for Practical Exam:-

1. BTO 103: Biochemical Techniques:-
    One major experiment   10 marks
    One minor experiment   05 marks

2. BTO 203: Micrbiological Techniques:-
    One major experiment   10 marks
    One minor experiment   05 marks

3. Practical on biophysics (Study of Lambert-Beer's law)   10 Marks
    OR
    Practical on Biostatistics
    OR
    Practical on Computer

4. Oral on Practicals   05 marks

5. Journal   05 marks

   Total Marks   50 marks.

Nature of question paper:

Practical Examination

E) Every candidate must produce a certificate from the Head of the Department in his college, stating that he has completed in a satisfactory manner a practical course on the lines laid down from time to time by the Academic Council on the recommendations of the Board of Studies and that the laboratory Journal has been properly maintained. Every candidate must have recorded his/her observations in the Laboratory journal and written a report on each exercise performed. Every journal is to be signed periodically by a member of the teaching staff and certified by the Head of the Department at the end of the year. Candidates are to produce their journals at the practical examination and such journals will be taken into account by the examiners in assigning marks.

F) The practical examination will be of 6 hours duration and will be conducted on two successive days (3 hours per day)

Distribution of Marks for Practical Examination:

1. Biochemical Techniques:
   One major experiment   10 marks

   One minor experiment   05 marks

2. Microbiological Techniques:
   One major experiment   10 marks

   One minor experiment   05 marks

3. Biophysics/Biostat./computer   10 marks

4. Oral on Practicals   05 marks

5. Journal   05 marks

   Total Marks: 50 marks

Note: Experiments may be arranged as per convenience of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR
UNITISED SYLLABUS FOR
B. Sc. I (Semester- II)

Syllabus for B. Sc. Sem-II, Bioinformatics

BTE 201- Paper-X
Organic and Inorganic Chemistry

Topic No.		Lectures 45
	Unit- I	**13**
1.	*Mechanistic Basis of Organic Reactions*	
	1.1 SN^1 and SN^2 mechanisms (Hydrolysis of t-butyl halide and primary alkyl halide) with energy profile diagram. 1.2 Elimination reactions- E1 and E2 mechanisms (Dehydration of alcohol), Hoffman's and Saytzeff's rules- statements and justifications. 1.8 Addition reactions- Electrophilic addition reactions in alkenes (Markovnikoff and anti-Markovnikoff additions), nucleophilic addition reactions of carbonyl compounds (cyanohydrin formation). 1.9 Concept of an aromaticity. 1.10 Mechanism of SE reactions in benzene- Nitration, sulphonation, halogenation, diazotization, Friedel-Craft's alkylation and acylation reactions. 1.11 Orientation effects as exemplified by various functional groups. (Nitro and –OH group) *1.12 Structure- reactivity correlation w.r.t. inductive, mesomeric, and steric effects.* *1.8 Tautomerism.*	
	Unit-II	**10**
2.	*Stereochemistry*	
	2.1 Geometrical isomerism in alkenes. 2.2 Optical activity-Polarimeter, specific rotation.	

	2.3 Chirality- Chiral molecules, symmetry elements, asymmetric carbon, compounds with one and two chiral centers, diastereomers. 2.4 E-Z and R-S nomenclatures. 2.5 Stereospecific and stereoselective reactions with example of an enzymatic reaction. 2.6 Numerical Problems	

3.	**Unit- III**
	Chemistry of Natural Products
	
	  3.1 **Terpenoids**-Isoprene rule, structure determinations of citral.
	  3.2 **Natural Pigments**- Carotenoids and their functions in Plants, structural details of chlorophyll.
	  3.3 **Alkaloids**- Basic structure, classification with suitable examples..
		05

4.	**Chromatography**
	  4.1 Introduction- Definition, classification.
	  4.2 Principle, Technique and application of paper chromatography and TLC.
		06

	Unit- IV	

5.	**UV-Visible Spectroscopy**
	  5.1 Introduction.
	  5.2 Electronic Transitions and designation of UV-bands.
	  5.3 General applications, spectrum, isolated double bonds, conjugated dienes, carbonyl compounds, aromatics.
	  5.7 Analytical uses.
	  5.8 Lambert-Beer's law
	  5.9 Instrumentation with respect to colorimeter and single beam spectrophotometer.
	  5.7 Applications of UV and Visible spectroscopy.
		11

References-(Use recent Editions)

1) University General Chemistry - C. N. R. Rao, Macmillan.
2) Physical Chemistry - R. A. Alberty, Wiley Eastern Ltd.
3) Quantum Chemistry Including Molecular Spectroscopy- B. K. Sen.
4) Organic Chemistry - D. J. Cram and G. S. Hammond (Mcgraw-Hill).
5) A Guide-book to Mechanism of Organic Chemistry-Peter Sykes-6th Edition.
6) Theoretical Principles of Inorganic Chemistry- G.S. Manku
7) Physical Chemistry by Sharma and Puri
8) Instrumental methods of chemical analysis- Chatwal & Anand
9) Instrumental methods of chemical analysis- B. K. Sharma
10) Organic Chemistry VOL-II 5th Edition- I. L. Finar
11) An introduction to electrochemistry- Samuel Glassstone

12) The elements of physical chemistry – P.W. Atkins.
13) Essential of physical chemistry- B .S. Bahel. & G. D.Tuli.
14) Principels of Physical Chemistry – S.H Maron & Pruton
15) Concisein Inorganic chemistry – J.D. Lee
16) Organic Chemistry – Morrison & Boyd.

BTE 202 – Paper-XI
Applied Physics

References:

15. Physics by Devid Hallday Roberet Resnik, (Vol-I and Vol-II) Wiley Eastern

Topic No.	SECTION–I Topics	Lectures 45
1	**Unit-I** **Optics correlated with microscopy:** Concept of interference and diffraction, Diffraction gratin (Description only), concept of polarization and plane polarized light, production of polarized light by absorption, reflection, refraction and scattering, Nicol prism, definition of optical activity, LASER- LASER action (Energy level diagram), properties of LASER, applications of LASER.	10
2	**Unit- II** **Bioelectricity** Introduction, electricity observed in living systems-examples, origin of bioelectricity, resting potential and action potential, Nernst equation, conduction velocity, origin of compound action potential, Electrocardiogram (ECG), Electroencephalogram (EEG), Electromyogram (EMG), Electroculogram(EOG),	13
3	**Unit- III** **Semiconductor Devices and Digital Electronics** Light Emitting Diode (LED), seven segment display, photodiode, optocoupler, spectral distribution of solar energy, solar cell-construction, working efficiency and fill factor, applications of solar cell. Binary and BCD number system, Basic logic gates OR, NOR, AND, NANA and NOT, Demorgans theorem, various waveforms used in electronics- square wave, sine wave, triangular wave, saw tooth wave and stairs case.	10
4	**Unit- IV** **Atomic structures and X-rays** Introduction, J. J. Thomson atomic model, Rutheford atomic model and Bohr model, Limitations of Bohr atomic model, Energy level diagram of Hydrogen atom,, Quantum numbers, Nuclear models and forces(Liquid drop modem and shell model), production of x-rays and its properties, Continuous and characteristics X-ray spectrum, Brags law, Applications of X-rays	12

limited
16. Fundamental of Mechanics, S.K.Saxena,Himalaya Publications
17. Perspectives of modern physics, Aurthur Beiser, McGrawHill Publication
18. Heat and Thermodynamics,Zemansky, McGrawHill Publication
19. Fundamentals of optics,Jenkins white, McGrawHill Publication
20. Text book of optics, N.Subrahmanyan Brijlal, S.chand and Company Limited

21. Optics by Ajoy Ghatak ,Tata McGrawHill   Publication
22. Properties of Matter, D.S.Mathur,Sha,alal Charetible trust
23. Solar Energy, Suhas Sukatme,Tata McGrawHill Publication
24. Principle of electronics, V.K.Mehta, S.chand and Company Limited
25. Digital Principles and application, Malvino and Leach,Tata McGrawHill
    Publication
26. Elements of Spectroscopy, Gupta,Kumar,Sharma, Pragati Prakashan
27. Introduction to Atomic spectra, H.E.White ,McGrawHill Publication
28. Biophysics, Vastala Piramal, Dominent Publishers and Distributor

