SHIVAJI UNIVERSITY, KOLHAPUR.

B
Accredited By NAAC
(2009)

Syllabus For

Bachelor of Science

Part - II (Sem.-IV)

to be implemented from the academic year 2011-12

(June 2011) onwards.)

(Subject to the Modifications that will be made from time to time)

Shivaji University, Kolhapur.

Syllabus of the B.Sc. Part - II Semester IV to be implemented from the academic year 2011-12 onwards.

Subjects	Name of the Paper	**Marks**	
		Theory	Internal
Botany	**Semester IV** Paper – VII: Plant Ecology	40	10
	Paper –VIII: Development of Plants	40	10
Seed Technology	**Semester IV** **Paper- VII** Seed Testing	40	10
	Semester IV **Paper- VIII** Seed Quality Control	40	10
Plant Protection	**Semester IV** **Paper- III** **Corp Diseases and Their Management**	40	10
	Semester IV **Paper- IV** Insect Pest and Their Management	40	10

Chemistry	**SEMESTER – IV** **Paper- VII** Physical and Inorganic Chemistry	40	10
	Semester IV Paper- VIII Organic and Inorganic Chemistry	40	10
Electronics	**SEMESTER – IV** **Paper VII –** Electronic Circuits	40	10
	SEMESTER – IV **Paper VIII –** Interfacing with Microprocessor and VHDL Programming	40	10
Geology	**Semester IV** **Paper- VII** Structural Geology, Photo geology and Hydrogeology	40	10
	Semester IV **Paper- VIII** Sedimentary and Metamorphic Petrology	40	10
MATHEMATICS	**Semester IV** **Paper- VII** **INTEGRAL CALCULUS**	40	10
	Semester IV **Paper- VIII** **NUMBER THEORY**	40	10

Microbiology	**Semester IV** **Paper- VII** Fundamentals of Industrial Microbiology, Biostatistics & Bioinformatics.	40	10
	Semester IV **Paper- VIII** Basics of Immunology and Medical Microbiology	40	10
Industrial Microbiology	**Semester IV** **Paper- VII** FERMENTATION TECHNOLOGY	40	10
	Semester IV **Paper- VIII** INDUSTRIAL PRODUCTION OF BIOFERTILISERS	40	10
Physics	**Semester IV** **Paper- VII** Optics and Lasera.	40	10
	Semester IV **Paper- VIII** Relativity and Modern Physics	40	10

Astro Physics	**Semester IV** **Paper- III** Cosmic Electrodynamics	40	10
	Semester IV **Paper- IV** Galaxies and Planets	40	10
STATISTICS	**Semester IV** **Paper- VII** Continuous Probability Distributions-II	40	10
	Semester IV **Paper- VIII** Statistical Methods	40	10
Zoology	**Semester IV** **Paper- VII** VII Animal Diversity IV	40	10
	Semester IV **Paper- VIII** VIII Histology & Physiology	40	10

Fisheries	**Semester IV** **Paper- III** Inland Fisheries	40	10
	Semester IV **Paper- IV** Aquaculture	40	10
BIOTECHNOLOGY OPTIONAL/VOCATIONAL	**Semester IV** **Paper- VII** Biophysics, enzyme technology	40	10
	Semester IV Paper- VIII r- DNA technology	40	10
Computer Science	**Semester IV** **Paper- VII** **Relational Management Systems**	40	10
	Semester IV **Paper- VIII** **Advanced Object Oriented Programming Using C++**	40	10

Food Science & Quality Control	**Semester IV** **Paper- VII** **Quality Control of Food and Food Products**	40	10
	Semester IV **Paper- VIII** **Cereals and Legume Processing**	40	10
Biochemistry	**Semester IV** **Paper- III** **Biochemical Techniques**	40	10
	Semester IV **Paper- IV** **Biotechnology and Bioinformatics**	40	10
Pollution	**Semester IV** **Paper- III** Air Pollution	40	10
	Semester IV **Paper- IV** Water Pollution-II	40	10

[Note:- The practical examination will be conducted in annual.]

B.Sc.Part II Botany

SEMESTER IV

Paper VII – Plant Ecology

Paper VIII: Development of Plants

Paper VII – Plant Ecology

Unit 1. Introduction to Ecology and Population ecology **11**

Sub Unit 1.1 Holocoenotic nature of environment

Sub Unit 1.2 Climatic factors

Sub Unit 1.3 Edaphic factors

Sub Unit 1.4 Concept of Ecological amplitude

Sub Unit 1.5 Concept of Population

Sub Unit 1.6 Density

Sub Unit 1.7 Natality and mortality

Sub Unit 1.8 Age distribution of population

Sub Unit 1.9 Carrying capacity – Brief account

Sub Unit 1.10 Limiting (regulatory) factors of population

-Abiotic factors: Nutrients, and moisture

-Biotic factors – Competition, and density.

Unit 2. Community ecology and Ecosystems **14**

Sub Unit 2.1 Introduction to community

Sub Unit 2.2 The form and structure of communities

Sub Unit 2.3 Classification

Sub Unit 2.4 Physiognomy

Sub Unit 2.5 Community characteristics

Sub Unit 2.6 Concept of species diversity ά, β and γ.

Sub Unit 2.7 Niche and Guilds

Sub Unit 2.8 Introduction to ecosystem

Sub Unit 2.9 Concept and general characters of ecosystem

Sub Unit 2.10 Types of ecosystem

Sub Unit 2.10 Biogeochemical cycles carbon, Nitrogen and water.

Sub Unit 2.11 Trophic organizations: Autotrophy, Heterotrophy, parasitism, pyramids and their types, food chains and their types, food webs.

Sub Unit 2.12 Energy flow in ecosystem, Box and pipe model of energy flow, Ecosystem productivity – primary, secondary. Gross and Net.

Unit 3. Ecological succession and adaptations:

9

Sub Unit 3.1 Concept and process

Sub Unit 3.2 Primary and secondary succession

Sub Unit 3.3 Hydrosere and Xerosere

Sub Unit3.4 Concept of plant adaptation

Sub Unit 3.5 Xeric, Hydric and Mesic adaptations.

Sub Unit3.6 Ecads, ecotypes and ecoclines.

Unit 4. Plant indicators

6

Sub Unit 4.1 Plants as indicators.

Sub Unit4.2 Role of indicators in environmental monitoring.

Sub Unit 4.3 Phytogeography

Sub Unit 4.4 General principles

Sub Unit 4.5 Phytogeographic regions of India

(as per Chatterjee and Mani)

Paper VIII: Development of Plants

Unit 1. The organization of higher plant body, **8**

Sub Unit 1.1 The plant organs

Sub Unit 1.2 Development of the plant body

Sub Unit 1.3 Internal organization

Sub Unit 1.4 Cell types and tissues

Sub Unit 1.5 Protoplast – ergastic substances

Sub Unit 1.6 Cell wall – chemical changes in cell wall (Lignification, cutinization, suberization, Plasmodesmata.

Unit 2. Meristem :

5

Sub Unit 2.1 Introduction

Sub Unit 2.2 Classification

Sub Unit 2.3 Functions

Sub Unit 2.4 Theories of apixal organization – The Apical cell theory, Histogen theory and tunica corpus theory.

Unit 3. Tissue systems and their functions:

13

Sub Unit 3.1 Epidermal tissue system.

Sub Unit 3.2 Secretory tissue system.

Sub Unit 3.3 Mechanical tissue system.

Sub Unit 3.4 Vascular tissue-Types of Vascular bundles

Unit 4. Secondary body of the plant and Anomalous secondary growth

14

Sub Unit 4.1 Vascular cambium.

Sub Unit 4.2 Normal secondary growth in dicot stem and root.

Sub Unit 4.3 Periderm and lenticel.

Sub Unit 4.4 Basic structure of wood and its types.

Sub Unit 4.5 General account.

Sub Unit 4.6 Anomalous secondary growth of stem of *Bignonia* and *Dracaena*.

Sub Unit 4.7 Anomalous secondary growth in Beet root.

SHIVAJI UNIVERSITY, KOLHAPUR

Nature of theory Question Paper will be as follows

For each theory paper:

Q.1 Objective types Questions.	8 Marks
Q.2 Long answer/Essay type (Any two out of three).	16 Marks
Q.3 Short notes (any four out of six):	16 Marks

PRACTICALS IN BOTANY AT B. Sc. II

(To be implemented from June, 2011.)

Botanical excursions – One teacher along with a batch not more than twenty students be taken for Botanical excursions to places of Botanical interest, one in each term. If there are female students in a batch of twenty,

one additional lady teacher is permissible for excursion. Each excursion will not be for more than 3 days during college working days. T. A. and D. A. for teachers and non teaching staff participating in the excursions should be paid as per the rules. The tour report duly certified by the concerned teacher and Head of the department should be separately submitted at the time of practical examination. Practical – I and II are to be covered in 25 practicals each. These practicals are to be performed by the students. Each practical is to be supplemented by permanent slides, preserved/fresh specimen/materials, charts and herbarium sheets wherever necessary. Every candidate must produce a certificate from Head of the Department in his/her college stating that he/she has completed practical course in a satisfactory manner as per the lines 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 Head of the Department at the end of the year. Candidates have to produce their certified journals and tour reports at the time of practical examination. A candidate will not be allowed to appear for the practical examination without a certified journal, otherwise a candidate must produce a separate certificate of his/her regular attendance for practical course and completion of the same signed by the concerned teacher and Head of the Department.

Distribution of Marks For Practicals

Practical I - 50 Marks (Based on Paper V & Paper VII)

Practical II - 50 Marks (Based on Paper VI & Paper VIII)

Practical I

Sr. No	Particulars	. Marks
1.	Physiology	20
2.	Ecology	20
3	Journal	05
4	Ecological tour report	05

Practical II

Sr. No	Particulars	. Marks
1.	Anatomy	20
2.	Domestication of Plants	20
3	Journal	05
4	Horticultural Term Paper	05

Each practical examination (Practical I and II) should be of maximum 5 hours duration and shall test a candidate in respect of following -

i. Identification and making of temporary and permanent slides.

ii. Identification and understanding of the practicals conducted with respect to development

of plants and their utilization.

iii. Submission of the report of the experiments.

iv. Identification and setting of physiology and ecological experiments.

v. Understanding of the principles of the experiments.

vi. Recording of observations and conclusions.

vii. Submission of the ecological field report.

viii. Practical study of external and internal structures of different plants as

per the syllabus.

ix. Spotting of the specimens as per the syllabus.

SHIVAJI UNIVERSITY, KOLHAPUR
B. SC. II BOTANY
PRACTICALS (LABORATORY EXERCISES)

PRACTICAL NO. 1

UNIT I- PLANT PHYSIOLOGY

Sub Unit 1. To study permeability of plasma membrane using different concentrations of

organic solvents.

Sub Unit 2. Determination of water potential of plant tissues.

Sub Unit 3. To study structure of stomata and to determine the Stomatal Index and frequency.

Sub Unit 4. To study comparative rate of stomatal and cuticular transpiration.

Sub Unit 5. Detection of essentiality of mineral elements by Hydroponics.

Sub Unit 6. To extract and separate chloroplast pigments by ascending paper chromatography.

Sub Unit 7. To study rate of photosynthesis or O2 evolved in photosynthesis.

Sub Unit 8. To study kranz leaf anatomy in C4 plants.

Sub Unit 9. To study diurnal fluctuations in tissue acidity (TAN) in CAM plants.

Sub Unit 10. To study respiration in germinating seeds of plants.

Sub Unit 11. Analysis of vegetative growth.

Sub Unit 12. Breaking of seed dormancy by mechanical and chemical methods.

Sub Unit 13, 14. Bioassay of IAA, GA and Cytokinin.

UNIT II: ECOLOGY

Sub Unit 1. To Study the working and use of meteorological instruments

Sub Unit 2. To Study soil texture

Sub Unit 3. To Study soil pH and water holding capacity of two soil samples.

Sub Unit 4, 5. Determination of density, abundance, frequency and IVI of different species.

Sub Unit 6. Ecological adaptations in morphology and anatomy of Hydrophytes.

a) Submerged

b) Floating

c) Amphibious

(One plant from each group)

Sub Unit 7. Ecological adaptations in xerophytes. *Nerium* and *Aloe.*

Sub Unit 8. Ecological adaptations in Epiphytes (*Aerides*) and parasites (*Cuscuta*).

Sub Unit 9, 10. To study maps of India with respect to major climatic zones, forest types and biogeographical regions.

Sub Unit 11. To prepare ecological tour report of any locality of botanical interest.

PRACTICAL II

UNIT- I: DEVELOPMENT OF PLANTS

Sub Unit 1. Study of organization in the flowering plants using w.m. of root tips of *Pistia* or V. S. of onion root tip/maize/aerial roots of *ficus*/*Tinospora* and w.m. of shoot tips of *Hydrilla*/V. S. of *Coleus/Bryophyllum*.

Sub Unit 2. Study of ergastic substances in plant cell.

a) Reserve food – starch (Potato),

b) Waste products – mineral crystals – Raphides, Sphaeraphides, Cystolith.

Sub Unit 3, 4. Types of vascular bundle (radial, conjoint, collateral, bicollateral,

concentric).

Sub Unit 5, 6. Double stained permanent micropreparation technique.

Sub Unit 7. Maceration technique.

Sub Unit 8, 9. Normal secondary growth in dicot stem and root.

Sub Unit 10, 11. Anomalous secondary structures in *Bignonia* stem and *Dracaena* stem.