BTE 203 – Paper-XII
Animal Science

Topic No.		Lectures 45
1.	**Unit- I**	**12**
	1.1. General classification of animal kingdom.	02
	1.2. Non-chordates –Study of phylum Porifera, Ceolenterata, Platyhelmenthes, Nemathelmenthes, Arthropoda, Mollusca & Echinodermata – General characters with representative examples- Sycon, Hydra, Liver fluke/ Taenia, Earthwarm / Nereis, Cockroach,	06
		04

	Pearl oister / Pila, Starfish 1.3. Chordates:- Study of class Pisces, Amphibia, Reptilia & Mammalia – General characters with representative examples – Lebeo, Frog, Cobra, Alligator, Fowl and Rat		
	Unit- II	**11**	
2.	**Host Parasite Relationship**		
	2.1 Protozoan parasite- Plasmodium 2.2 Nematode parasite- Ascaris 2.3 Platehelminthes parasite- Liver fluke, & Tape worm- Teania solium	02 03 06	
	Unit- III	**12**	
3.	3.1 Tissues i) Epithelial ii) Muscular iii) Nervous iv) Connective tissue-Blood (Plasma, Serum, Clotting), Bone, Cartilage. 3.2. Histological Architecture i) Skin ii) Tooth iii) Liver iv) Kidney v) Uterus	05 07	
	Unit- IV	**10**	
4.	**Applied zoology** 8.1 Vermiculture 8.2 Apiculture 8.3 Sericulture 8.4 Pearl culture 8.5 Pisci culture	02 02 02 02 02	

Reference Books :
1. Kotpal – Invertebrates
2. Kotpal – Chordates
3. Shukla and U. Pandey- Applied Zoology.

BTE204 – Paper-XIII
Statistical Methods

	SECTION II	Lectures 45

1	**Unit- I**
	Introduction to statistics and collection of data.
	   1.1 Meaning of statistics
	   1.2 Scope of statistics in Biological and medical sciences
	   1.3 Primary and Secondary data
	   1.4 Classification of data, Inclusive and Exclusive methods, Discrete and Continuous frequency distribution.
	   1.5 Cumulative frequencies
	   1.6 Graphical representation :- Histogram and ogive curves
		09

2	**Unit- II** **Measures of central tendency and measures of dispersion**
	    2.1 Concept of measures of central tendency
	    2.2 Definitions of A.M., Median, Mode, Quartiles,
	            Weighted mean, Examples on ungrouped and
	            grouped data.
	    2.3 Properties of A.M. (statement only)
	    2.4 Methods of obtaining mean & quartiles graphically
	    2.5 Concept of measures of dispersion . Absolute and
	            Relative measures of dispersion.
	    2.7 Definitions of Range, Q.D, S.D and variance ,
	            coefficient of variation. Examples on grouped and
	            ungrouped data
			13

3	**Unit- III** **Correlation and Regression**
	    3.1 Concept of correlation between two variables and
	            types of correlation.
	    3.3 Method of obtaining correlation (i) by scattar
	            diagram method
	                  ii) By Karl Pearson Correlation coefficient
	                  iii) By Spearman's Rank correlation
	        coefficient with and without tie.
	              Properties of correlation coefficient.
	    3.3 Examples on ungrouped data
	    3.4 Concept of regression, Lines of regression
	            Regression coefficients and properties without proof.
	    3.5 Examples on ungrouped data.
	    3.6 Idea of multiple and partial correlation
			10

4	**Unit- IV** **Probability and Sampling**
	
	    4.1 Definition of sample space, Outcomes, events,
	            exhaustive events, Mutually exclusive events,
	            Equally likely events, certain events impossible
	            events.
	    4.2 Definition of probability, Limits of probability.
	            Probability of complementary event, Additive law of
	            probability. Simple illustrative examples.
	    4.4 Definition of conditional probability, Multiplicative
	            law of probability,
	            Independent events, Simple illustrative examples.
	    4.4 Idea of population and sample.
	            Simple Random Sampling and Stratified Random
	            sampling. Advantages and disadvantages of both the
	            methods.
	    4.5 Testing of hypothesis
	            Simple and composite hypothesis, Null and
			13

	alternative hypothesis, types of errors, Critical region, Acceptance region, level of significance.	
	4.7 Tests of significance: Chi square tests, t tests and F test.	

Reference books:

10) Goon A. M., Gupta M. K. and Dasgupta B.:
    Fundamentals of mathematical statistics vol. I & II. World Press, Calcutta.
11) Gupta & Kapoor: Fundamental of mathematical statistics.
12) Thingale T. K. and Dixit P. G. (2003): A text book of paper- I for B.Sc. I, Nirali Publication, Pune.
13) Waiker and Lev: Elementary Statistical methods.
14) Rohatgi V. K. and Sauh A. K. Md E. (2002)
    An Introduction to probability and statistics (John Wiley & Sons-Asia).
15) Thigale T. K. and Dixit P. G. (2003): A text book Of paper II for B.Sc. I.
16) Meyer P. L. (1970): Introductoryto probability and statistical Application. Addision wesly.
17) Cochran, W.G.: Sampling Techiniques, Wiley Estern Ltd., New Delhi.
18) Des Raj : Sampling theory

BTE 205 – Paper-XIV
Proteins and Enzymes

		Lectures 45
1	**Unit- I** **Protein:** Amino acid classification (Side chain, nature of R group, incorporation in proteins), structure & properties of amino acids, acid base behavior and reactions, zwitterions, peptide bond, Determination of primary structure (Sanger's method, Edman's method, Dansyl chloride, Dabsyl chloride), Forces stabilizing secondary structure, Ramchandran plot, Tertiary structure (Describe different bonds) Quaternary structure Hb & antibody)	**13**
2	**Unit- II** **Protein purification :** Method of cell disruption (Blenders, grinding with abrasives, presses, enzymatic method, sonication); Salt participation- Salting in, salting out, organic solvent precipitation, dialysis, ultra filtration, paper electrophoresis, centrifugation (Basics, Principal, Svedberg's constant)	**10**
	Unit- III	

3	**Enzymes:** Introduction, IUB classification, active site, energy of activation, transition state hypothesis, lock and key hypothesis, induced fit hypothesis, allosteric enzymes, enzyme inhibition, MM equation, Line weaver- Burk plot, Eadie-Hofstee plot.	12
4	**Unit- IV** **Co-enzymes:** Thiamine, riboflavin, niacin, pyridoxol phosphate, lipoic acid, panthothenic acid, folic acid. (Introduction, structure, chemistry, sources, daily requirement, deficiency, biological functions)	10

References books:-

27) Biochemistry – Nelson & Cox
28) Biochemistry - Stryer
29) Enzymes - Trevor Palmer
30) Biochemistry - Voiet & Voiet
31) Biochemistry - J.L.Jain
32) Basic Biophysics- M. Daniel
33) Biochemistry -   Powar and Chatwal
34) Protein Purification- Harris and Angel
35) Practical biochemistry – Keith Wilson And Walker
36) Principles of Biochemistry - T. N. Pattabriraman.
37) Biochemistry 3rd Edition – Hames & Hopper.
38) General Biochemistry – J. H. Well.
39) Biochemistry – J. H. Ottaway & D. K. Apps
40) Biochemistry – Trchan
41) Text Book of Biochemistry- R.A. Joshi.
42) Biochemistry – U. Satyanarayanan
43) Biochemistry a Functional Approach – Robert W McGilvery & Goldstein
44) Text Book of Biochemistry – A.V.S.S. Rama Rao
45) Clinical Biochemistry –Praful B. Godkar.