Sub Unit 12, 13, 14. Study of Epidermal, Mechanical and Secretory tissue systems.

Sub Unit 15. Study of wood anatomy of porous and non-porous woods.

UNIT II- UTILIZATION OF PLANTS

Sub Unit 1. Study of vegetative and floral morphology and pods in chickpea, red gram,

and fodder legumes(Lucern, stylograss and *Sesbania*)

Sub Unit 2. Study of vegetative and floral morphology and structure of oil storing tissues

in mustard, groundnut, soybean and coconut.

Sub Unit3. Study of fibre yielding plants – cotton, Jute and coir, Botanical sources and

uses.

Sub Unit 4. Study of perfumes and cosmetics yielding plants – *Citronella, Vetaveria, Jasmine, rose, Lawsonia and Pogostemon* (Patchauli).

Sub Unit 5. Study of plants (live or herbarium) used as resource of drugs as per theory.

Sub Unit 6. Study of plant insecticide sources – *Azadirachta indica* (Neem,) *Artemisia*

annua. Chrysanthemum cinerarifolium,(Pyrethrum), *Nicotiana tabacum*.

Sub Unit7. Study of sources of dyes – *Curcuma longa, Bixa orellana, Crocus sativus, Butea monosperma, Indigofera* (Indigo). *Lawsonia inermis* (Mehndy)

Sub Unit 8. Study of ornamental plants as per theory.

Sub Unit 9. Study of world map to show Vavilov's centers of origin of cultivated plants

and Zhukovsky's concepts of mega centers..

Sub Unit 10. Horticultural term paper – Ornamental plants – seasonals, perennials, climbers, bonsai, Cacti and succulents and indoor plants.

SHIVAJI UNIVERSITY, KOLHAPUR
B. Sc. - II, Practical Examination, March/April,

BOTANY PRACTICAL - I

Centre Total Marks: 50
Date Time: 11.00 am onwards

N.B.: 1. Draw neat labelled sketches wherever necessary.
2. Do not write about theoretical points, unless asked specifically.
3. Record your observations carefully and neatly wherever asked.

Q.1 Set up the physiological experiment assigned to you and record your observation, submit

the report to the examiner.

09

Q.2 Arrange the physiological experiment given to you and show it to the examiner.

05

Q.3 Prepare the list quadrate of the marked area and find out the percentage frequencies /

density of different species there in.

09

Q. 4 Set up the ecological experiment assigned to you and show it to the examiner or

Describe the ecological adaptations in the given specimen **A.**

05

Q.5 Identifications:

a) Identify and comment - (Physiology)

02

b) Identify and comment - (Physiology)

02

c) Identify and comment - (Physiology)

02

d) Identify and comment - (Ecology)

02

e) Identify and comment - (Ecology)

02

f) Identify and comment - (Ecology)

02

Q.6 a) Submission of ecological tour report

05

b) Journal

05

SHIVAJI UNIVERSITY, KOLHAPUR
B. Sc. - II, Practical Examination, March/April,

BOTANY PRACTICAL - II

Centre Total Marks: 50
Date Time: 11.00 am onwards

N.B.: 1. Draw neat labelled sketches wherever necessary.
2. Do not write about theorotical points, unless asked specifically.
3. Record your observations carefully and neatly wherever asked.

Q.1 Make a double stained permanent micro preparation of a T. S. of specimen **A.**

09

Q.2 Macerate the given material **B** and prepare the slide from it. Show the slide to the Examiner.

05

Q.3 **a)** Identify, give the botanical name, plant part/s used and medicinal uses of specimen **C**

05

b) Identify, give the botanical name, plant part/s used and uses of specimen **D** (Legumes/Plant insecticides).

04

Q.4 Identify, give the botanical name, plant part/s used and uses of specimen **E** (Oil yielding Plants/Perfumes and cosmetics)

05

Q.5 Identification

a) Identify and describe (Anatomy)

02

b) Identify and describe (Anatomy)

02

c) Identify and describe (Anatomy)

02

d) Identify and comment (Plant utilization)

02

e) Identify and comment (Plant utilization)

02

f) Identify and comment (Plant utilization)

02

Q.6 **a)** Journal

05

b) Horticulture Term Paper

05

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Suggested Readings

PLANT PHYSIOLOGY

1. Galston, A. W. 1969, Life Processes in Plants. Scientific American Library, Springer-Verkag, New York, USA.
2. Elsevier, Amsterdam, The Netherlands.
3. Hopkins, W. G. 1995. Introduction to Plant Physiology. John Wiley & Sons, Inc., New York, USA.
4. Moore, T. C. 1989. Biochemistry and Physiology of Plant Hormones (2nd edition). Springer-Verlag, New York, USA.
5. Salisburry, F. B. and Ross, C. W. 1992. Plant Physiology (4th edition). Wadsworth Publishing Co., California, USA.
6. Taiz, L. and Zeiger, E. 1998. Plant Physiology (2nd edition). Sinauer Associates, Inc., Publishers, Massachusetts, USA.

ECOLOGY

1. Odum, E. P. 1983. Basic Ecology, Saunders, Philadelphia.
2. Barbour, M. G., Burk, J. H. and Pitts, W. D. 1987. Terrestrial Plant Ecology. Benjamin/Cummings Publication Co., California.
3. Kormondy, E. J. 1996. Concepts of Ecology, Prentice-Hall of India Pvt. Ltd., New Delhi.
4. Hill, M. K. 1997. Understanding Environmental Pollution. Cambridge University Press.
5. Mackenzie, A. et al. 1999. Instant Notes in Ecology. Viva Books Pvt. Ltd., New Delhi.

DEVELOPMENT OF PLANTS

1. Carlquist, S. 1998. Comparative Wood Anatomy:Systematic, Ecological and Evolutionary Aspects of Dicotyledonous Wood. Springer-Verlag, Berlin.
2. Cutter, E. G. 1969. Part I. Cells and Tissues. Edward Arnold, London.
3. Cutter, E. G. 1971. Plant Anatomy: Experiment and Interpretation. Part II. Organs. Edward Arnold, London.
4. Esau, K. 1977. Anatomy of Seed Plants, 2nd edition, John Wifey and Sons, New York.
5. Fahn, A. 1974. Plant Anatomy, 2nd edition. Pergamon Press, Oxford.
8. Lyndon, R. F. 1990. Plant Development : The Cellular Basis. Unwin Hyman, London.
9. Mauseth, J. D. 1988. Plant Anatomy. The Bonjamin/cummings Publishing Company Inc., Mento Park, California, USA.
10. Nair, M. N. B. 1998. Wood Anatomy and Major Uses of Wood. Faculty of Forestry, Universiti Putra Malaysia, 43400 Serdang, Selangor D. E., Malaysia.
11. Rahvan, V. 2000. Developmental Biology of Flowering Plants. Springer-Verlag, New York.
16. Steeves, T. A. and Sussex, I. M. 1989. Patterns in Plant Development, 2nd edition. Cambridge University, Press, Cambridge.
17. Thomas, P. 2000. Trees : Their Natural History. Cambridge University Press, Cambridge.

UTILIZATION OF PLANTS

6. Fuller, K. W. and Gallon, J. r. 1985. Plant Products and New Technology. Calrendon Press, Oxford, New York.
7. Kocchar, S. L. 1998. Economic Botany in Tropics, 2nd edition. Macmillan India Ltd., New Delhi.
12. Raven, P. H., Evert, R. F. and Eichhorn, S. E. 1999. Biology of Plants. 5th edition. W. H, Freeman and Co., Worth Publishers, New York.
13. Sambamurthy, A. V. S. S. and Subramanyam, N. S. 1989. A Textbook of Economic Botany, Wiley Eastern Ltd., New Delhi.
14. Sharma, O. P. 1996. Hill's Economic Botany. Tata McGraw Hill Publishing Company Ltd., New Delhi.
15. Simpson, B. B. and Conner-Ogorzaly, M. 1986. Economic Botany - Plants in

Our World. McGraw Hill, New York.
18. Tippo, O. and Stern, W. L. 1977. Humanistic Botany. W. W. Norton, New York.

EQUIVALENCE FOR THEORY PAPERS
(From June-2011) B.Sc. II Botany

Old syllabus (Annual pattern)		**Revised Syllabus (Semester pattern)**	
PAPER NO.	**TITLE OF THE PAPER**	**PAPER NO.**	**TITLE OF THE PAPER**
III	Section I: Plant Physiology Section II: Ecology	**Semester III** Paper – V **Semester IV** Paper VII	Plant Physiology Ecology
IV	Section I: Development of Plants Section II: Utilization Plants	**Semester IV** Paper VIII **Semester III** Paper VI	Development of Plants Utilization Plants

SHIVAJI UNIVERSITY, KOLHAPUR

Semester IV
Paper VII: Seed Testing

Total Lecturing Periods – 40

UNIT-1 Concept and Seed Organizations- **(10)**

1.1 Definition, History, Objectives and development of Seed testing in India

1.2 International Seed Organizations, working, achievements (ISTA,SCST,AOSA, SAAC).

1.3 National seed organizations, working and achievements (NSC, CSCB, Central Seed Committee, Central Seed Testing Laboratory).

UNIT-2 Seed Testing Laboratory- **(10)**

2.1 Lay out, furnishing, capacity.

2.2 Seed testing equipments and their maintenance.

2.3 Laboratory management, staff and functioning of laboratory.

UNIT-3 Physical Analysis- **(10)**

3.1 Seed Sampling & Dividing : Principle, Types, Equipment (Seed Triers, Seed dividers etc.), Procedure, handling and testing of the samples.

3.2 Physical purity analysis : Definition, objectives, equipments, procedure, purity components, reporting.

3.3 Heterogeneity Test : Principle, definition, symbols used, method, calculation, reporting.

3.4 Other determinations :

a) Determinations of No. of seeds /Kg.

b) Determination of husk less seeds in paddy.

c) Determination of seeds of other distinguishable varieties.

3.5 Moisture testing : Objectives, equipments, methods, reporting.

UNIT-4 Methods of Seed Testing- (10)

4.1 Germination testing : Principle, requirements, procedure of seedling evaluation, reporting of the results.

4.2 Rapid test for seed quality determination : Principle, method, requirements, calculation, expression of results of TZ Test and embryo excision test.

4.3 Seed vigour testing : Principle, objectives and kinds – direct, indirect.

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Semester IV

Paper VIII: Seed Quality Control

Total Lecturing Periods – 40

UNIT-1 Concept of Seed Quality Control- (10)

1.1 Concept : Seed health, physical purity, genetic purity, germination ability, variety variation.

1.2 Quality controlling organization in India : composition & working of Central Seed Certification Board, State Seed Committee and Management of seed certification programme.

1.3 GATT & Seed quality control

UNIT-2 Seed Legislation-
(10)

2.1 Objectives,
2.2 Indian seed Act,
2.3 Seed rules & seed order.
2.4 Seed Inspector: Duties and responsibilities.
2.5 New seed policy (1988).

UNIT-3 Field Inspection-
(10)

3.1 Principles, objectives, procedure, techniques of field inspection of seed plots of varieties and hybrids (Cereals, Pulses, Oil seeds, Fiber Crops and vegetable crops).

3.2 Inspection of harvesting, threshing and processing.

3.3 Sampling for seed quality evaluation.

UNIT- 4 Seed Certification-

(10)

4.1 Definition, concept, classes of seeds, phases of certification, certification agency & its organization(s), certification standards (i.e. Land requirement, isolation distance) etc.

4.2 Issue of certificates, tags and sealing.

4.3 Pre and post control check: Genetic purity verification, certification, records and reporting.

4.4 Revalidation of seed lot: Procedure, issuing of certificate.

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References -

1. Mukarji K.G.- Binny Mathur, B.P. Chamola, P. Chitralekha – 1992 – Advances in Botany, A.P.H. Publishing corporation, New Delhi –2.
2. Swarup V. – 1933 – Breeding procedures for cross pollinated vegetable crops, ICAR, New Delhi.
3. Innes N.L. – 1983 – Breeding field vegetables, asian vegetable research and development center, Tainan (Taiwan).
4. Bassett M.J. – 1982 – Breeding vegetable crops, AVI Publishing Company.
5. Singh B.D. – 1999 – Plant breeding: Principles & Methods, Kalyani Publishers – New Delhi.
6. Chaudhari H.K. – 1980 – Elementary Principles of plant breeding, Oxford & IBH Publishing Company – New Delhi.
7. Chandrachekharan S.N. – 1933 – Cytogenetics and plant breeding.

8. Coulter J.M. – 1933 – Fundamentals of plant breeding, Prakash publiashers, Jaipur.
9. Poehlman J.M. & Sleper D.A. – 1995 – Breeding field crops, Panima Publishing Corporation – New Delhi.
10. Chaudhari R.C. – 1993 – Introduction to Plant Breeding – Oxford & IBH Publishing Company Pvt. Ltd. – New Delhi.
11. Aagarwal R.L. – 1998 – Fundamentals of Plant Breeding & hybrid seed production – Oxford & IBH Publishing Company Pvt. Ltd. – New Delhi.
12. Singh P. & Narayanan S.S. – 1993 – Biometrical techniques in Plant Breeding, Kalyani Publishers – New Delhi.
13. Richharia R.H. – 1953- Plant Breeding & Genetics in India I , Scientific Book Company – Patana –4.
14. Swaminathan M.S., P.K. Gupta & Umakant Sinha – 1993 – Cytogenetics of crop plants- Macmillan India Ltd. – New Delhi –2.
15. Bhandari M.M. – 1939 – Practicals in Plant Breeding – Oxford & IBH Publishing House – New Delhi.
12. Jahir J. & Others – 1992 – Techniques of Plant Cytogenetics, Oxford & IBH Publishing Company Pvt. Ltd. – New Delhi.
13. Singh C. – 1993 – Modern techniques of raising field crops – Oxford & IBH Publishing Company – New Delhi.
18. Vaidya V.G., Sahastrabuddhe K.R. & V.S. Khuspe – 1983- Crop Production & Field experimentation, Continental Prakashan , Pune –30.
19. Ram H.H. & Singh H.G. – 1994- Crop Breeding & Genetics – Kalyani Publishers- New Delhi.
20. Yadav D.S. – 1992 – Pulse Crops- Kalyani Publishers- New Delhi.
21. Das P.C. – 1993 – Vegetable crops of India - Kalyani Publishers- New Delhi.
22. Barooah S. – 1993 – Vegetable growing in India - Kalyani Publishers- New Delhi.

23. Arya P.S. – 2000 – Vegetable Breeding, production & seed production- Kalyani Publishers- New Delhi.
24. Chalam G.V. - Seed testing manual, ICAR, New Delhi.
25. Perry D.A. - Seed Vigour testing, ICAR , New Delhi.
26. Schwass R.H . - Seed Quality Control, ICAR, New Delhi.
27. 1992 Legislation on seed ministry of agriculture & cooperation, NSC, Govt. of India.
28 .Tanwar N.S.& Singh S.V. 1988 -Indian minimum Seed certification standards, central seed committee, dept. of agriculture – Govt. of India, New Delhi.
29. Nema N.P. 1989 -Principles of seed certification & testing, Allied Publishers Ltd. New Delhi.

30. Agarwal R.L. -2nd ed. Rip.2003 - Seed Technology, Oxford & IBH Publishing Company, New Delhi
31. Agarwal P.K.& Dadlani M. 1990 -Techniques in Seed Science & Technology, South Asian Publishers, New Delhi.
32. Kozlowski T.T.1932 Ed. -Seed biology Volume III , Academic press, New York.
33. Kulkarni G.N.- Principles of seed technology, Kalyani Publishers- New Delhi.
34. S.S. Purohit – Biotechnololgy, Agrobios Publications

The Nature of theory question papers (Semester Pattern) at B.Sc. II Course.

For B.Sc. II there will be two papers for each semester. Each paper will carry 40 marks.

Q.1 Objective type 8 questions (multiple choice)…… 8 marks

Q.2 Long answer / essay type (any two out of three)……..16 marks

Q.3 Short notes (any 4 out of 6) ……...…… 16 marks

Practical Course

Practical I

1,2,3,4- Studies of Inflorescence, floral arrangements, floral morphology of cotton, caster,
maize, tomato, onion, brinjal.

5 -Study of breeder's kit

6 -Artificial emasculation and pollination studies in maize, cotton.

7 -Studies in protogynous and protoandrous flowers in pearl millet, sunflower.

8 -Detail study of sunflower – receptacle, ray and disc flowers, main and lateral capitula in restorers. Anther arrangement, time of anthesis, process and hour of stigma extrusion, mechanism of cross and self-pollination.

9-Identification of male sterile anthers by structure and colour. Identification of genetic male sterile plants at bud initiation stage. Laboratory methods for confirmation by acetocarmine test.

10-Study of induction of male sterility in Sunflower capitulum in bud condition by GA3 treatment

11. Raising of nursery, its requirement and management, seedling age for transplanting, precautions and irrigation.

12-Study of time for opening of flower, anther, maturity, dehiscence, collection of pollens in maize, sunflower, brinjal.

13- Study of pollen germination in water, sugar solution, pollen jelly.

14,15 -Selfing and crossing techniques in cucurbits, brinjal, tomato, onion, pea, bean.

16 -Identification and characterization of vegetable seeds (Temperate, tropical, Temperate tropical,

17-Study of vegetable breeding farm by visiting nearby localities

18-Examples on multiplication ratio based on some assumptions.

19-Study of vegetable nursery by visiting nearby localities.

Practical II

1-To study procedure of seed sample registration in STI.

2 -Determination of relative efficacy by using various mixing and dividing techniques. components and reporting results.

3 -Draw the working sample and conduct the physical purity test.

4 -Determination of moisture holding capacity of various germination substrata.

5,6. 7- Plotting the seeds for germination, seedling evaluation and reporting of results.

8,9 -Pretreatments, predrying, prechilling, chemicals – KNO3, GA3, scarification, hot water treatment and delinting of cotton seed.

10,11-Tetrazolium testing of agricultural, vegetable and forestry seeds.

12 - Determination of seed viability by X-ray photography method.

13 - Moisture testing by oven drying method/OSWA meter.

14 - Filling of application form for seed certification.

15,16 -Exercise in field area measurement and field map preparation.

17,18 -Field inspection and identification of objectionable weeds.

19,20 -Study of stable morphological characters useful in identifying off – types in seed production plots.

21,22-Taking of field counts and filling of inspection reports of important field crops both hybrids and state varieties.

23-Study of sampling techniques by using seed triers.

24, 25-Study of varietal purity through examination of seeds, seedlings and

plants,recording of data and filling result forms.

Details of Practical Examination

A. Every candidate must produce a certificate from Head of the Department in his/her college stating that, he/she has completed practical course in satisfactory manner as per the lines 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 certified journal and reports at the time practical examination. Candidate is not allowed to appear for the practical examination without a certified journal or a certificate from Head of the Botany Department regarding the same.

B. Report of seminar or job training done for one week (In vacation after B.Sc. I and before appearing for B.Sc. II examination.) must be submitted separately. It will be duly signed by the teacher in charge and certified by the Head of the Department. The same has to be submitted by every candidate at the time of practical examination. The report will be duly signed by the job training teachers

C. There shall be two practicals for examination based on Paper III & IV respectively, on two consecutive days. Each practical examination will be of five hours duration and carrying 50 marks each. Practical will be conducted annually.

D. Distribution of Marks:

Practical I

Marks

1. Floral arrangements and morphology of flower.

05

2. Artificial emasculation

05

3. Identification of male sterile anthers by structure, color, and aceto-carmine test.

05

4. Selfing / crossing technique on given flowers.

05

5. Problem on multiplication ratio.

05

6. Identifications-

a. Identification of simple/germinating pollen grains.
02
b. Identification of protogyny / protoandry in the flower.
02
c. Identification of vegetable seeds.
02
d. Identification of vegetable crops from floral structure.
02
7. Report of job training/ seminar. 10
8. Journal
05
9. Field report in journal
02----------

Total 50

Practical II

Marks

1. Physical purity analysis.
05
2. Testing of substrata for moisture holding capacity/oven drying method/OSWA meter for testing seed moisture.
05
3. Hot water treatment/scarification/ delinting.
05
4. Seed vigour test/ TZ test for agricultural, vegetable and forestry seeds.
05
5. Sampling technique/ filling up of a result form of varietal purity.
05
6. Filling up a form of application for seed certificate under seed certification programme by using given data.
05
7. Identifications-
a. Identification of weeds/ X-ray photograph.
03
b. Identification of off types/ seed sampling equipment.
03
c. Co-relating field area & field map.
03

d. Filling up of field inspection report using given data.
03
e. Making seed management programme for given seeds.
03
8. Journal
05 -------

Total 50

E. Skeleton for practical examination

Practical – I

N. B. : Draw neat diagrams wherever necessary.
Q. **1**.Describe floral arrangements and floral morphology of specimen A (leave the slide for inspection). ……..
5
Q.**2**. Set up the experiment of artificial emasculation in specimen B ..……
5
Q.**3.** Identify male sterile anthers of specimen C. ……..
5
(By observations like structure, colour and acetocarmine test)
Q.**4.** Demonstrate selfing technique/crossing technique on given flowers of specimen D ……..
5
Q.**5**. Solve the given problem on Seed multiplication ratio ……..
5
Q.**6**. Identification ……..
8
a. Identify pollen grains of specimen E.
b. Comment on contrivances of cross pollination of specimen F
c. Identify the vegetable seeds of specimen **G**
d. Identify and describe vegetable crop with the help of floral structure in the
specimen **H**
Q.7. Submission of report on training/seminar. ……..
10
Q.**8**. Journal ……..
5
Q.**9**. Field report in journal……..
2

--

Total 50

Practical – II

N. B. : Draw neat diagrams wherever necessary.

Q.**1**. Set up an experiment for working of a seed sample A for physical purity analysis ……..

5

Q.**2**. Set up the experiment for testing moisture holding capacity of substrata / seed sample /specimen B by oven drying method and OSWA meter.

5

Q.**3**. Set up an experiment to demonstrate a process of germination by hot water treatment/scarification process/delinting in specimen C. ……..

5

Q.**4**. Perform an experiment to demonstrate seed vigour test/ Tetrazolium test in seed sample D … ……..

5

Q.**5**. Prepare a seed sampling report of specimen E in a given proforma ……..

5

Q.**6**. Fill up a form of application for seed certificate for a given seed sample F under seed certificate program on the basis of data……..

5

Q.**7**. Identification ……..

15

a. Identify and describe specimen G.
b. Identify and describe specimen H.
c. Correlate field area and field map I.
d. Prepare field inspection report with given data J
e. Prepare a seed management program for seed sample k

Q.**8**. Journal . ……..

5

50

EQUIVALENCE FOR THEORY PAPERS.

(From June-2011)

Old Syllabus	Semester Pattern Syllabus
Paper No. Title of the Paper	Paper No. Title of the Paper
.	
Paper III: Hybrid Seed Production Production and Vegetable Production Seed Production	Semester III Paper V: Hybrid Seed Production Paper VI: Vegetable Seed Production
Paper IV: Seed Testing and Seed Quality Control	Semester IV Paper VII : Seed Testing Paper VIII : Seed Quality Control

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SEMESTER IV

PAPER III: CROP DISEASES AND THEIR MANAGEMENT

PAPER IV: INSECT PESTS AND THEIR MANAGEMENT

PAPER – III

CROP DISEASES AND THEIR MANAGEMENT

Unit No. 1 Crop diseases

1.1: Definition and concept of disease, terminologies in plant pathology host, pathogen, pathogenecity, pathogenesis, symptoms, infection, incubation period, susceptibility, immunity, hypersensitivity, resistance.

(03)

1.2 Classification of plant diseases – Based on a) Pathogens, b) Symptoms, c) Severity of disease – sporadic, epidemic and epiphytotic, d) transmission of pathogens through seed, soil, air and insects.

(03)

1.3 Methods of studying plant pathogens

(05)

a) Isolation

b) Methods of Inoculation

c) Incubation

d) Reproduction of disease

e) Koch's postulates

Unit No. 2 Mechanism of plant infection

(04)

2.1 Mode of infection

2.2 Factors affecting infection

2.3 Etiology

Unit No. 3 Study of following crop diseases and their management.

3.1 Diseases caused by phytoplasma

(02)

a) Little leaf of Brinjal

b) Grassy shoot of Sugarcane

3.2 Diseases caused by Viruses

(02)

a) Yellow vein mosaic of Okra (Bhendi)

b) Leaf curl of chilli

3.3 Diseases caused by Bacteria

(02)

a) Citrus canker

b) Bacterial wilt of Tomato/Chilli

3.4 Diseases caused by Fungi

(08)

i) Powdery mildews of cucurbits

ii) Downy mildew of Grapes

iii) Rust of soybean

iv) Rust of Groundnut

v) Grain smut of Jowar

vi) Whip smut of Sugarcane

vii) Blast of Rice

Unit No. 4 Assessment and Management of diseases

4.1 Assessment of diseases in crop plants.

(04)

a) Qualitative

b) Quantitative

4.2 Principles of plant disease management.

(05)

a) Exclusion

b) Eradication

c) Protection (Physical, Chemical)

d) Resistance

(Total 38 lecture period)

PAPER – IV

INSECT PESTS AND THEIR MANAGEMENT

Unit No. 1 Introduction to insect pests

1.1 Definition and losses (qualitative and quantitative) caused by insect pests(02)

1.2 General characters of typical insect with respect to

(05)

a) Mouth parts,

b) Wings (venation, wing coupling apparatus)

c) Legs (Types of legs)

d) Abdomen (Structure, Segments, appendages)

1.3 Classification of insect pests based on

(02)

a) Nature of damage b) Mouth parts c) Metamorphosis

Unit No. 2 Study of insect pests

2.1 Study of following insect pests of different crops with reference to –

a) Scientific name b) Marks of identification

c) Host range d) Life cycle

e) Carryover f) Nature of damage and management

(09)

i) Paddy – Grasshopper

ii) Jowar – Stem borer

iii) Sugarcane – White Woolly aphids

iv) Groundnut – White grubs

v) Gram – Pod borer

vi) Mango – Jassids

vii) Brinjal – Fruit borer

viii) Tomato - Red Spiders

ix) Rose – Thrips

2.2 Stored grain pests and their management.

(02)

i) Rice weevil ii) Pulse beetle

Unit No. 3 Management of Insect pests

3.1 Causes of insect assuming pest status

(02)

3.2 Principles of insect pest control.

(01)

3.3 Classification of insecticide based on:

(07)

a) Mode of entry – stomach, contact, systemic

b) Mode of action – Respiratory, Nervous

c) Chemical nature –

i) Inorganic

ii) Organic – Chlorinated hydrocarbons, Organophosphates, Carbamates, Synthetic pyrethroids.

iii) Plant origin insecticides.

d) Nature of formulation – Dusts, Granules, Wettable powder, Emulsifiable

concentrates.