BIF 206- Paper-XV
Database programming languages

		Lectures 45
1	**UNIT -I**	
	Computer Networking 1.1 Introduction to networking, Modem, Network topology concepts and types with advantage and drawbacks of each, Component of LAN, WAN, Medium concept of networking, modem, dial up access, leased line connections, browsers, domain and addresses, applications in databases. 1.2 **Database Management** Need of Databses, RDBMS, definition of data and Information, Databases, Concept of DBMS, RDBMS, DBA and Responsibility of DBA, RDBMS Terminology. Relation. ii. Attributes. iii. Domain, tuple.	12
2	**UNIT –II**	11
	Structured Query Language (SQL) 2.1 Introduction to SQL: Data Definition language, Data manipulation language, Query language, Data control language, Starting SQL plus, Retrieving data: retrieving data from a table and selected columns, write a query. Set Operations: union, intersect, minus, other set operations: the in clause and exists clause, Retrieving data from multiple tables by using Cartesian coordinates, self join.	
3	**UNIT -III**	12
	3.1 SQL Operators 3.1 Value operators, logical operators, query expression operators. Functions: Number functions, Character functions, Date functions. Pseudo columns, Defining variables, Aggregate function, Group by clause and having clause, Hierarchical and some advanced queries. **3.2 Constraints in SQL** Integrity constraints and its type: Domain constraints, Key constraints and its various types, Functional dependency, multivalued dependency, miscellaneous constraints	
4	**UNIT -IV**	10
	4.1 Different analytical functions and its applications in SQL, Use of Roll up and Cube in 4.2 Joins used in SQL Introduction of joins and its importance in operating SQL, Natural joins, Cross joins, Outer and full outer joins.	

References books:-

1) Database System Concepts- Korth Silberschetz.
2) Commercial Application Development Using Developer 2000 by Ivan Bayross.

3) Structure Query Language- By Osborne.
4) Internet: An Introduction- Tata McGraw Hill Pub
5) SQL for Oracle 9i by P. S. Deshpande.

BTE 207- Paper-XVI
Techniques in Microbiology

Topic		Lectures

No.		45
1	**Unit- I**	**11**
	Microbial growth: Definition of growth, phases & growth curve a] Continuous culture b] Synchronous growth c] Diauxic growth Effect of environmental factors on growth-temperature, pH., osmotic pressure, hydrostatic pressure, surface tension, heavy metals, ultra violet light.	
2	**Unit- II**	
	Microscopy a] general priciples of microscopy (concept of optics, resolving power of microscope working distance.) b] study of compound microscope & electron microscope **Stains & staining procedures** a] definition of dye & stain b] classification of stains- acidic, basic, neutral c] theories, procedures & mechanism of simple staining, negative staining, differential staining-Gram staining. **Microbial nutrition** a] nutritional requirements b] classification on the basis of C & energy source c] bacteriological media-natural, syenthetic, semisythetic, differential, enriched, enrichment, selective, living media	**12**
3	**Unit- III**	

	Techniques in microbiology
	Principle, working & application of
	    c) Laminar air flow
	    d) Outline of lypholization technique
	Techniques in microbial filtration, vacuum filtration, gravity,
	membrane, micro, nano, reverse osmosis
		11

4	**Unit- IV**	
	Soil microbiology Definition of soil, layers, Soil micro flora, humus formation **Milk microbiology** Definition and composition, sources of microbes	**11**

References books:

1) General microbiology-Stanier
2) Introduction to microbiology-Ingraham
3) Brock biology of microorganisms-Madigan etal
4) Fundamentals of microbiology-Frobisher
5) Microbiology-Pelczar
6) General microbiology -Pawar&Daginawala

7) Text book of microbiology-Ananthanarayan

BTE 208 – Paper-XVII
Programming concept and C -language

		Lectures 45
1	**UNIT -I**	

		Introduction to Programming:	
		Steps involving in problem solving, Problem definition, Algorithm, Characteristics, Notation of Algorithm, Flow-charts-Definition, Symbol, Features, Running and Debugging the program. **Introduction to 'C' Language** 2.1 Historical background of 'C': Character set, Constants, Variables, Keywords and Comments, Instructions: Type declaration instruction, Arithmetic instruction, Integer and float conversion, Hierarchy of operations, Control instructions in C.	**10**
2		**UNIT -II**	
		Control structure 3.1 Definition, Various types of control structure used in 'C ' and its various applications Decision control structure: The *if* statement *if-else* statement, Nested *if-else* and forms of *if*. 3.2 Operators: Arithmetic, Logical, Relational, Bitwise, Increment, Decrement, Conditional operators. Loop Control structure: The *while* loop, *for* loop: Nesting of loops and multiple initializations in *for* loop, Odd loop: *break* statement, *continue* statement, *do-while* loop. Case control structure: Decision using switch, Tips and Traps, The *goto* statement	**11**
3		**UNIT -III**	
		Functions and Pointers 4.1 Introduction to function: Application of function, Passing Values, Scope and rule of functions, advanced features of function, Function declaration and prototype, call by values and call by reference, Pointer: Introduction, Pointer notation and Back to function call, Recursion.	**12**
5		**UNIT-IV**	**12**
		Arrays and Strings 5.1 Importance of arrays in 'C', Array initialization, Bounds checking, passing array element to a function, Pointer and arrays, More than one dimension, three dimensional array. 5.2 Strings: Basic concept of strings, Standard library function of string: *strlen(), strcply(), srcat(), strcmp(),* Two dimensional array of characters, Array of pointer to strings, Limitation of array of pointer to strings	

Reference books

1) Let us C- Y. C. Kanetkar
2) 'C' programming- Dennis Ritchie
3) Programming in C- Gottfried
4) C Application program and projects by Pramod Vasambekar.
5) Ansi C by Balgurusami.

6) Database System Concepts- Korth Silberschetz.
7) Commercial Application Development Using Developer 2000 by Ivan Bayross.
8) Structure Query Language- By Osborne.
9) Internet: An Introduction- Tata McGraw Hill Pub

BIF 111 - Practical on Botany and Microbiology   (10)

Sr. No.	Name of the Practical	Practical 10
1.	Use, care and study of Compound Microscope.	
2.	Demonstration of Laboratory equipments i) Incubator ii) Autoclave iii) Hot air oven iv) Seitz's filter v) pH meter vi) Distilled water plant vii) Laminer Air Flow	
3.	Microscopic examination of Bacteria i) Monochrome staining ii) Negative staining iii) Gram staining iv) Hanging drop technique of motility	
4.	Staining of – i) Cell wall (Chance's method) ii) Capsule (Maneval's method)	
5.	Preparation of culture media – i) Peptone water ii) Nutrient broth iii) Nutrient agar iv) MacConkey's agar v) Starch agar	
6.	Isolation, Colony characteristics, Gram staining and motility of – i) Escherichia coli ii) Bacillus species	
7.	Mitosis in Plants	
8.	Meiosis in Plants tissue	
9.	Study of tissue in Plants	
10	Extraction of DNA from Plant	

Books recommended for Practical:

1) Stains and Staining procedures by Desai and Desai.
2) Introduction to Practical Biochemistry by D. Plummer, J Wiley and Sons.
3) Bacteriological techniques by F. J. Baker.
4) Laboratory methods in Biochemistry by J. Jayaraman.
5) Experimental Microbiology – Patel & Patel

BIF 112 - Practical on Chemistry

Sr. No.	Name of the Practical	Practicals 10

1.	A) **Organic preparation** (Any Three Practicals)
	  1) Preparation of P - Nitro acetanulide from acetanilate
	  2) Preparation of m -dinitrobezene from nitrobenzene
	  3) Preparation of phthalimide from phthalir anhydride
	    a) Preparation of methylsalicylicate and
	    b) Preparation of nitro salicylic acid	

2.	B) **Organic estimation** (Any Three)
	  1) Determination of specific rotation of sucrose sample and hence determination of
	    unknown sucrose concentration from the sample
	  2) Estimation of sap value of given oil sample
	    a) Estimation of amount of sucrose from sample using fehling solution A&B
	    b) Estimation of a vitamin - C tablet
	  6) Analysis of commercial vinegar	

3.	Preparation of solutions of given molarity and normality.	

4.	Chemical Kinetics
	  a) To investigate the reaction between potassium presulphate and potassium iodide in solution with equal concentrations of the reactants.
	  b) Acid catalyzed hydrolysis of methyl acetate.	

5.	**Conductomatry**
	  a) To determine the strength of the given strong acid solution by conductometric method by titrating against a strong alkali solution.
	  b) Determination of degree of dissociation and dissociation constant of acetic acid at various concentrations and to verify Oswald's dilution law.	

6.	**Thermochemistry** Determination of heat of ionization of a weak acid	
7.	**Standardization of solutions.** a) Preparation of standard potassium dichromate solution and determination of its normality using oxalic acid.	

8.	Preparation of dilute solution from given stock solution	

Practical Reference Books:
1) Practical books of Physical Chemistry -Nadkarni, Kothari and Lawande.
2) Experimental Physical Chemistry - A. Findly
3) Systematic experimental Physical Chemistry - S. W. Rajbhoj, Chondhekar (Anjali Publication)
4) Experiments in Physical Chemistry - R. S. Das and B. Behra (Tata Mc. Graw Hill)
5) Advanced Practical Physical Chemistry - S. B. Yadavs (Goel publishing house).
6) Text book of practical Organic chemistry (4th Edition, Longman) - A. I. Vogel

BTE 113- Bioinformatics Practical

Sr. No.	Name of the Practical	Practicals 10
A)	**Bioinformatics Practicals**	
1.	Browsing and understanding NCBI web page.	
2.	Understanding Human Genome Project.	
3.	Introduction to literature database- PubMed	
4.	Introduction to journal database.	
5.	a) Getting protein sequences. b) Getting gene sequence	
B)	**Practicals on Database management systems :- (DBMS, RDBMS)**	
6.	Introduction to RDBMS.	
7.	Creation of: Client Master, Create table Product Master, Create table Salesman master, Create table sales order, Create table Sales order details, Create table Supply Master, Create table Employee, Create table Department Master.	
8.	Queries: Queries, Select Queries, Select Queries, Update Queries, Delete Queries, Create table Book title, Create table Book Author, Create table Author, Queries, Alter Queries, Select Queries on client Master Table, Select Queries, Delete and Drop Queries on Client, and product Master, to check Palindrom Number/String, Reverse given number	
9.	Write a cursor to calculate area of circle.	
10	Write a PL-SQL Procedure to calculate 5% of salary of Employee from Employee table.	

Suggested readings

1) Bioinformatics Sequence and Genome analysis, II Edition by David W. Mount.
2) Introduction to Bioinforamtics by Attwood, T. K. and Parry-Smith, D. J.
3) Bioinforamtics Methods and Applications by Rastogi, S. C., Mendiratta and Rastogi, P.
4) NCBI web site (http://www.ncbi.nlm.nih.gov)
5) Discovering, Genomics, Proteomics and Bioinformatics by A. Malcom Campbell and Laurie J. Heyer.

6) Bioinformatics by Shalini Suri
7) Database System Concepts- Korth Silberschetz.
8) Commercial Application Development Using Developer 2000 by Ivan Bayross.
9) Structure Query Language- By Osborne.
10) Internet: An Introduction- Tata McGraw Hill Pub
11) SQL for Oracle 9i by P. S. Deshpande.

BTE 114 – Practical on Computer Science

Sr. No.	Name of the Practical	Practicals 15
	Computer Practicals	
1	Demonstration of peripherals	
2	Linking of various peripherals	
3	Operation of all keys of keyboard	
4	DOS – external and internal commands, batch files commands	

5	Windows Operating System – Windows explorer, program manger,	
6	control panel, print manager, Creating folders, files, icons, shortcuts	
7	MS–WORD – Creating new documents, typing, deleting, selecting text, undo, redo, formatting text – auto format, formatting, insertion of table characters, drop caps, Paragraphs, line spacing, margins, page setup, headers and footers, Writer's tools – spelling checker, auto format, auto correct, find and replace, Mail merge – Data source, Main document, creating mail merge document.	
8	MS–EXCEL - Creating worksheet, Graphs, resizing graphs, formulas, if statement, types of functions, frequently used mathematical and statistical functions	
9	power point :-creating slides, insertion of text ,picture ,table, charts etc, custom animation, slide transaction.	
10	Internet :- browsing internet ,creating e-mail account,using mail, sending, receiving, attachment etc, browsing search engine like as Google, yahoo search ,download files using search engine	

B. Sc. Bioinformatics

1. **Introduction and advantages:**

A three year B. Sc course formulated for developing expert manpower in Bioinformatics for whom significant job opportunities exists in this country. The course is based on basic sciences involved viz. Physics, Chemistry, Mathematics, Statistics, Computer Science, Biochemistry, Microbiology, Immunology and Virology. Bioinformatics is a new branch in the field of life science, where knowledge of information technology applied to the management and analysis of biological data with the help of computers. It is the science of using information

to understand biology in better way. It is a field in which biological information collected, compared, studied and analyses to find the interrelation between them for solving structural, functional and evolutionary problems using computational technologies.

The programme obliges students to read original publications and envisages significant inputs in laboratory work, communication skill, creativity, planning, execution and critical evaluation of the studies undertaken. This program gives common basic knowledge (Biochemistry, Molecular Biology, Computer programming, Genetic Engineering and Human Genome project for development of various drugs, research methodology, and Bioinformatics along with basic sciences) during this course.n

The undergraduate education should meet the occupational demand and absorptive capacity of the economy. Specialized courses offered at this level are by and large needed for jobs in research and education sector. Moreover, for the development of biotechnology, knowledge of bioinformatics will be much more useful. For the growth of drug-designing, pharmaceutical and biotechnology industry, it is quite likely that the demand for bioinformatics will be increase in the next few decades.

The knowledge of bioinformatics is useful to do protein sequencing, nucleic acid sequencing and their analysis, elucidation of function of a molecule based on its structure, find proteins their interaction, activity, modification and function, gene expression, analysis, prediction and establish genomic library, molecular modeling and molecular dynamics methods to study structure from sequence, and drug designing. In the recent years in this age of internet and sequenced genome we have more information than ever before. Organizing and analyzing this entire data is becoming more and more important. Expert man power is also necessary to analyze the biological information. Keeping this view in mind we have decided to start three year B. Sc. course in Bioinformatics. This course will provide common basic knowledge of Bioinformatics including Mathematics, Statistics, Computer Science, Chemistry, Physics and Biology. After completing B. Sc. Bioinformatics course students can be accommodated in any college/academia/research institute, national/multinational and other companies.

2. **Objectives:**

   i) Develop an expert manpower in bioinformatics to help industry, academia and thereby society.

   ii) Training of students in various Information technology -Biotechnology (IT-BT) related fields.

   iii) Provide knowledge to analyze biological molecules and drug designing.

3. **Title of the course:** B. Sc. Bioinformatics.

4. **Duration of the course:** 3 years.

5. **Intake Capacity of the Students**: 20 per Batch

6. **Fees of the Course**: Rs. 24,500/- per year (Other charges as per University norms).

   This fee structure is recommended according to BCS and B. Sc. Entire Biotechnology course of Shivaji University, Kolhapur.

Teachers Qualification:

i) Qualification of the teacher should be M. Sc. (Bioinformatics, Biochemistry, Biotechnology, Microbiology, Botany, Zoology, Statistics, and Computer Science along with PG Diploma in Bioinformatics OR with knowledge of Bioinformatics.

ii) Teacher should be SET/NET qualified.

Nature of question paper:

Practical Examination

G) Every candidate must produce a certificate from the Head of the Department in his college, stating that he has completed in a satisfactory manner a practical course on the lines laid down from time to time by the Academic Council on the recommendations of the Board of Studies and that the laboratory Journal has been properly maintained. Every candidate must have recorded his/her observations in the Laboratory journal and written a report on each exercise performed. Every journal is to be signed periodically by a member of the teaching staff and certified by the Head of the Department at the end of the year. Candidates are to produce their journals at the practical examination and such journals will be taken into account by the examiners in assigning marks.

H) The practical examination will be of 6 hours duration and will be conducted on two successive days (3 hours per day)

Distribution of Marks for Practical Examination:

1. Biochemical Techniques:
   One major experiment   10 marks
   One minor experiment   05 marks

2. Microbiological Techniques:
   One major experiment   10 marks
   One minor experiment   05 marks

3. Biophysics/Biostat/computer   10 marks

4. Oral on Practicals   05 marks

5. Journal   05 marks

   Total Marks: 50 marks

Note: Experiments may be arranged as per convenience of the examiner.