Unit No. 4 Recent trends in pest management

(06)

a) Attractants b) Repellents c) Antifeedents

d) Pheromones e) Chemosterilants f) Microbial insecticides.

g) Precautionary measures used during pesticide application. (02)

(Total 38 lecture period)

SHIVAJI UNIVERSITY, KOLHAPUR

Nature of theory Question Paper will be as follows

For each theory paper:

Q.1 Objective types Questions.	8 Marks
Q.2 Long answer/Essay type (Any two out of three).	16 Marks
Q.3 Short notes (any four out of six):	16 Marks

PRACTICAL – I (Based on Paper I & Paper III)

1. Agronomic studies of following crops with reference to gross morphology for crop identification and agronomic conditions:

(08)

Jowar, Wheat, Groundnut, Sunflower, Gram, Tur, Sugarcane, Mango, Brinjal, Rose, Tuberose.

2. Study of following diseases in crops with reference to host, causal organism, symptoms and management.

A) Phytoplasmal Diseases

(01)

a) Little leaf of brinjal

b) Grassy shoot Disease of Sugarcane

Compare healthy and infected specimens by observing external symptoms.

B) Viral Diseases

(01)

a) Yellow vein Mosaic of Okra (Bhendi)

b) Leaf curl of Chilli/Tomato

C) Bacterial Diseases

(01)

a) Citrus canker (gram staining)

b) Bacterial wilt of Tomato / Brinjal / Chilli

(Gram staining & Oozing)

D) Fungal Diseases

(05)

a) Powdery mildew of Cucurbits

b) White rust of *Amaranthus* / Crucifers

c) Rust of Soybean

d) Wheat rust (Black or Brown)

e) Grain smut of Jowar

f) Whip smut of Sugarcane

g) Anthracnose of Chilli / Bean / Grapes

3. Preparation and sterilization of

(02)

a) Nutrient Agar (N. A.)

b) Potato Dextrose Agar (P.D.A.)

4. Isolation of pathogen from diseased plant (Koch's postulates)

(03)

a) Inoculation b) Incubation c) Reproduction and symptoms

(Select any one suitable disease e.g. purple leaf blotch of Onion (*Alternaria porri*), Early blight of Tomato (*Alternaria solani*), Brown leaf

spot of rice (*Drechslera oryzae*), Leaf spot of Crucifers (*Alternaria brassicola*), Leaf spot of Maize (*Helminthosporium maydis*).

5. Study of pesticides with reference to chemical nature, characters, properties, mode of action and uses. (At least two from each group)

(02)

Groups: Bactericides, Fungicides, Nematicides, Acaricides, Rhodenticides.

6. Micrometry of fungal spores (Any suitable material)

(01)

7. Determination of sucrose percentage in different varieties of Sugarcane. (01)

8. Determination of pH of two soil samples (Soil Samples from Crop fields) (01)

9. Project work

(02)

(Total 26 practical)

Distribution of Marks

PRACTICAL – I	**Marks**
1) Study of diseases of crops	12
2) Preparation of culture medium / inoculation / Isolation	06
3) Soil pH / Sucrose percentage	05
4) Identification of Crops and pesticides (each with four marks)	12
5) Project work	10
6) Journal	05
	Total 50

PRACTICAL – II (Based on Paper II & Paper IV)

1) Study of following weeds with reference to gross morphology for identification,

reproduction, dispersal and management.

(06)

A. Dicot weeds

a) *Argemone mexicana*

b) *Portulaca oleracea*

c) *Parthenium hysterophorus*

d) *Amaranthus spinosus*

e) *Alternanthera* sps.

f) *Euphorbia* sps.

g) *Striga* sps.

B. Monocot weeds

(02)

a) *Cyperus rotundus*

b) *Cynotis cristata*

c) *Commelina benghalensis*

d) *Cynodon dactylon*

2. Study of following weeds with reference to reproduction and ecology.

A. Estimation of seeds by seed count method

(01)

a) *Argemone mexicana*

b) *Celosia argentia*

c) *Portulaca oleracea* or any locally available weed.

B. Study of mode of dispersal in following weeds.

(01)

a) *Parthenium hysterophorus*

b) Tridax proucmbens

c) Vernonia cinerea

d) Xanthium strumarium

e) Alternanthera sps.

f) Achyranthus aspera

g) Cynodon dactylon

3. Herbicidal (weedicidal) action on seed germination of *Amarathus viridis* or *Portulaca oleracea* or *Argemone mexicana.*

For example – weedicide like 2, 4-D/Glyphoset

(01)

4. A) Technique of collection and preservation of insect pests.

(01)

a. Wet preservation

b. Dry preservation

B) Collection of weeds and preservation by herbarium technique.

(01)

5. A) Study of following insect pests with reference to scientific name, host-range; life cycle, marks of identification, nature of damage and management.

(04) Crops infested Name of the pest

a. Paddy – Grasshopper

b. Jowar – Stem borer

c. Sugarcane – Woolly aphids

d. Gram – Pod borer

e. Groundnut – White grubs

f. Mango – Jassids

g. Brinjal – Fruit borer

h. Tomato - Red Spiders

i. Rose – Thrips

B) Study of stored grain pests with reference to above points as in 5.A

a.Rice weevil b.Pulse bettle

C) Study of root-knot of vegetables with reference to above points as in 5.A (01)

6. Separation of amino acids from healthy and diseased plants, using circular paper chromatography technique.

(02)

7. Study of herbicides and insecticides with reference to chemical nature, characters, properties, mode of action and uses.(at least two from each group).

(01

)

8. Preparation of pesticides for application.

(01)

9. Calibration of the sprayer.

(01)

10. Study of pesticide application equipments.

(01)

a. Duster – Hand rotary duster

b. Sprayer – Knap – sac sprayer

11. Submission and Tour report – Field visits / Excursions / Visits to Agricultural institutes / Polyhouses

Practicals 26

Distribution of Marks

PRACTICAL – II

Marks	
1) Study of weeds	8
2) Study of insect pests	6
3) Chromatography	5
4) Preparation of pesticides/ calibration of sprayer	4
5) **Identification**	
a) 'F' weed	2
b) 'G' Insect pest	2
c) 'H' Weed dispersal	2
d) 'I' Herbicidal action	2
e) 'J' Herbicide / Insecticide	2
f) 'K' Duster / Sprayer	2
6) Submission	10
7) Tour report	5
	Total 50

Practical Examination Instructions:

A. Each candidate must produce a certificate from Head of the Department stating that he/she has completed practical course in satisfactory manner recommended by Board Studies and Laboratory Journal has been properly maintained. Every candidate must have recorded his/her observations in the laboratory journal and written report on each exercise performed. Every journal is to be checked and signed periodically by a Teacher Incharge and certified by the Head of the Department at the end of the year. Candidates are to produce their journals at the time of practical examination. Without which he/she shall not be allowed to appear for practical examination.

B. Excursions for the study of crop, plants weed in local areas should be frequent and report thereon should be submitted. One of excursions shall be to research institute or Agricultural centres actively engaged in Plant Protection for not more than 5 days. There shall be one teacher-in-charge for not more than 16 students and one additional lady teacher, one field collect and one peon are to be allowed for study Tour. T.A. and D.A. be paid to the concerning staff as per University Rules. Each candidate must submit tour report of the same.

C. Each candidate must complete the project work as per the guidelines provided and it should be certified from the Incharge teacher and head of Department.

D. Candidate shall be required to submit the following records at the time of practical examination.

1. Certified laboratory Journal
2. Tour Report - visit to fields, Agricultural Institutes, polyhouses
3. Project Work
4. Submission of preserved or dry specimens of diseased plants

(at least ten), preserved insect pests (at least ten), herbaria of weeds (at least ten).

E. Candidate will be orally examined in their project work and submission.

Guidelines for Project Report Submission:

1. It should be of 10 to 15 pages, well certified by the teachers Incharge & H.O.D.
2. It should contain index, introduction, matter, conclusion and list of reference books.
3. It should be based upon any article related to advanced agriculture.
4. Following topics may be included for the project work.

a. Group of pesticides - Commercial name, manufacturer, Chemical nature, dosages, season of application, diseases controlled.

b. Growth hormones - Commercial name, manufacturer, Chemical nature, dosages, various applications.

c. Cultural practices, economics, and marketing of any crop.

d. Govt. schemes for the welfare of farmers.

e. Losses due to mineral deficiencies in the crops.

f. Breeding programme of any crop.

g. Herbicides - Commercial name, Chemical content, manufacturer, weed management.

h. Toxic hazards due to pesticides and precautions during their applications.

i. Identification of crop varieties.

j. Common diseases / pests of particular crop.

SHIVAJI UNIVERSITY, KOLHAPUR
B. Sc. - II (New Course) EXAMINATION
MARCH / APRIL - 2011
PLANT PROTECTION
PRACTICAL - I

Time : 5 Hours 11.00 am onwards **Marks :** 50

N. B.: Draw neat labelled sketches wherever necessary.

Q.1 Identity and describe symptoms of specimen 'A' and 'B' (Leave your preparation for inspection.) 12

Q.2 a) Prepare and sterilize culture medium PDA/NA 03

b) Isolate and inoculate the pathogen from specimen 'C' 03

Q.3 Find out sucrose percentage in D_1 and D_2 by hand refractometer. 05

OR

Q.3 Find out pH of given soil samples D_1 and D_2. 05

Q.4 **Identification**

i) Identify the crop and describe the agronomical conditions of specimen ‘E’ and 'F'. 04

ii) Identify and describe the symptoms of specimen 'G' and 'H'. 04

iii) Comment on the properties of 'I' and 'J' 04

Q.5 Project work 10

Q.6 Journal 05

SHIVAJI UNIVERSITY, KOLHAPUR
B. Sc. - II (New Course) EXAMINATION
MARCH / APRIL - 2011
PLANT PROTECTION

PRACTICAL - II

Time : 5 Hours 11.00 am onwards **Marks** : 50

N. B. : Draw neat labelled sketches wherever necessary.

Q.1 Identity and describe gross morphology, reproduction and management of

specimen 'A' and 'B' (Leave your preparation for inspection.) 08

Q.2 Sketch and label the damaging stage/s in lifecycle of specimen 'C' and 'D',

Comment on nature of damage and its management. 06

Q.3 Find out amino acid composition in E_1 and E_2 with the help of circular /ascending paper chromatography.(Show your results to the examiners)05

Q.4 Solve the given problem on calibration of sprayer/preparation of pesticide solution. 04

Q.5 Identification

i) Identify and describe the marks of identification of specimen 'F'. 02

ii) Identify with scientific name and give management of specimen 'G'. 02

iii) Identify and describe mode of reproduction and dispersal of specimen 'H'. 02

iv) Comment on herbicidal action in experiment 'I'. 02

v) Identify and give the uses of specimen 'J'. 02

vi) Comment on use and working of specimen 'K'. 02

Q.6 Submission 10

Q.7 Tour report 05

PAPER I: Major crops, methods of integrated plant protection
PAPER III: Crop diseases and their management

Sr. No.	Name of the Book	Author (s)
1.	Agronomy	V. J. Vaidya *et. al.*
2	Biofertilizers in Agriculture	Subbo Rao
3	Commercial Vegetable Growing	Tind all
4	Crop production and field experimentation	Vaidya Sahastrabudhe and Khupse
5	Cropping System and Theory	Chattarjee
6	Floriculture	Waurie and Ries
7	Handbook of Agriculture	IARI, New Delhi
8	High Yielding Varieties of Crops	Mahabal Ram
9	Identification of Crop Varieties	Agarwal
10	Irrigation	Michael
11	Plant Pathology	R. S. Malhotara
12	Plant Protection	Mukundan
13	Principles and Procedures of Plant Protection	Chattopadhyay
14	Roses	Tony Gregory
15	Scientific Crop Production	Mathur
16	Sugarcane	C. N. Babu
17	Sugarcane Cultivation	M. G. Jadhav
18	The culture of Vegetables and Flowers from Seeds and Root.	Martin Sutton
19	Tropical and Sub-tropical Agriculture Vol	
20	Vegetable growing in India	P.S. Arya Prakash

Sr. No.	Name of the Book	Author (s)
1.	Chemistry of insecticides and fungicide	D. S. Sreeramalu
2	Disease of crops plants in India	Rangaswami
3	Fungi and Diseases in Plants	Butler
4	Fungicides in Disease Control	Y. L. Nene
5	Introduction to plant viruses	C. L. Mandahar
6	Plant disease and epidemiology	Narayanan
7	Plant disease	Singh
8	Plant disease	Mathur
9	Plant disease Gopal	S. Dasgupta
10	10. Plant Pathogens	Singh R. S.
11	Plant Pathologist pocket book EMI	
12	Plant Pathology	P. D. Sharma
13	Plant Pathology	Walker
14	Post Harvest technology of Cereals, Pulses and Oilseeds	Chakravarty
15	Viruses and Mycoplasma Diseases of Plants	Ray Chaudhari

PAPER - II: Introduction to Weeds, Non-insect Pests
PAPER - IV: Insect Pests and their management