BIF 211 – Practical on Zoology and Microbiology

Sr. No.	Name of the Practical	Practicals (10)
1	Mitosis in Animals tissue	
2	Meiosis Animals tissue	
3	Study of tissue in Animals	
4	Study of Paramecia	
5	Study of Hydra, and Earthworm with respect to morphology and reproduction.	
6	Study of life cycle in Epiculture and their importance	
7	Study of life cycle in Sericulture, and their importance	
8	Extraction of DNA from Animal tissues.	
9.	Study of following biochemical tests - i) IMViC test ii) Sugar fermentation – glucose and lactose iii) H_2S production test	
10.	Detection of enzyme activity - i) Amylase ii) Catalase	
11.	Enumeration of bacterial numbers by - i) Serial dilution and plating of water ii) MPN of water.	
12.	Study of growth curve of bacteria	

References books:-

1) Stains and Staining procedures by Desai and Desai.
2) Introduction to Practical Biochemistry by D. Plummer, J Wiley and Sons.
3) Bacteriological techniques by F. J. Baker.
4) Laboratory methods in Biochemistry by J. Jayaraman.
5) Experimental Microbiology – Patel & Patel

BIF 212 Practical on Biochemistry

Sr. No.	Name of the Practical	Practicals 10
1	Separation Identification & determination of Rf values of	

	Nitroamilines, Nitrophends (Any Two)	
2.	Spot test a) Ni^{++} b) Co^{++} c) Cu^{++} d) Al^{+++} e) Zn^{++} f) Hg^{++} g) Mg^{++} h) Mn^{++} i) Fe^{+++}	
3	a) Estimation of Glucose - DNSA and Benedict's method.	
4.	b) Detection of sugar and albumin in urine.	
5.	Qualitative assay - Alpha amylase	
6.	Extraction of lipids - Cholesterol and lecithin from egg yolk	
7.	Estimation of DNA.	
8	Separation and identification of amino acid by chromatographic techniques- TLC & paper chromatography	
9.	Preparation of Buffers (Phosphate Buffer, Acetate Buffer) and determination of pH with pH meter.	
10.	Preparation of solutions of given molarity and normality.	

Practical Reference Books:

1) An introduction to Practical Biochemistry - David Plummer.
2) Laboratory manual in Biochemistry - Jayraman.
3) Practical Biochemistry - Keith Wilson & Walker.
4) Laboratory methods in Biochemistry- J. Jayraman.

BIF 213- Practical on Biostatistics

Sr. No.	Name of the Practical	Practicals 10
1	Preparation of Frequency distribution	
2	Graphical Representation	
3	Measures of central tendency – 1	

4	Measures of central tendency – 2	
5	Measures of Dispersion - 1	
6	Measures of Dispersion - 2	
7	Correlation	
8	Rank Correlation	
9	Regression	
10	Simple random Sampling	
11	Chi-square test of goodness of fit	
12	Application of T-test and F-test	

BIF 214 – Practical on Mathematics

Sr. No.	Name of the Practical	Practicals 10
1.	Hermitian and Skew Hermitian matrixes	
2	Given values and given vector of a matrix	
3	Application of differential equation	

Shivaji University , Kolhapur
Revised Syllabus for the F.Y.B.Sc. (Computer Science)
To be implemented from- June-2010

F.Y.B.Sc. (Computer Science)

First Year Structure

Semester-I

Paper -no	Name of The subject	Total Marks	Total Theory per week	Total Practical per week per batch
01	Modern Operating Environment	50		
02	Introduction to programming	50		
			05	04

Semester-II

Paper -no	Name of The subject	Total Marks	Total Theory per week	Total Practical per week per batch
03	Fundamentals of Databases	50		
04	Procedure Oriented Programming through 'C'	50		
I	Practical Paper-I (Based on Paper-I ,II ,III and Paper-IV)	5o		
			05	04

Nature of Practical Question Paper –

a) The practical question paper is based on Paper-I ,

Paper-II, Paper-III and

Paper-IV.

b) In practical question paper there shall be four questions each of twenty marks,

   a student has to attempt any two questions.

c) Five marks are reserved for the Journal and 5 marks for the oral examination.

d) Practical examination be of four hours duration which includes paper work ,

   on line implementation and viva examination.

Requirements -

1.Core faculty –

Qualifications for Teachers
For Computer Science - M.Sc. Computer / M.C.A.
(All of above with NET /SET as per existing rules)
One lab instructor –B.Sc.-Computer / B.C.S./ P.G.D.C.A.

2.Library **–**

 The college / Institute shall spend Rs. 10,000 in each of first , second and third year on purchase of books and Journals .

3. Equipment-

    Audio-Visual equipments

Server-	01
Pc/Workstations	20
Printers	01
Scanner	01

    Software's- O/S , Application SW , Packages SW as per syllabus

A batch for practical will have 20 students .

Semester-II

Paper –III Fundamentals of Databases

Unit-I Database System Concept :-   08
 Basic Concept, Advantages of DBMS over file processing system, data
 abstraction, Database languages, Data independence

Unit-II Components of DBMS and overall structure of a DBMS   08
 Client server based or centralized, Parallel computing based, Distributed
 database , Data base architecture, Database application architecture, storage
 manager , Query processor , Database Users and administrator ,
Responsibilities
 of Database manager

Unit III Data Model :   08
 Network Model, Hierarchical Model, E-R Model .
 Client – Server Architecture.
 Select , Project , Union, Intersection Difference ,Cartesian product ,
 Simple Join .

Unit – IV : Relational Database and SQL :   16
 Introduction Codd's 12 rules, Concept of domain tuple. .
 Structure query Language. :-> Features of SQL , Data types, Integrity
 constraints, Classification of SQL command . DDL (Create, Alter, Drop)
 and DML(Insert , Update , Delete)
 SQL operator and Clauses :- Logical, relational, in, between, like operator
 Order by , group by, Having clause .
 SQL Function :-> Numeric (ABS, POWER, SQRT)
 Conversion (to_number, to_char)
 Aggregate (SUM, MAX, MIN, COUNT, AVG)

Reference Books-
Database Management System Concept by Korth
Commercial Application Development Using ORACLE Developer 2000 by Ivan
Bayross

 Practical Based On Paper-III

 1.Demonstration and Use of simple SQL commands.
 2.Create table and add record using SQL..
 3.Alter Table for given Clauses
 4.Use different Function.
 5.Use Various operator , clause and constraints while creating table and
 manipulating data in the table .

Paper-IV Procedure Oriented Programming through 'C'

Unit-I User defined functions   (10)

   a. Definition of user defined function , need , multi-function program , function prototype , General form of UDF
   b. Category of function , calling function , passing arguments, passing array to function.
   c. Recursion – definition , use of recursion ,nested function calls.

Unit-II Pointer   (8)

   a. Definition and use of pointer , accessing address of variable
      Declaration and initialization of pointer variable , pointer expressions , pointer increment and scale factor
   b. Pointer to array – pointer and arrays , pointer and character string ,pointer as function arguments
   c. Dynamic memory allocation

Unit-III Structures and Union   (11)

   a. Concept of structure – Definition of structure , declaration and initialization of
       structure, accessing members of a structure . Basic difference between array and structure, copying and comparing structure variables .
   b. Nested structures – concept of structure within structure , handling nested structures , array within structure , arrays of structures , size of structure.
   c. Union – definition , declaration and use.

Unit-IV File Handling   (11)

   a. Introduction – What is file , file name , data type and structure of a file , purpose of file , need of a file .
   b. Basic file operations – Opening a file , naming a file , closing a file , modes of operations.
   c.Types of files – sequential , random access , text files , binary files.
        reading ,writing , modifying and appending contents of a file

Reference Books-
Programming in ANSI C 4E E Balagurusamy McGraw-HILL
Let Us C – Yashwant Kanetkar
Progranming 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-IV

1 Programs on user defined functions (defining and declaration of UDF , calling a function , passing arguments to function and returning values to called portion of program)
2. Demonstration of call by value and call by reference.
3. Programs using structures and Union (Declaration and initialization of structure , accessing members of structure).
4 Demonstration of use of arrays for handling structures.
5. Programs on Nested structures.
6 . Multifunctional programs demonstrating passing arrays and structures to UDF
7 . Simple programs for handling files .(Integer oriented operations)
8 . Programs to perform characters oriented operations on a file .
9 . Handling multiple files in a program.
10 . Use of structure and array for file handling
11. Handling binary files and menu driven programs.

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

Semester- II

Paper Number   : 1.2
Paper Title   : Modern Operating Environment - Part-II

Unit-1 Introduction to Operating system
Definition of OS, Types of OS, Basic functions, features of OS, Comparison between DOS and Windows , Windows OS- concept of window, windows Explorer, control panel, managing files and folders.

Unit-2 Microsoft Word
Use and features and applications of Microsoft Word, Creating , formatting and printing the documents, Table option, mail merge

Unit-3 Microsoft Excel
Use and features and applications of Microsoft Excel, Creating , formatting and printing the worksheet, Formula, different functions and graphs

Unit-4 Network Basics and Internet
Network-Definition, Types, Network topologies, Concept of internet, uses and benefits of internet, search engines, handling e-mails

Reference Book

Computer Today- S. Basandara
Computer Fundamentals- P. K. Sinha
Ms- Office – Dreamtech Publication
Operating System – Achyut Godbole
Computer Fundamentals- V. Rajaraman
Introduction to Computer and Data Processing- Pawar, Lad, Shinde, Patil (Dreamtech)

Lab Course

1. Managing files and folders using windows Explorer
2. Managing desk top using control Panel and other utilities
3. Ms-word Creating letter, table, formatting documents
4. mail-merge
5. Creating and saving worksheets
6. Use of different formula and functions
7. creating worksheets and demonstrating various graphs
8. Opening new accounts on internet
9. Searching using various search engines
10. Composing and sending e-mails

Paper Number   : 2.2
Paper Title   : Programming Through 'C'- Part-II

Unit 1:
Array:
Definition, one and two dimensional array, declaration and initializing one and two dimensional array, multi dimensional array, Handling of character strings – Reading and writing strings- gets(), puts(), Putting strings together, comparison of two strings, String handling functions

Unit 2 :
User defined functions:
Need, multi functioned program, form of a c function, return value and their type, calling a function, category of a functions, functions with array Storage classes- auto, external, static and register

Unit 3 :
Pointers:
Understanding pointers, accessing address of variable, declaration and initializing pointers, pointer expression, pointer to array and functions, function call by value and by reference,

Unit 4:
Structures and Unions:
Defining and processing a structure, Defining and processing a Unions

Reference Book

Programming in ANSI C   - E. Balagurusamy
Programming in C – Schuam outline Series
Let Us C – Yashwant Kanetkar
Introduction to Programming Using C- A. J Pawar, R. A. Lad, S. S. Shinde, D. R. Patil(Wiley-Dreamtech)

Lab Course
1 Programs based on array
2. Programs based on string handling
3. Programs based on user defined functions
4. Programs based on pointers
5. Programs based on Structure
6. Programs based on Unions

Paper   : 3.2
Paper Title   :File and Data Structure - Part II

Unit 1 Stack
Definition of stack and examples, , operations on stack, declaration of stack, infix, prefix and postfix concepts, stack applications.

Unit 2 Queues

Definition, queue as an ADT, implementation of queue, types of queue, operations on queue, Priority queue, queue applications

Unit 3 Link-list
Definition and concept of linked list, operations on linked list, linked list as stack and queue, circular and double linked list

Unit 4 Tree
Basic concepts of Tree, Binary tree, Types of Binary tree, representation, binary tree traversal, threaded binary trees, tree operations, tree applications

Computer Lab Practical
1. Programs on linked list, add, Remove node from linked list (Min 4 Program)
2. Programs on implementation of a circular list   (Min 2 Program)
3. Programs on stacks Push and Pop (Min 2 Program)
4. Program on binary Tree (Min 2 program)
5. Program to implement linear queue.

6. Program to reverse linked list

Reference Books-

Data Structure using c and c++ - L. A. Tenenbaum
Data Structure through c – Dr. Sahani
Data Structure through c and c++ - Jagatap
Data Structure through C – Y. C. Kanetkar
Data Structure through C – V. K. Shukla(Wiley)

Paper 4.2   Digital Electronics-Part II

Unit 5 Flip- flop

Flip-Flop- concept of sequential circuit, S-R, J-K, preset and clear, master slave, JK-MS, D and T flip flops, their truth tables and excitation tables, conversion from one type to another type of flip flop. Registers. Logic families and their characteristics. Characteristics of digital IC's –7402, 7400, 7408, 7475, 7474.

Unit 6 Multi-vibrator

Types of Multivibrator, Block diagram of IC555, application of IC555 as Astable and Monostable (Calculation of frequency and pulse width) crystal clock using invertor. Clock circuit using NAND gate.

Unit 7 Introduction to Digital Memory

Types of memory- Volatile and non-volatile, SRAM and DRAM, classification and working principle of memory devices, RAM, ROM, PROM, EPROM, EEPROM.

Unit 8 Memory Organization

Concept of Diode matrix ROM, speed and cost range of memory devices, Memory organization- building the required memory size by using available memory chips, memory address map.

References:

Fundamentals Digital   electronics- R. P. Jain, TMG
Digital Electronics – Derek Molly, PHI
Digital Electronics, An Introduction to theory and practice   – William H. Gothmann

Electronics Lab Practical

1. Study of Basic Gates
2. Zener diode as a voltage regulator
3. Transistor as a switch

4. Inter conversion of gate by using NAND
5. Inter conversion of gate by using NOR
6. Verification of De-Morgan's Theorems
7. IC-555 as Astable Multivibrator
8. IC-555 as Mono stable Multivibrator
9. Study of D and edge triggered D flip flop
10. Study of R-S and J-K flip flop
11. Half and full Adder
12. Multiplexer and De-Multiplexer using IC's
13. Crystal clock using NAND gate
14. Architecture of 80386, 486 and Pentium system
15. Study of counter

Mathematics

Semester – II (Numerical Methods)

Unit 5 – <u>Errors in Numerical calculations and Solution to Algebraic and Transcendental Equations.</u>
5.1. Introduction
5.2. Errors
      5.2.1. Absolute Error.
      5.2.2. Relative Error.
      5.2.3. Percentage Error.
5.3. Solution to Algebraic and Transcendental Equations
      5.3.1. Bisection Method.
      5.3.2. Method of False Position.
      5.3.3. Newton – Raphson Method

Unit 6 – <u>Interpolation</u>
6.1. Introduction.
6.2. Forward Difference.
6.3. Backward Difference.
6.4. Newton's Forward Difference Interpolation.
6.5. Newton's Backward Difference Interpolation.
6.6. Lagrange's Interpolation.
6.7. Least – Square Curve Fitting Method.
      6.7.1. Fitting a straight line.
      6.7.2. Fitting parabola.

Unit 7 – <u>Solution of Simultaneous Algebraic Linear Equations</u>
7.1. Cramer's Rule
7.2. Gauss Elimination Method.
7.3. Gauss – Jordan Method.
7.4. Gauss – Seidel Method.

Unit 8 – <u>Numerical Solution of Ordinary Differential Equations & Numerical</u>
<u>Integration</u>

8.1. Numerical solution of 1st and 2nd order differential equations.

      8.1.1. Taylor Series.

      8.1.2. Euler's Method

      8.1.3. Euler's Modified Method

      8.1.4. Runge – Kutta Method (2nd, 4th order)

8.2. Numerical Integration.

      8.2.1. Trapezoidal Rule.

      8.2.2. Simpson's $\frac{1}{3}$ Rule.

      8.2.3. Simpson's $\frac{3}{8}$ Rule.

Reference Books:

* Shanti Narayan : **Differential Calculus.**

* S.B. Nimse : **Calculus**

* H.T.Dinde, A.D. Lokhande, P.D.Sutar, U.H.Nai: **A Text Book Of Calculus And**

      Differential Equations, Published by SUMS, 2003.

* R.B. Kulkarni, J.D. Yadhav, N.I.Dhanshetti: **A Text Book Of Algebra And Geometry,**

      Published by SUMS, 2003

* G.V. Kumbhojkar, H.V. Kumbhojkar: **Calculus & Differential Equations, Nirali**

      Prakashan.