Sr. No.	Name of the Book	Author (s)
1.	Agricultural Pests of India and Southeast Asia	Atwal
2	An Introduction to Entomology	P.D. Srivastava
3	Entomology	Pramod Kumar
4	General Entomology	M.S. Mari
5	Insect Pests of Crops	Pradhan and Jotwam
6	Introduction of Pest Management	Dhaliwal and Aruna
7	Introduction to Insect Pest Management	Metculf
8	Modern Entomology	Tembhare
9	Nematode Diseases of Agricultural Crops	Abstracts of 8th All Union Conference
10	Pest Control	Van Emden
11	Plant Protection (Principles and Practice)	Mukundan J.R.
12	Principles of Weed Science	Rao V.S.
13	Scientific Weed Management	Gupta O.P.
14.	Weed Control and as Science	Klingmein
15.	Weed Science	Thakur
16.	Weeds of the world	King
17.	World Guide to Insects Vol. I & II.	Paekard A.S
18.	Plant Disease Epidominology	Nagrajan
19.	Experimental and Conceptual Plant Pathology	Singh *et al*
20.	Weed Weedicides and Weed control Principle and Practice	R. C. Mandal
21.	Soils and Soil Management	Gustafson
22.	Concepts in Integrated Pest Management	Norris *et al*
23.	Seed Science and Technology Lab manual	McDonald & Copeland
24.	Seed Technology	Agarwal
25.	Vegetable Crops Vol. I & II ed.	Bose *et al*
26	Hand Book of Horticulture ICAR	K.L. Chandha
27.	Commercial Flowers - Vol. I & II	Bose *et al*
28.	Fruits-Tropical & Subtropical - Vol. I	Bose *et al.*
29.	Irrigation	Micheal

EQUIVALENCE FOR THEORY PAPERS
(From June-2011)

Old Syllabus(Annual pattern)		**Revised Syllabus (Semester pattern)**	
PAPER NO.	**TITLE OF THE PAPER**	**PAPER NO.**	**TITLE OF THE PAPER**

I	**Section I**: **Major crops, methods of integrated Plant Protection** **Section II**: **Crop Diseases**	**Semester III Paper – I** **Semester IV Paper - III**	**Major crops, methods of integrated Plant Protection** **Crop diseases and their management**
II	**Section I: Introduction to weeds, non-insect pests** **Section II**: **Insect pests**	**Semester III Paper –II** **Semester IV Paper - IV**	**Introduction to weeds and Non-insect pests** **Insect pests and their management**

B.Sc.II Chemistry

Semester - IV

Paper - VII

(Physical and Inorganic Chemistry)

Section – I : Physical Chemistry

Unit 1 : Surface chemistry - - - - - -

[8]

1.1 : Introduction : Adsorption, mechanism of adsorption, factors influencing adsorption.

1.2 : Types of adsorption : Physical and chemical adsorption

1.3 : Types of adsorption isotherms

1.4 : Adsorption isotherms a) Freundlich adsorption isotherm (derivation expected) b) Langmuir's adsortption isotherm (derivation expected)

1.5 : B.E.T. isotherm, determination of surface area of adsorbents.

1.6 : Applications of adsorption.

Unit 2 : Physical properties and chemical constitution - - - - - -

[8]

2.1 : Classification of physical properties.

2.2 : Surface tension and chemical constitution, use of parachor in elucidating molecular structure.

2.3 : Viscosity, coefficient of viscosity, determination of viscosity by Ostwald's viscometer. .

2.4 : 1.Dipole moment – definition, units, polar and non polar molecules, polarization of a molecule (electronic, atomic, orientation)

2. Use of dipole moment in elucidating molecular structure..

2.5 : Numerical problems.

Unit 3 : Chemical Kinetics - - - - - -

[9]

3.1 : Introduction, third order reactions – derivation of rate constant, characteristics and example of third order reactions.

3.2 : Methods to determine order of reaction: i) van't Hoff differential method ii) Integral rate expression method iii) Half life method.

3.3 : Effect of temperature on the rate of reaction : (i) Temperature coefficient, (ii) Arrhenius equation, (iii) Energy of activation.

3.4 : Theories of reaction rate : (i) Collision theory, (ii) Transition state theory. (only quantitative aspect, derivation not expected.

3.5 : Fast reactions : Study of Kinetics by
(i) Stop flow technique.
(ii) Flash photolysis.

3.6 : Numerical problems.

Section – II : Inorganic Chemistry

Unit 1 : Chelation - - - - - -

[5]

1.1 : A brief introduction w.r.t. ligand, chelating agent, chelation and metal chelate.

1.2 : Structural requirements of chelate formation.

1.3 : Difference between metal chelate and metal complex.

1.4 : Classification of chelating agents (with specific illustrations of Bidentate chelating agents).

1.5 : Applications of chelation w.r.t. chelating agent EDTA and DMG.

Unit 2 : Acids and Bases - - - - - -

[4]

2.1 : Arrhenius concept.

2.2 : Bronsted. – Lowry concept.

2.3 : Lewis concept.

2.4 : Lux-Flood concept.

Unit 3 : Non-aqueous solvents : - - - - - -

[4]

3.1 : Introduction – Definition and characteristics of solvents.

3.2 : Types of solvents.

3.3 : Physical properties and Acid-base reactions in non-aqueous solvents w.r.t. liquid NH_3 and liquid SO_2

Semester - IV

Paper - VIII

(Organic and Inorganic Chemistry)

Section – I : Organic Chemistry

Unit 1 : Spectroscopic methods - - - - - -

[12]

1.1 : Introduction, Nature of electromagnetic radiation, Types of electronic transitions, Advantages of spectroscopic methods over chemical methods.

1.2 : Ultra-violet (UV) Spectroscopy : Introduction Terms used in UV spectroscopy: Chromophore, Auxochrome, Bathochromic, hypsochromic, hypochromic and hyperchromic shifts, Effect of conjugation on position of UV and visible bands. Calculation of λmax by Woodward Fischer rules for conjugated dienes and enones.

Applications of UV spectroscopy : Determination of structure and stereochemistry (cis & trans). Spectral problems based on UV.

1.3 : Infrared spectroscopy : Introduction, principle of IR spectroscopy, fundamental modes of vibration, types of vibration, Hooke's law. Conditions for absorption of radiation and selection rule, fundamental group regions of IR spectrum, functional group region. Characteristic absorption of various functional groups. Factors affecting IR absorption band values. Applications of IR spectroscopy: Determination of structure, Identification of functional groups. Spectral problems based on IR.

Unit 2 : Nitrogen containing compounds - - - - - -

[10]

Aliphatic - Nitrogen containing compounds

2.1 Nitriles :

Introduction. Method of preparations of alkanenitriles i) haloalkane ii) From alkali salts of sulphonic acid iii) From aldoxime iv) From Grignard reagent

Chemical properties – i) Hydrolysis ii) Reduction iii) Addition of hydrogen halide iv) Reaction with Grignard reagent.

2.2 Isonitriles :

Introduction. Method of preparations of alkaneisonitriles i) From haloalkane ii) From amine, Chemical properties – i) Hydrolysis ii) Reduction iii) Addition of hydrogen halide iv) Reaction with Grignard reagent.

2.3 Isocyanates :

Introduction. Method of preparations of methylisocyanate from potassium cyanate and from phosgene.

Chemical properties – i) Hydrolysis ii) Reaction with alcohol & phenol. iii) Reaction with NH_3 iv) Trimerization.

2.4 Isothiocyanates :

Introduction. Method of preparations of methylisothiocyanate From Hoffmann's

mustard oil test and from sulphur and isonitrile

Chemical properties – i) Hydrolysis ii) Halogenation iii) Reaction with amines.

Aromatic - Nitrogen containing compounds

2.5 Introduction – Groups activating and deactivating Benzene ring.

2.6 Mechanism of electrophilic substitution reactions with respect to halogenation of

nitrobenzene & aniline

2.7 Mechanism of nucleophilic substitution reactions with respect to alkylation of

nitrobenzene & aniline.

Unit 3 : Alcohol Industry - - - - - -

[3]

3.1 Introduction, Manufacture of ethyl alcohol from molasses.

3.2 Rectified spirit, Denatured spirit, absolute alcohol and power alcohol.

3.3 By-products of alcohol industry.

Section – II : Inorganic Chemistry

Unit 1 : Chemistry of Elements of First Transition Series : - - - - - -

[7]

1.1 : Introduction to d-block elements.

1.2 : Study of first transition series w.r.t. electronic structure, coloured ions(d-d transitions only), magnetic character, oxidation states, complex formation. (Octahedral Inner and Outer orbital complexes)

Unit 2: Catalysis : - - - - - -

[5]

2.1: Introduction.

2.2: Classification of catalytic reactions – Homogeneous and Heterogeneous.

2.3: Types of catalysis.

2.4: Characteristics of catalytic reactions.

2.5: Mechanism of catalysis.

i) Intermediate compound formation.
ii) Adsorption.

2.6: Industrial applications of catalysts.

Physical Chemistry Reference Books :

1. Physical Chemistry by G. M. Barrow (Tata Mc-Graw Hill publishing Co., Ltd.)
2. Elements of Physical Chemistry by S. Glasstone and D. Lewis.(D.Van Nostrand Co. Inc.)
3. Physical Chemistry by W. J. Moore (Orient Longman).
4. Principles of Physical Chemistry by S. H. Maron and C. F. Prutton. (Oxford & IBH Publishing Co.)
5. University General Chemistry by C. N. R. Rao (Mac-Millan).

6. Elements of Physical Chemistry by P. W. Atkins. (Oxford University Press).
7. Physical Chemistry by R. A. Alberty (Wiley Eastern Ltd.).
8. Physical Chemistry through problems by S. K. Dogra, D. Dogra(Wiley Eastern Ltd)
9. Principles of Chemistry by Puri and Sharma (S.Nagin)
10. Physical Chemistry by A. J. Mee. ELBS & Heinemann Educational Books Ltd.
11. Essentials of Physical Chemistry by B. S. Bahl and G. D. Tuli.(S.Chand)
12 Chemical Kinetics by K. J. Laidler (Tata Mc-Graw Hill Publishing Co. Ltd).
13. Text Book of Physical Chemistry by Soni-Dharmarha.
14. A Text Book Physical Chemistry by S. Glasstone, (Mac Millan.)
15. Advanced Chemistry by Philip Mathews, Cambridge University.
16. Instrumental methods of Chemical Analysis by Chatwal and Anand. (Himalaya Publishing House, Mumbai.)

Organic Chemistry Reference Books :

Latest editions of following reference books.

1. Organic Chemistry. Volume 1 – The fundamental principles by I. L. Finar.
2. Organic Chemistry. Volume 2 – Stereochemistry and the chemistry of natural. Products by I. L. Finar, Low-priced Edn. ELBS - Longman
3. Organic Chemistry. Volume I, II, III by S.M. Mukharjee, S. P. Singh and R. P. Kapoor. Wiley Eastern Limited.
4. Advanced Organic Chemistry, by B. S. Bahl, Arun Bahl. S. Chand & Company, Ltd.
5. Organic Chemistry by Morrison – Boyd.
6. A Text Book of Organic Chemistry by K. S. Tiwari. S. N. Meharotra. N. K. Vishnoi. Vikas Publication, Meerut.
7. Spectroscopic methods in Organic Chemistry by Williams and Fleming. Mc-Graw Hill.
8. Stereochemistry of Organic Compounds by E. L. Eliel. Orient Longman.
9. Stereochemistry of Organic Compounds by P. S. Kalsi. New Age International Ltd.
10. Shreve's Chemical Process Industries by George T Austin. Mc Graw Hill International Edn.
11. Industrial Chemistry by Reigel. Asta Publishing House, Mumbai.
12. A Text book of Organic Chemistry by P. L. Soni. Sultan Chand & Sons.
13. Deductive Organic Chemistry by Kenneth Conrow, Richard N. McDonald. Indian Book Company.

14. Organic Chemistry by Bhupendra Mehta and Manju Mehta.
15. A Text book of Organic Chemistry by Lloyd N Ferguson. East West Press Pvt. Ltd.
16. Organic Chemistry by Louis fieser and Mery fieser. Asia Publishing House.
17. Principles of Organic Chemistry by James Englis and Harold Cassidy. Mc Graw Hill Book Company Inc.
18. A Guide Book to Mechanism in Organic Chemistry by Peter Sykes.
19. Advanced Organic Chemistry, structure, reactions and mechanism by Jerry March. Mc Graw Hill Kogakusha, Ltd.
20. Spectroscopy of Organic Compounds by P. S. Kalsi.
21. Absorption spectroscopy of Organic molecules by V. M. Parikh.
22. College Organic Chemistry Part I & II by G. R. Chatwal.
23. Advanced Organic Chemistry by Philip Mathews Cambridge University Press.
24. Stereochemistry by Nasi Puri.
25. Organic synthesis by Smith.

Inorganic Chemistry Reference Books :

1. Concise Inorganic Chemistry by J. D. Lee. ELBS 4^{th} & 5^{th} Edn.
2. Basic Inorganic Chemistry by F.A. Cotton, G. Wilkinson and P. L. Gaus Wiley.
3. Concepts and Models of Inorganic Chemistry by B. Douglas. D. Mc.Daniel and J. Alexander, John Wiley.
4. Inorganic Chemistry by A. G. Sharpe. ELBS.
5. Advanced Inorganic Chemistry by Satyaprakash, Tuli, Basu (S. Chand & Co.)
6. Inorganic Chemistry by Puri and Sharma (S. Chand & Co.)
7. Inorganic Chemistry by G. S. Manku. Tata Mc. Graw Hill.
8. Inorganic Chemistry by Agrawal.
9. University General Chemistry by CNR. Rao. (Mc Millan)
10. Industrial Chemistry by B. K. Sharma.
11. Environmental Chemistry by S. M. Khopkar (Wiely Eastern Ltd.)
12. Environmental Chemistry by A. K. De (Wiely Eastern Ltd.)
13. Inorganic Chemistry by D. E. Shriver. P.W. Atkins & C. H. Langford, Oxford.
14. Co-ordination Chemistry by R. Basolo.
15. Selected topics in Inorganic Chemistry : Madan, Malik, Tuli, S. Chand & Company.
16. Environmental chemistry by B. K. Sharma.

B.Sc. Part – II.

Laboratory Course

Note :- i) Use of Electronic / Single pan balance/Chainometric balance/Analytical

Balance is allowed.

ii) Use of scientific calculator is allowed.

Physical Chemistry

[A] Instrumental

1. **Viscosity :**
   To determine the percentage composition of a given liquid mixture by viscosity method. (Density data to be given).

2. **Refractometry :**
   To determine the specific and molar refractions of benzene, toluene and xylene by Abbe's refractometer and hence determination of the refraction of $-CH_2-$ group (Methylene group). (Densities should be determined by students.)

3. **Polarimetry :**
   To determine the specific rotation and unknown concentration of sugar solution.

4. **Conductometry**
   (i) To determine degree of dissociation and dissociation constant of acetic acid at various dilutions and to verify Ostwald's dilution law conductometrically.
   (ii) To determine the normality of the given strong acid by titrating it against strong alkali conductometrically.
   (iii) To determine equivalent conductance at infinite dilution of strong electrolyte (any one from KCl, NaCl, KNO_3 and HCl) and verify Onsager equation. (Taking five different dilutions)

[B] Non - Instrumental

1. **Chemical Kinetics**
   (i) To study the hydrolysis of methyl acetate in presence of HCl and H_2SO_4 and to determine the relative strength of acids.
   (ii) To study the effect of acid strength (0.5 M and 0.25 M HCl) on hydrolysis of an ester.
   (iii) To study the reaction between $K_2S_2O_8$ and KI (unequal concentrations)
   (iv) To study the reaction between $KBrO_3$ and KI. (equal concentrations)

Reference Books:

1. Experimental Physical Chemistry by A. Findlay. Longman.
2. Advanced Practical Physical Chemistry by J.B. Yadav. (Goel Publishing house, Meerut).
3. Experiments in Physical Chemistry by R. C. Das and B. Behra. Tata Mc Graw Hill.
4. Advanced experimental Chemistry Vol. I. Physical by J. N. Gurtu and R. Kapoor. S. Chand & Co.
5. Experiments in Physical Chemistry by J. C. Ghosh, Bharati Bhavan.
6. Practical book of Physical Chemistry – by Nadkarni Kothari & Lawande. Bombay Popular Prakashan.
7. Systematic Experimental Physical Chemistry – by S. W. Rajbhoj, Chondhekar. Anjali Publication.
8. Practical Physical Chemisty – by B. D. Khosala & V. C. Garg. R. Chand & Sons.
9. Experiments in Chemistry by D. V. Jagirdar.
10. Practical Chemistry, Physical – Inorganic – Organic and Viva – voce by Balwant Rai Satija. Allied Publishers Pvt. Ltd.
11. College Practical Chemistry by H. N. Patel, S. R. Jakali, H. P. Subhedar, Miss. S. P. Turakhia. Himalaya Publishing House, Mumbai.
12. College Practical Chemistry by Patel, Jakali, Mohandas, Israney, Turakhia. Himalaya Publishing Housing, Mumbai.

Organic Chemistry

A) Organic Qualitative Analysis

Identification of at least Ten Organic compounds with reactions including <u>two</u> from acids, <u>two</u> from phenols, <u>two</u> from bases and <u>four</u> from neutrals.

Acids – Succinic acid, Phthalic acid, Salicylic acid, Aspirin.

Phenols – Alpha-Naphthol, o-nitrophenol, p-nitrophenol.

Bases – o-,m- and p-nitroanilines, Diphenyl amine.

Neutrals – Urea, Acetanilide, Carbon tetrachloride, Bromobenzene, Methyl acetate, Nitrobenzene, Naphthalene, Anthracene, Acetophenone, Ethyl methyl ketone.

<u>Note</u> : A systematic study of an organic substance involves reactions in the determination of elements and functional group.

B) Organic Quantitative Analysis

i) Estimations

1) Estimation of ester.
2) Estimation of acetone.

3) Estimation of vitamin C.

ii) Organic preparations

1) p-nitro acetanilide from acetanilide.
2) Acetanilide from aniline using anhydrous $ZnCl_2$ and Zn dust.
3) Phthalimide from phthalic anhydride.
4) Benzoic acid from benzamide.

iii) Chromatographic separation – Thin layer chromatography.

Separation, identification and determination of Rf values of Nitroanilines and phenols. Solvent system : n-Butanol + Acetic acid + water – 8 : 2 : 2.

Spraying reagent – 0.1M 1:1 Mixture of ferric chloride and potassium ferricyanide.

Reference Books :

1. Practical Organic Chemistry by A. I. Vogel.
2. Hand book of Organic qualitative analysis by H. T. Clarke.
3. A laboratory Hand Book of Organic qualitative analysis and separation by V. S. Kulkarni. Dastane Ramchandra & Co.
4. Practical Organic Chemistry by F. G. Mann and B. C. Saunders. Low – priced Text Book. ELBS. Longman.
5. Experiments in General Chemistry by C. N. R. Rao. Affiliated East-West Press Pvt. Ltd. Delhi.
6. Advanced Practical Organic Chemistry by N. K. Vishnoi. Vikas Publishing House Private Limited.
7. Comprehensive Practical Organic Chemistry Qualitative Analysis by V. K. Ahluwalia, Sunita Dhingra. University Press. Distributor – Orient Longman Ltd.
8. Comprehensive Practical Organic Chemistry Preparation and Quantitative Analysis by V. K. Ahluwalia, Renu Aggarwal. University Press. Distributor – Orient Longman Ltd.
9. Practical Chemistry – Physical – Inorganic – Organic and Viva – voce by Balwant Rai Satija. Allied Publishers Private Limited.
10. College Practical Chemistry by H. N. Patel, S. R. Jakali, H. P. Subhedar, Miss. S. P. Turakhia. Himalaya Publishing House, Mumbai.
11. College Practical Chemistry by Patel, Jakali, Mohandas, Israney, Turakhia. Himalaya Publishing House, Mumbai.
12. Practice of thin layer chromatography by Joseph C. Touchstone, Murrell F. Dobbins. A Wiley – Interscience Publication John-Wiley & Sons.

Inorganic Chemistry

1) Gravimetric Analysis

i) Gravimetric estimation of iron as Fe_2O_3 from a solution containing Ferrous ammonium sulphate and free sulphuric acid.

ii) Gravimetric estimation of barium as $BaSO_4$ from a solution containing barium chloride and free hydrochloric acid.

2) Titrimetric Analysis :

(Calibration of burette, pipette and volumetric flask is essential)

i) Fertilizer analysis : To determine percentage of nitrogen in the given sample of a nitrogenous fertilizer (ammonium sulphate). Known weight of the sample to be taken by the student. For preparing its solution which is to be refluxed with known excess of alkali. Standard HCl solution to be supplied.

ii) Quality control : To determine percentage purity of a given sample of soda ash. Standard HCl solution to be supplied. Known weight of the sample to be taken by the student for preparing its solution.

iii) Determination of total hardness of water using 0.01M EDTA solution. (Students should standardise the given EDTA solution by preparing 0.01M $CaCl_2$ solution. using $CaCO_3$ salt.)

iv) Determination of alkali content of antacid tablet using HCl.

(**Note** : These experiments are performed by preparing caliberated sets of burettes, pipettes and volumetric flasks.)

3) Inorganic Preparations

i) Preparations of Ferrous ammonium sulphate (Mohr's salt)

ii) Preparation of Tetrammine copper (II) sulphate.

4) Semi-micro qualitative analysis

Analysis of binary mixtures with non interfering cations and anions (at least 6 mixtures to be analysed)

i) Following anions are to be given :
Cl^-, Br^-, I^-, NO_3^-, CO_3^{--}, SO_4^{--}

(Only insoluble carbonates are to be given)

ii) Following cations are to be given :
Cu^{+2}, Cd^{+2}.

Al^{+3}, Fe^{+3}, Cr^{+3}.

Zn^{+2}, Mn^{+2}, Ni^{+2}, Co^{+2}.

Ca^{+2}, Ba^{+2}.

Mg^{+2}.

NH_4^+, K^+ .

Note:-Use of spot tests to be made whenever possible.

Reference Books :

1. Qualitative Inorganic Chemistry by A. I. Vogel.
2. Quantitative Inorganic Chemistry by A. I. Vogel.
3. Physical Chemistry of Inorganic qualitative analysis by Kuricose & Rajaram.
4. Practical manual in water Analysis by Goyal & Trivedi.
5. Basic Concepts in Analytical Chemistry by S. M. Khopkar. Wiley Eastern Ltd.
6. Practical Chemistry, Physical – Inorganic – Organic and Viva voce by Balwant Rai Satija. Allied Publishers Private Limited.
7. College Practical Chemisty by H. N. Patel, S. R. Jakali, H. P. Subhedar, Miss. S. P. Turakhia. Himalaya Publishing House, Mumbai.
8. College Practical Chemistry by Patel, Jakali, Mohandas, Israney, Turakhia. Himalya Publishing house.
9. Experiments in General Chemistry by C. N. R. Rao. Affiliated East –West Press Private Ltd., Delhi.

B.Sc. Part – II
Nature of Question Papers
For Papers- V/VI/VII/VIII
(Total Marks – 40)
Section – I Marks- 27

Question No.	Details	Marks
1	A) Objectives :Multiple choice (05) B) Solve any **one** out of **two** (08)	13
2	A) Solve any **two** out of **three** (10) B) Solve any **one** out of **two** (04)	14

Section – II Marks 13

3	A) Objectives :Multiple choice (03) B) Solve any **one** out of **two** (10)	13
Total		40

EQUIVALENCE FOR THEORY PAPERS.
(From June-2011)

Pre Revised Syllabus		**Revised Syllabus**	
Paper No.	**Title of the Paper**	**Paper No.**	**Title of the Paper**
	Paper – III Physical and Inorganic Chemistry		Paper – V Physical and Inorganic Chemistry Paper – VII Physical and Inorganic Chemistry
	Paper – IV Organic and Inorganic Chemistry		Paper – VI Organic and Inorganic Chemistry Paper – VIII Organic and Inorganic Chemistry

B.Sc. Part II(ELECTRONICS)
Semester IV
Paper VII **Electronic Circuits**

UNIT 1

10

Transistor Amplifiers :

Transistor as an amplifier, classification of amplifiers as CE, CB and CC.

Multistage amplifiere :

Different coupling schemes : RC coupling ,transformer coupling ,direct coupling (Qualitative treatment only)

UNIT 2

10

Power Amplifiers :

Class – A amplifier, Class – B amplifier, Class AB and Class – C amplifiers. Pushpull amplifier. (Class A anb B) Complementary symmetry push – pull amplifier. Types of distortions in power amplifiers.

UNIT 3

10

. ***Feedback circuit and Oscillators :***

Theory of feed back circuit. Effect of negative feed back on distortion, noise, gain, bandwidth, input impedance and output impedance. Analysis of current series feedback and voltage series feedback.

Oscillators :

Barkhausen criterion
RC oscillators: phase – shift oscillator, Wien Bridge oscillator.
LC oscillators: Hartley oscillator, Colpit's oscillator.
Crystal oscillator working.

UNIT 4 10

Multivibrators :

BJT as a switch

a) Bistable Multivibrators :
   Collector coupled bistable multivibrator, circuit operation, study of wave forms, .
b) Monostable Multivibrator :
   Collector coupled monostable multivibrator, circuit operation, study of wave forms, Expression for gate width,
c) Astable Multivibrator :
   Collector – coupled astable multivibrator, circuit operation. Study of wave form Expression for output frequency, Duty cycle,
d) Study of IC 555, Astable mode and Monostable mode.
   Applications of Multivibrators :
   Numerical on multivibrators.

Schmitt Trigger :

Circuit operation, study of wave form and applications.

Reference Books :

1. A Text Book of Applied Electronics
   By R. S. Sedha (S. Chand & Co)
2. Electronics Devices & Circuit : An Introduction
   By Allen Mottershead (PHI)

Electronics Devices & Circuits
   By Jacob Millman & Christos, C. Halkias (TMH)

4. Principal of Electronics
   By V. K. Mehta
5. Electronics Design From concept to reality
   By Martin S. Roden
   Gordon L. Carpenter
   William R. Wicserman
   Fourth Edition
   SPD (Shroff Publishing and Distributors pvt. Ltd. Colcata)

B.Sc. Part II
(ELECTRONICS)
Semister IV

Paper VIII ***Interfacing withMicroprocessor and VHDLProgramming***

UNIT 1

10

Interfacing Techniques : Data transfer methods: Unconditional, Polling, Interrupts, Wait state generation.
Study of 8255PPI, its operating modes, control word,

UNIT 2

10

Study of 8253, modes of 8253, control word
Address generation, Decoding methods Interfacing of EPROM 2764, 27128 with 8085 and memory mapping.