* S.S. Sastry: **Introduction Methods of Numerical Analysis, PHI.**

* V. Rajaraman: **Computer Oriented Numerical Methods.**

* Balguruswami: **Numerical Methods, PHI.**

* Mathews: **Numerical Methods for Scientist & Engineers, PHI.**

* S.S. Sastry: **Introduction Methods of Numerical Analysis, PHI.**

* Steven C: **Numerical Methods for Engineers with programming and Software**

      Applications.

* Richard L Burden, J Douglas Faires, Brooks/Cole, Thompson: **Numerical Analysis.**

Mathematics Lab Practical

Second Term

7	Solution of Simultaneous Algebraic Linear Equations (a) Gauss Elimination Method (b) Gauss – Jordan Method (c) Gauss – Seidel Method	3
8	Numerical solution of Ordinary Differential Equations (a) Euler' Method	3

	(b) Euler's Modified Method	
	(c) Runge – Kutta Method (2nd , 4th order)	
9	Numerical Integration (a) Trapezoidal Rule. (b) Simpson's ⅓ Rule (c) Simpson's ⅜ Rule	3

Reference Books:
* Shanti Narayan : **Differential Calculus.**
* S.B. Nimse : **Calculus**
* S.P.Thorat, A.A.Basade, H.V.Patil : **A Hand Book Of Mathematics Laboratory – I, Published by SUMS, 2003.**
* S.S. Sastry: **Introduction Methods of Numerical Analysis, PHI.**
* V. Rajaraman: **Computer Oriented Numerical Methods.**
* Balguruswami: **Numerical Methods, PHI.**
* Mathews: **Numerical Methods for Scientist & Engineers, PHI.**
* S.S. Sastry: **Introduction Methods of Numerical Analysis, PHI.**
* Steven C: **Numerical Methods for Engineers with programming and Software Applications.**
* Richard L Burden, J Douglas Faires, Brooks/Cole, Thompson: **Numerical Analysis.**

Paper No. 6.2
Paper Title: Business Communication Part-II

Unit I :	Developing oral skills through interviews, group discussions & seminars etc.	**(07 lecture)**
Unit II:	Information transfer & interpretation of data	**(10 lecture)**
Unit III:	Modern office communication Notices, Agenda, minutes, letters related to appointments, letter of acceptance or joining report application letter for transfer	**(15 lecture)**
Unit IV:	Developing vocabulary and avoiding errors in written English	**(18 lecture)**

For Internal Evaluation

Spoken & written skills:

1]	Express Yourself (about family, friends, interests, ambitions etc.)	**(5 lecture)**

2]	Group discussions Interviews, telephonic conversation & Various communication situations, sending E-mail, power point presentation, etc.	**(5 lecture)**

List of Reference Books -		
1.	Handbook of Communication Skills in English	by R.L. Kulkarni (Phadke Prakashan, Kolhapur.)
2.	Business Communication	By Dr.Prakash M. Herekar (Mehta Publishing House Kolhapur)
3.	Communication for business : A Practical Approach	by Shirley Taylox (Pearson Education Ltd.)
4.	Business Communication	By Mary Allen Guffey
5.	Communication Skills for Engineers	(Pearson Education Ltd.)
6.	Learn Reading	By Sahrolyn Pollard Durodola (Anmol Publications Pvt. Ltd. New Delhi)
7.	Oral Skills by	G.V. Kulkarni
8.	English for Communication :A Test book of B.Sc.-I	(Shivaji University Press)
9.	English for Communication :A Test book of B.A.-III	(Shivaji University Press)
10	Effective Business Communication by Herta & Murphy.	H.W. Hildebrandl & J.P. Thomas (McGraw Hill)
11	www.usingenglish.com	
12	www.britishcouncil.org	

B.Sc-I Botany

Sr No	Title of Old Syllabus	Title of New Syllabus
	Paper I Diversity and Classification of Plant Kingdom	Semester I- Paper -I : Diversity and Classification of Plant Kingdom Non-Vascular Plants Semester-II - Paper –I: Diversity and Classification of Plant Kingdom Vascular Plants
	Paper-II Basic plant Biochemistry and Cell Biology	Semester I: Paper -II- Basic Plant Biochemistry Semester-II - Paper –II: Cell Biology.

B.Sc-I Seed Technology

Sr No	Title of Old Syllabus	Title of New Syllabus
	Paper I Seed Development and Morphology and Seed Physiology	Semester I- Paper -I :Seed Development & Morphology Semester-II - Paper –III: Seed Physiology
	Paper-II Plant Breeding and Seed Production	Semester I: Paper -II- Plant Breeding Semester-II - Paper –IV: Seed Production.

B.Sc-I Chemistry

Sr No	Title of Old Syllabus	Title of the New Syllabus
1	Paper-I Physical and Inorganic Chemistry	Sem-I Paper-I Physical and Inorganic Chemistry Sem-II Paper-I Physical and Inorganic Chemistry
2	Paper-II Organic and Inorganic Chemistry	Sem-I Paper-II Organic and Inorganic Chemistry Sem-II Paper-II Organic and Inorganic Chemistry

B.Sc-I Electronics   Equivalences Electronics

Old Courses	New Course
Paper –I Electronics	Sem-I-Basic Electronics p-I Sem II- Electtronic Devices P-II
Paper-II Digital Electronics	Sem-II - Digital Electronics p-III Sem II- Digital Electronics P-IV

B.Sc-I Geography

Sr.No.	Title of Old Paper	Title of New Paper	
1	Paper-I :Geomorphology	Semester-I	Paper-I :Physical Geography
			Paper-II :Geomorphology
2	Paper II: Climatology and Oceanography	Semester-II	Paper-III :Climatology
			Paper-IV :Oceanography
3	Practical		Practical

B.Sc-I Geology

Equivalence of new syllabus given to old syllabus.

	Old syllabus	New syllabus
	Paper I – Introduction to General Geology and Physical geology	**Semester I** **Paper I –** General Geology **Semester II** **Paper III –** Physical Geology
	Paper II – Mineralogy, Crystallography and Petrology	**Semester I** **Paper II –** Mineral and Crystallography **Semester II** **Paper IV –** Petrology

B. Sc. I Mathematics

Equivalence of the papers may be as follows

Old Syllabus	New Syllabus
Mathematics Paper – I (Algebra and Geometry)	Mathematics Paper – I (Algebra) Mathematics Paper –III (Geometry)
Mathematics Paper – II (Calculus and Differential)	Mathematics Paper – II (Calculus) Equations) Mathematics Paper – IV (Differential Equations)

B.Sc-I Microbiology

Sr.No.	Title of Old Paper	Title of New Paper
1.	Paper - I : Fundamental of Microbiology and Basic Biochemistry.	Semester I: Paper I : Fundamental of Microbiology Paper II : Basic Microbial Techniques and Biochemistry
2.	Paper-II : Microbial Techniques & Applied Microbiology.	Semester II:

		Paper III : Medical Microbiology, Microbial Techniques and Bioinstrumentation. Paper IV : Applied Microbiology
3.	Practical – Old	Practical – New

B.Sc –I Industrial Microbiology.

Sr.No.	Title of Old Paper	Title of New Paper
1.	Fundamentals of Industrial Microbiology	Paper I : Fundamentals of Industrial Microbiology. Paper II : Basics of Fermentation.
2.	Fermentation Equipments and Techniques	Paper III: Fermenter Design & Instrumentation. Paper IV: Fermentation Techniques.
3.	Practical – Old	Practical - New

B.Sc –I Physics

Old Annual Exam Pattern	Revised Semester Exam Pattern	
Paper I	Semester I	Paper I (Mechanics and Properties of matter)
	Semester II	Paper III (Kinetic theory of gases, Heat and Thermodynamics.)
Paper II	Semester I	Paper II (Oscillations, Waves and Optics)
	Semester II	Paper IV(Electricity, Magnetism and Basic

Electronics.)	