UNIT 3

10

DAC R-2R ladder,ADC Sucessive approximation method, Interfacing of A / D converter , Interfacing LED, Seven segament display, Relay & optocoupler with 8085.

UNIT 4

10

VHDL Programming
Introduction to VHDL
Features and Capabilities, entity, architecture and levels of abstraction using case study of RS Flip-Flop.
Modeling of combinational logic circuits with example of multiplexer, decoder.
Sequential logic design with example of shift resister, Up Down counter

Reference Books

1.Microprocessor Architecture, Programming and Applications with the
8085 By. Ramesh S. Gaonkar

2.Microprocessor and its Applications - B.RAM
3.Microprocessor & Applications- Vibhute & Borole
1. VHDL By Dougles P. Evry, Tata mcgroul
2. Xiliax Data manual
3. Digiotal design Principle and Practises By John F. Wakerly.

B.Sc. II Electronics
Practical (Total mark 100)

(Minimum 29 experiments have to be performed by a student out of 32 experiments provided)

(Distribution of mark for practical as per provided in the structure of B. Sc. Electronics Course)

Group A

1. Full Wave Rectifier(Bridge)
2. Voltage Regulator (Using IC)
3. Series Resonance/ Parallel Resonance Circuit
4. Clippers (+ve -ve), +ve clamper
5. Study of filters (II filter)
6. RC Differentiator and Integrator
7. UJT Oscillator with constant current source
8. Miller integrator

From sr. 1 to 8 minimum seven experiment have to be performed by students

Group B

1. Study of CE amplifier
2. Study of emitter follower
3. Audio amplifier using IC
4. Hartley oscillator/Colpitt's oscillator
5. Phase shift oscillator
6. Study of negative feedback amplifier
7. FET as VVR
8. Schmitt trigger

From Sr. No. 1 to 8 minimum Seven experiments have to be performed by Students.

Group C

1. Astable multivibrater using BJT
2. IC 555 as mono stable mvt.(measure long time period using LED)
3. Bistable multivibrater using BJT
4. Arithmetic operations using 8085(addition & Multiplication)
5. Arithmetic operations using 8085(subtraction & Division)
6. Logical instructions using 8085

7. Block transfer / exchange using 8085
8. Stack instructions using 8085

Sr. No. 1 To 8 minimum Seven experiments have to be performed by student

Group D

1. Modeling simulation of 4:1 multiplexer using Xilinx web pack
2. Modeling simulation of Shift resister & Counter using Xilinx web pack
3. Modeling simulation of 4 bit Adder
4. Modeling simulation of D flip -flop
5 Interfacing of LED and Relay with 8085
6 Interfacing seven segment display with 8085
7 Interfacing of DAC 0808 to generate square, Triangular wave
8 Study of 8253 for any two modes

- Pattern of Practical Examination will be Annual.

EQUIVALANCE

OLD PAPERS	**NEW PAPERS**
Paper III Linear and Electronic circuits	Paper V Semester III Linear Circuits Paper VII Semester IV Electronic Circuits
Paper IV Microprocessor,VHDL and Introduction to C Programming	Paper VI Semester III microprocessor Paper VIII Semester IV Interfacing with microprocessor and VHDL Programming

B.Sc.II Geology

SEMESTER IV

Paper VII
Structural Geology, Photogeology and Hydrogeology

Unit I: Structural Geology-Dip and Strike; Outcrop, Width of outcrop, Inlier and outlier, Definition and description of lineation and foliation.

Folds- Definition, parts of fold, Types and Recognition in field.

(10 Lectures)

Unit II - **Joints**- Definition, Description, Genetic and Geometric Classification

Faults- Definition, parts of fault, Classification and Recognition in the field. Effects of faulting on the outcrops

Unconformities- Definition, Development of unconformity, Types of unconformity, and Recognition in field.

(10 Lectures)

Unit III: Photogeology-

Introduction to Aerial Photography, Types of aerial photographs on the basis of camera axis orientation, Overlap-Forward and Lateral, Errors in aerial photographs. Stereoscopic Vision

Geometrical properties of aerial photographs- Scale, Parallax and Difference in Parallax, Relief Displacement, Vertical Exaggeration.

Elements of photo-recognition - Tone, Texture, Pattern, Shape, Size, Shadow Pattern.

(10 Lectures)

Unit IV: Hydrogeology -

Hydrological Cycle,

Sources of Groundwater. Rock Properties affecting Groundwater like Porosity, Permeability and transmissivity. Vertical Distribution of Groundwater. Aquifersand their types, Springs, Erosional and Depositional features of groundwater, Investigation of groundwater - Geological, Geobotanical and Electric Resistivity method.

(10 Lectures)

Reference Books:

1. Structural Geology - By M. P. Billings, Prentice-Hall of India Pvt.Ltd.
2. Fundamentals of Structural Geology - By N. W. Gokhale, CBS Publishers, Delhi
3. Photogeology and Regional Mapping - By J. A. E. Allum, Pergamon Press.
4. Principles and Applications of Photogeology - By S. N. Pandey, Wiley Eastern Ltd.
5. Photogeology - By Victor C. Miller, Mc Graw Hill Book Co.Inc.
6. Remote Sensing-Principles and Interpretation - By F. F. Sabins, ----------
7. Groundwater - By Todd D. K., John Wiley and Sons.
8. Groundwater - By K. V. Karanth, ----------
9. Groundwater and Tubewells - By S.P. Garg, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
10. Hydrogeology - By Stanley N. Davis, Roger J. M. De Wiest, John Wiley and Sons.

Paper VIII
Sedimentary and metamorphic Petrology

Unit I: Sedimentary (Secondary) Petrology - Study of Residual Deposits- Laterite,Bauxite, Study of Sedimentary deposits - Rudaceous, Arenaceous, Argillaceous
Study of chemical deposits - siliceous deposits, calcareous deposits, ferruginous deposits, salts (Chloride, sulphates,carbonates, borates and nitrates
Organic Deposits or Biogenic deposits – Calcareous deposits, Phosphatic deposits, ferruginous deposits, siliceous deposits , carbonaceous deposits (10 Lectures)

Unit II Environment of Deposition (Physical and chemical), Provenance (10 Lectures)

Unit III: Metamorphic Petrology - Study of Cataclastic, Thermal, Dynamothermal and Plutonic Metamorphism of different kinds of rocks viz. Quartzofeldspathic, Argillaceous, Calcareous, Carbonaceous, Basic and Ultrabasic rocks.
(10 Lectures)

Unit IV: Outline of Facies and Grades of Metamorphism. Retrograde Metamorphism, Polymetamorphism, Metasomatism, Anatexis and Migmatites.
(10 Lectures)

Reference Books:
1. The Principles of Petrology - By G. W. Tyrrell,
B.I.Publications Pvt. Ltd. Mumbai.
2. Igneous and Metamorphic Petrology - By Turner and Verhoogen,
3. Igneous and Metamorphic Petrology - By Best M.G., CBS Publishers, Delhi
5. Metamorphic Petrology - By Turner, CBS Publishers, Delhi
6. Petrogenesis of Metamorphic Rocks - By Winkler H.G.F.,
Springer Verlag, / Narosa Publishing House, New Delhi.
7. Petrology of Metamorphic Rocks - By Mason Roger, CBS Publishers, Delhi
8. Sedimentary Rocks - By Petijohn, Oxford & IBH
Publishing Co. Pvt. Ltd., New Delhi.
9. Introduction to Sedimentology - By Sengupta, S.,
10. Depositional sedimentary Environments: Reineck and Singh

Practical Course

Unit I: Mineralogy

a) Megascopic study of minerals:

Study of Physical Properties, Uses and Occurrences of the following minerals- Silica Group- Quartz, Rock Crystal, Amethyst, Chalcedony, Agate, Flint, Jasper, Chert, Opal. Feldspar Group- Orthoclase, Microcline, Plagioclase. Feldspathoid Group- Nepheline, Leucite, Sodalite. Mica Group- Muscovite, Biotite, Lepidolite, Phlogopite. Amphibole Group- Hornblende, Actinolite, Tremolite, Asbestos. Pyroxene Group- Augite, Diopside, Hypersthene. Olivine Group- Olivine. Epidote Group- Epidote. Chlorite Group- Chlorite. Garnet Group- Garnet. Alumino-silicate Group- Andalusite, Kyanite, Sillimanite. Carbonate Group- Calcite, Dolomite, Magnesite. Zeolite Group- Natrolite, Stilbite. Apophyllite.

b) Microscopic study of minerals: Study of Optical Properties of following

minerals In Polarised Light, and Between Crossed Nicols- Quartz, Orthoclase, Microcline, Plagioclase, Muscovite, Biotite, Hornblende, Actinolite, Tremolite, Augite, Hypersthene, Olivine, Garnet, Staurolite,

Calcite, Chlorite.

Unit II: Igneous Petrology

a)Megascopic study of Textures and Structures in Igneous Rocks:
Granitic, Porphyritic, Graphic, and Glassy textures; Flow, Vescicular, Amygdaloidal, Ropy, Pillow, Columner, and Xenolithic structure.
b) Microscopic study of Textures and Structures in Igneous
Rocks:Granitic, Porphyritic, Ophitic, Graphic, Intergranular and Intersertal textures. Flow and Reaction Rim structures.
c) Megascopic study of Igneous Rocks:Study of Colour, Texture / Structure, Mineral Composition, and Classification of following rocks- Granite, Hornblende granite, Graphic granite, Syenite, Diorite, Gabbro, Dunite, Porphyritic granite, Pegmatite, Dolerite, Rhyolite, Pitchstone, Obsidian, Pumice, Trachyte, Andesite and Basalt.
d) Microscopic study of Igneous Rocks: Study of Texture / Structure**,** Mineral Composition, and Classification of following rocks- Granite, Hornblende granite, Graphic granite, Syenite, Diorite, Gabbro, Dunite, Dolerite, Rhyolite, Trachyte and Basalt

Unit III Structural Geology
a) Study of Geological Maps: Description of Topography, Geology and Geological History and Drawing Geological Section of the area shown in the maps, having
1. Horizontal Series
2. Inclined Series
3. Inclined Series with sill, vertical dyke, two vertical intersecting dykes
4. Inclined Series with vertical fault
5. Inclined Series and horizontal series separated by an Unconformity
6. Two inclined Series separated by an Unconformity.

b)Study of Structural Problems: Graphical solution of problems involving Strike, True Dip, Apparent Dip, Slope of ground and Width of Outcrop.

Unit IV: Photogeology
Photogeology: Study of Aerial Photographs for recognition of Tone, Texture, Pattern, Shape, Size, Shadow, Pattern in Aerial Photographs. Recognition of Geological, Geomorphological features, Drainage pattern etc. in Aerial Photographs.
Determination of Scale of Photograph by comparison with toposheet.

Unit V: Sedimentary (Secondary) Petrology
a) Megascopic study of Structures in Secondary Rocks:
Stratification, Lamination, Current Bedding, Graded Bedding, Ripple Marks, Mud Cracks, Clastic Structure, Oolitic and Pisolitic structures.
b) Microscopic study of Structures in Secondary Rocks:
Clastic, Oolitic and Pisolitic structures.
c) Megascopic study of Secondary Rocks: Study of Colour, Texture / Structure, Composition, and Classification of following rocks- Sandstone, Ferruginous sandstone, Grit, Arkose, Breccia, Conglomerate, Limestone, Oolitic Limestone,

Fossiliferous Limestone, Shale, Laterite and Bauxite.

d) Microscopic study of Secondary Rocks: Study of Texture / Structure, Composition, and Classification of following rocks- Sandstone, Ferruginous sandstone, Arkose, Limestone, Oolitic Limestone, Fossiliferous Limestone.

Unit VI: Metamorphic Petrology

a) Megascopic study of Structures in Metamorphic Rocks: Slaty Cleavage, Schistose, Granulose, Gneissose, Augen, Banded structures.

b) Microscopic study of Structures in Metamorphic Rocks: Slaty Cleavage, Schistose, Granulose, Gneissose structures.

c) Megascopic study of Metamorphic Rocks: Study of Texture / Structure, Mineral Composition, and Classification of following rocksSlate, Phyllite, Hornblende Schist, Mica Schist, Mica Garnet Schist, Chlorite Schist, Tremolite Schist, Granite Gneiss, Biotite Gneiss, Hornblende Gneiss, Augen Gneiss, Amphibolite, Banded Haematite Quartzite, Charnockite, Marble, Quartzite.

d) Microscopic study of Metamorphic Rocks: Study of Texture / Structure, Composition, and Classification of following rocks- Hornblende Schist, Mica Schist, Mica Garnet Schist, Chlorite Schist, Tremolite Schist, Granite Gneiss, Biotite Gneiss, Hornblende Gneiss, Charnockite, Marble, Quartzite.

NOTE : 1. A practical Record book is to be maintained through out the academic year compulsorily for all the Units above with a separate record book for Unit III

2. Field Work and Field report is compulsory:

Field Work in the area of geological interest for Seven Days for studying rocks and minerals in field, their mutual relations and structures etc. Submission of the Report on the Field Work and Specimens collected in field is necessary at the time of annual Practical Examination.

Nature of Practical Examination

Practical Examination

The Practical Examination will be for 100 marks and conducted for two days.
One day prior to the practical days will be Inspection and Preparation day.