B.Sc-I Statistics

Sr. No.	Title of Old Paper	Title of New Paper
1.	PAPER-I: DESCRIPTIVE STATISTICS	SEM.-I / PAPER-I: DESCRIPTIVE STATISTICS –I SEM.-II / PAPER-III: DESCRIPTIVE STATISTICS -II
2.	PAPER-II: PROBABILITY AND DISCRETE PROBABILITY DISTRIBUTIONS	SEM.-I / PAPER-II: ELEMENTAY PROBABILITY THEORY SEM.-II / PAPER-IV: DISCRETE PROBABILITY DISTRIBUTIONS
3.	Practical Paper-I	Practical Paper-I

B.Sc. I Zoology Equivalence to old syllabus

Sr. No.	Title of Old Paper		Title of New Paper
	Old paper – I Non-chordates, Cell Biology, Genetics and Ethology		Semester-I- Paper I -Animal Diversity-I Semester-I- Paper II- Cell Biology, Genetics
	Old paper –II Chordates, Embryology,Environmental Science, Zoogeography and Evolution		Semester- II- Paper- I - Animal diversity II, Semester-II-Paper-II-Ecology, Ethology, Evolution and Applied Zoology

B.Sc I Computer Science

Sr-No	Title of old Paper	Title of New paper
01	Paper-I Modern Operating Environments and Application software's	Sem-I/Paper-I Modern Operating Environment Sem-II/Paper-III Fundamentals of

		databases
02	Paper-II Programming skills Using 'C''	Sem-I/Paper-II Introduction to programming Sem-II / Paper-IV Procedure Oriented programming through 'C'
03	Practical Paper-I	Practical Paper-I

B.Sc. Part - I Information Technology

Equivalence

SrNo	PaperNo	Title Of Old Paper	New Paper No	Title Of New Paper
1	1	Modern Operating Environment	1.1	Modern Operating Environment- Part-I
			1.2	Modern Operating Environment- Part-II
2	2	Programming Through 'C'	2.1	Programming Through 'C'- Part-I
			2.2	Programming Through 'C'- Part-II
3	3	File and Data Structure	3.1	File and Data Structure Part-I
			3.2	File and Data Structure Part-II
4	4	Digital Electronics	4.1	Digital Electronics Part I of Sem. I
			4.2	Digital Electronics Part II of Sem II
5	5	Foundations of Mathematics	5.1	**Semester-II** Foundation of Mathematics (Matrices & Calculus) Part-I
			5.2	**Semester-II** Foundation of Mathematics (Numerical Methods) Part-II
6	6	Business Communication	6.1	Business Communication
			6.2	Business Communication
7	7	Lab Course-I Based On Paper-I	8	Lab Course-I Based On Paper-1.1,1.2,2.1,2.2,3.1,3.2
7	8	Lab Course-IV Project and Viva	10	Lab Course-IV Project and Viva

B. Sc. Biotechnology (Entire)

B. Sc. I Biotechnology (F.Y.) and B. Sc. Biotechnology Semester-I and II

Course Code	Title of the Course	Course Code	Title of the Course	
First Year		Semester-I and Semester-II		
Bb-101	Fundamental of Chemistry	BTE-101, Paper-I BTE-201, Paper-X	Physical and Inorganic Chemistry Organic and Inorganic Chemistry	
Bb-102	Fundaments of Physics	BTE-102, Paper-II BTE-202, Paper-XI	Basics in Physics Applied Physics	
Bb-103	Basic Biosciences	BTE-103, Paper-III BTE-203, Paper-XII	Plant Science Animal Science	
Bb-104	Mathematical & Statistical Methods for biologist	BTE-104, Paper-IV BTE-204, Paper-XIII	Mathematical Methods Statistical Methods	
Bb-105	Fundamentals of Biological Chemistry	BTE-105, Paper-V BTE-205, Paper-XIV	Biomolecules Proteins and Enzymes	
Bb-106	Cell Biology	BTE-106, Paper-VI BTE-206, Paper-XV	Basics in Cell Biology Advances in Cell Biology	
Bb-107	Microbiology	BTE-107, Paper-VII BTE-207, Paper-XVI	Basics in Microbiology Techniques in Microbiology	
Bb-108	Use of Computers	BTE-108, Paper-VIII BTE-208, Paper-XVII	Computer Basics and Bioinformatics Computer Programming	

B. Sc. I Biotechnology (Optional/Vocational) and B. Sc. Biotechnology Semester-I and II (Optional/Vocational)

Course Code	Title of the Course	Course Code	Title of the Course
First Year		Semester-I and Semester-II	

Bb-101 Paper –I	**Basics for Biotechnology - I**	BTO-101, Paper-I BTO-201, Paper-III	Basics for Biotechnology Cell Biology and Genetics
Bb-102 Paper –II	Basics for Biotechnology - II	BTO-102, Paper-II BTO-202, Paper-IV	Mathematics, Biostatistics and Computers Microbiology

B.Sc. Bioinformatics
Shivaji University, Kolhapur
Equivalence subjects of B. Sc. Bioinformatics Part I (Sem I & II)

	B. Sc. Bioinformatics (Implemented from June 2008)	Semester System (Implemented from June 2010)
Paper I	Introduction to Bioinformatics	Sem I: Introduction to Bioinformatics Sem II: Database programming languages
Paper II	Computer Fundamentals	Sem I: Computer Fundamentals Sem II: Programming concept and C- language
Paper III:	Basic Botany and Zoology	Sem I: Plant Science Sem II: Animal Science
Paper IV	Microbiology and Virology	Sem I: Basics in Microbiology Sem II: Techniques in Microbiology
Paper V	Cell Biology and Biological Chemistry	Sem I: Basics in Cell Biology Sem II: Proteins and Enzymes
Paper VI	General Chemistry	Sem I: Physical and Inorganic Chemistry Sem II: Organic and Inorganic Chemistry
Paper VII	Basic Mathematics and Statistics	Sem I: Mathematical Methods Sem II: Statistical Methods
Paper - VIII	Basic Concept of Physics	Sem I: Basics in Physics Sem II: Applied Physics
Paper - IX	English for Communication	Sem I: English for Communication-I Sem II: English for Communication-II

Nature of Question Paper for all (Theory) papers U.G. Courses under Under Faculty of Science.

Nature of Question Paper (except Chemistry)		
Q.No.1	Multiple Choice based objective type question (four options for each question be given)	8 Marks
Q.No. 2	Attempt any two of the following (out of five)	16 Marks
Q.No. 3	Shot notes (4 out of 6)	16 Marks
	Total	40 Marks

टीप: बी.ए./बी.कॉम – भूगोल, एस.टी.डी. तसेच बी.ए. गृहशास्त्र या अभ्यासक्रमांना अनुक्रमे सामाजिकशास्त्रे / वाणिज्य व सामाजिकशास्त्रे विद्याशाखांनी निश्चित केल्याप्रमाणे प्रश्नपत्रिकेचे स्वरूप राहील

Nature of question papers for B.Sc. Part-I Semester Course
Semester – I & II
Physical and Inorganic Chemistry (Paper – I & III)

	Section- I (Physical Chemistry)	
Q.1A)	Multiple Choice Questions : 05 sub questions-all compulsory	Marks 05
B)	Solve any One out of Two: (Long answer type questions)	Marks 08
Q.2A)	Solve any Two out of Three: (Short answer type questions)	Marks 10
B)	Solve any One out of Two : (Short answer type questions)	Marks 04
	Section- II (Inorganic Chemistry)	
Q.3A)	Multiple Choice Questions : 03 sub questions-all compulsory	Marks 03
B)	Solve any Two out of Three:(Short answer type questions)	Marks 10
	Total -	Marks 40

Semester – I & II
Organic and Inorganic Chemistry (Paper – II & IV)

	Section- I (Organic Chemistry)	
Q.1A)	Multiple Choice Questions : 05 sub questions-all compulsory	Marks 05
B)	Solve any One out of Two : (Long answer type questions)	Marks 08
Q.2A)	Solve any Two out of Three : (Short answer type questions)	Marks 10
B)	Solve any One out of Two : (Short answer type questions)	Marks 04
	Section- II (Inorganic Chemistry)	
Q.3A)	Multiple Choice Questions : 03 sub questions-all compulsory	Marks 03
B)	Solve any Two out of Three : (Short answer type questions)	Marks 10
	Total -	Marks 40