Day 1- Practical I

Session I

Unit I: Mineralogy	Microscopic	6 Marks
	Megascopic	9 Marks

Session II

Unit II: Igneous Petrology

Microscopic Rocks	4 Marks
Microscopic Textures/Structures	2 Marks
Megascopic Rock	6 M.arks
Megascopic Textures/Structures	3 Marks

Unit III Photogeology

Aerial Photographs	5 Marks

Day 2- Practical II

Session I

Unit IV: Sedimentary (Secondary) Petrology

Microscopic Rocks	4 Marks
Microscopic Textures/Structures	2 Marks
Megascopic Rocks	6 Marks
Megascopic Textures/Structures	3 Marks

Unit V: Metamorphic Petrology

Microscopic Rocks	4 Marks
Microscopic Textures/Structures	2 Marks
Megascopic Rocks	6 Marks
Megascopic Textures/Structures	3 Marks

Unit VI : Structural Geology

Geological Maps	10 Marks
Structural Problem	5 Marks
Field Work with field report	8 Marks
Practical Record (Journal)	7 Marks
Viva	5 Marks

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

(MATHEMATICS)

Implemented from June – 2011

Paper – VII (INTEGRAL CALCULUS)

Unit – 1 : GAMMA AND BETA FUNCTIONS

12 lectures

1.1 Definition of Gamma function

1.2 Properties of Gamma function.

1.2.1 $\left|\overline{1} = 1.\right.$

1.2.2 Recurrence formula : $\left|\overline{n} = (\mathbf{n}-1)\right|\overline{n-1}$.

1.2.3 $\left|\overline{n} = \mathbf{(n-1)!}\right.$, *where n is a positive* int*eger*.

1.2.4 $\left|\overline{n} = 2\int_0^\infty e^{-x^2}.x^{2n-1}dx.\right.$

1.2.5 $\int_0^\infty e^{-kx}.x^{n-1}dx = \frac{\left|\overline{n}\right.}{k^n}$, *where* $n>0$, $k>0$.

1.3 Definition of Beta function.

1.4 Properties of Beta function.

1.4.1 Symmetric property : β(m, n) = β(n, m).

1.4.2 $\beta(m,n) = 2\int_0^{\pi/2} \sin^{2m-1}\theta \cos^{2n-1}\theta \, d\theta.$

1.4.3 $\int_0^{\pi/2} \sin^{p}\theta \cos^{q}\theta \, d\theta = \frac{1}{2}\beta\left(\frac{p+1}{2}, \frac{q+1}{2}\right).$

1.4.4 $\beta(m,n) = \int_0^{\infty} \frac{x^{m-1}}{(1+x)^{m+n}} dx.$

1.4.5 $\int_0^{\infty} \frac{x^{m-1}}{(a+bx)^{m+n}} dx = \frac{1}{a^n b^m}\beta(m,n).$

1.4.6 $\int_0^{\infty} \frac{x^{m-1} + x^{n-1}}{(1+x)^{m+n}} dx = \beta(m,n).$

1.5 Relation between Beta and Gamma function

$$\beta(m, n) = \frac{\lceil m \lceil n}{\lceil m+n}.$$

1.6 $\lceil \frac{1}{2} = \lceil \pi.$

1.7 Duplication formula : $2^{m-1} \lceil m \lceil m + 1/2 = \lceil 2m \sqrt{\pi}.$

1.8 $\lceil \frac{1}{4} \cdot \lceil \frac{3}{4} = \pi\sqrt{2}$.

Unit – 2 : <u>MULTIPLE INTEGRALS</u>

10 lectures

2.1 Double Integral : Evaluation of double integrals.

2.2 Evaluation of double integrals in Cartesian coordinates.

2.3 Evaluation of double integrals over the given region.

2.4 Evaluation of double integrals in polar coordinates.

2.5 Evaluation of double integrals by changing the order of integration.

2.6 Triple integrals : Evaluation of triple integrals.

Unit – 3 : <u>FOURIER SERIES</u> 13 lectures

3.1 Definition of Fourier series with Dirichlet condition.

3.2 Fourier Series for function f(x) in the integral $c < x < 2\pi$.

3.3 Formulae for Fourier series for intervals $0 < x < 2\pi$ and $-\pi < x < \pi$.

3.4 Change of intervals.

3.5 Even and odd functions.

3.6 Half Range Series.

Unit – 4 : DIFFERENTIATION UNDER INTEGRAL SIGN AND APPLICATIONS OF INTEGRATION

10

lectures

4.1 Introduction: Differentiation under Integral sign.

4.2 Integral with its limit as constant.

4.3 Integral with limit as function of the parameter [Leibnitz Rule]

4.4 Length of the curve

4.5 Area under the curve

4.6 Volume of solid of revolution

REFERENCE BOOKS

1. P. N. and J. N. Wartikar, Elements of Applied Mathematics.

2. B.S.Phadatare, U.H.Naik, P.V.Koparde, P.D.Sutar, P.D.Suryvanshi, M.C.Manglurkar, A Text Book Of Advanced Calculus Published by Shivaji University Mathematics Society (SUMS), 2005.

3. S.B.Kalyanshetti, S.D.Thikane, S.R.Patil, N. I. Dhanashetti, A Text Book Of Mathematics -Advanced Calculus Published by Sheth Publishers Pvt. Ltd. Mumbai.

4. Gorakh Prasad, Integral Calculus, Pothishala Pvt. Ltd., Allahabad.

5. N. Piskunov , Differential and integral Calculus, Peace Publishers,

6. Shanti Narayan, Integral Calculus, S. Chand and Company, New

Delhi.

7. Kulkarni, Jadhav, Patwardhan, Kubade, Mathematics- Advanced Calculus , Phadke Prakashan.

8. P. N. and J. N. Wartikar, A Text book of applied mathematics.

Mathematics Paper VIII
(Number Theory)

Unit - I Relations 10 Lectures

1.1 Product sets, Relations, Inverse relation

1.2 Pictorial representation of relations

1.3 Composition of relations and matrices

1.4 Types of relation – Reflexive, Symmetric, Anti symmetric, Transitive. and its examples

1.5 Closure properties and its examples

1.6 Equivalence relations and partitions

1.7 Theorem : (with proof) If R is an equivalence relations on Set S then the quotient set S/R is a partition of S. And its converse.

1.8 Examples on Equivalence relation

1.9 Partial ordering relations.

Unit - II Properties of Integers 10 Lectures

2.1 Simple rules of addition and multiplication

2.2 Fundamental Theorem of Arithmetic (with proof)

2.3 Order, inequalities and absolute values

2.4 Properties of relation $\leq$ in Z (statement only)

2.5 Law of Trichotomy (statement only)

2.6 Proposition : (with proof) Let $a \leq b$ and c be any integer. Then (i) $a + c \leq b + c$

(ii) $ac \leq bc$, $c > o$ but $ac \geq bc$ when $c < o$

2.7 Properties of absolute value functions (with proof)

2.8 Mathematical Induction : Principle of Mathematical Induction and its examples.

2.9 Second form of induction (with proof)

2.10 Well ordering principle (statement only)

Unit - III Division Algorithm 13 Lectures

3.1 Division Algorithm for positive integers (with proof)

3.2 Division Algorithm for integers (without proof)

3.3 Examples on division algorithm

3.4 Divisibility and primes

3.5 Basic properties of divisibility

3.5.1 Theorem : (with proof) Let a,b,c are integers

(i) If $a|b$ and $b|c$, then $a|c$

(ii) If $a|b$ then, for any integer x, $a|bx$

(iii) If $a|b$ and $a|c$, then $a|(b+c)$ and $a|(b-c)$

(iv) If $a|b$ and $b \neq 0$, then $a = \pm b$ or $|a| < |b|$

(v) If $a|b$ and $b|a$, then $|a|=|b|$, i.e., $a= \pm b$

(vi) If $a|1$, then $a = \pm 1$

3.5.2 Corollary : (with proof) Let $a|b$ and $a|c$. Then, for any integers x and y, $a|(bx + cy)$.

3.5.3 Theorem : (with proof) Every integer n>1 can be written as a product of primes.

3.5.4 Theorem : (with proof) There exists an infinite number of primes.

3.6 G.C.D. and Euclidean Algorithm.

3.6.1 Theorem : (with proof) Let d is the smallest integer of the form ax + by then d = g.c.d.(a,b)

3.6.2 Theorem : (with proof) If d = g.c.d.(a,b) then there exists integers x and y such that d = ax + by

3.7 Properties of g.c.d. (with proof)

3.7.1 Theorem : (with proof) A positive integer d=gcd (a,b) if and only if d has following two properties :

- **(1) d divides both a and b**
- **(2) If c divides both a and b, then c|d**

3.7.2 Simple properties of the greatest common divisor (with proof) :-

- **(a) gcd (a,b)=gcd (b,c)**
- **(b) If x>o, then gcd (ax,bx)=x, gcd (a,b)**
- **(c) If d=gcd (a,b), then gcd (a|d, b|d)=1**
- **(d) For any integer x gcd (a,b)=gcd (a,b+ax)**

3.8 Euclidean algorithm

3.9 Examples on Euclidean algorithm.

3.10 Least Common Multiple

3.10.1 Theorem : (with proof) For any integers a and b g.c.d.(a,b) x l.c.m.(a,b)= |ab|

3.11 Relatively prime integers

3.11.1 Theorem : (with proof) If g.c.d.(a,b)=1 and a and b both divides C then ab divides C.

3.11.2 Theorem : (with proof) If a|bc and g.c.d(a,b)=1 then a|c

3.11.3 Theorem : (with proof) Let a prime p divides a produce ab. Then p|a or p|b.

3.11.4 Fundamental theorem of Arithmetic (statement only) and examples on it.

Unit - IV Congruence equations Lectures 12

4.1 Congruence Relation

4.1.1 Theorem : (with proof) Let m be a positive integer. Then :

- **(i) For any integer a, we have $a \equiv a \pmod{m}$**
- **(ii) If $a \equiv b \pmod{m}$, then $b \equiv a \pmod{m}$**
- **(iii) If $a \equiv b \pmod{m}$ and $b \equiv c \pmod{m}$, then $a \equiv c \pmod{m}$**

4.2 Residue classes

4.3 Congruence Arithmetic

4.3.1 Theorem : (with proof) Let $a \equiv c \pmod{m}$ and $b \equiv d \pmod{m}$. Then :

- **(i) $a + b \equiv c + d \pmod{m}$**
- **(ii) $a.b \equiv c.d \pmod{m}$**

4.4 Arithmetic and residue classes

4.5 Integer modulo m, Z_m

4.6 Cancellation laws for congruences

4.7 Euler phi function

4.7.1 Theorem : (with proof) If a and b are relatively prime, then Ø (ab) = ø (a) ø (b).

4.8 Congruence equations

4.9 Linear congruence equation ax ≡ 1 (mod m)

4.9.1 Theorem : (with proof) If and m are relatively prime,

then ax=1 (mod m) has a unique solution; otherwise it

has no solution.

4.10 Linear congruence equation ax ≡ b (mod m)

4.10.1 Theorem : (with proof) Let a and m are relatively prime. Then ax≡b (mod m) has a unique solution. Moreover, if s is the unique solution to ax ≡1 (mod m), then x = bs is the unique solution to ax≡b (mod m)

4.10.2 Theorem : (statement only) Consider the equation ax ≡ b (mod m) where d = gcd (a, m)

(i) Let d does not divide b. Then ax≡b (mod m) has no solution.

(ii) Let d does divide b. Then ax≡b (mod m) has d solutions which are all congruent modulo M to the unique solution of Ax ≡ B (mod M)

Where A = a|d, B = b|d, and M = m|d

4.11 Chinese remainder thereon (statement only)

4.11.1 Examples on Chinese remainder theorem for two congruence equations

4.11.2 Examples on Chinese remainder theorem for three

congruence equations.

REFERENCE BOOKS

1. **SCHAUM'S outlines " DISCRETE MATHEMATICS "**
   (Second edition) by Seymour Lipschutz , Marc Lipson
   Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. **DISCRETE MATHEMATICAL STRUCTURES**
   (6th Edition) by Kolman, Busby, Ross.
   Pearson Education (Prentice Hall)
3. **INTRODUCTION TO NUMBER THEORY**
   By Ajay kr Chaudhuri
   New Central Book AgencyLtd Delhi.

Computational Mathematics Laboratory – II

(Differential and Integral Calculus, Differential Equations, Number Theory)

SEMISTER – III		
Sr.No.	**Topic**	**No. of Practicals**
1	**Jacobian**	**1**
2	**Extreme values for two variables**	**1**
3	**Langrange's Method of Undetermined Multipliers**	**1**
4	**Div, Curl & Gradient (examples)**	**1**
5	**Homogeneous Liner Differential Equations and Reduced to Homogeneous Linear Differential Equations**	**1**
6	**Second Order Linear Differential Equations (One Integral is known)**	**1**
7	**Second Order Linear Differential Equations (Removal of first order derivative)**	**1**
8	**Second Order Linear Differential**	**1**

	Equations (By changing independent variable)	
SEMISTER – IV		
9	**Gamma and Beta Functions**	**1**
10	**Evaluation of double integrals over the given region**	**1**
11	**Fourier Series : [0, 2π]**	**1**
12	**Fourier Series : [-π,π]**	**1**
13	**Length of the curve Area and volume**	**1**
14	**Examples on Relation & Equivalence relations**	**1**
15	**Euclidean Algorithm for finding g.c.d.**	**1**
16	**Congruence Equations**	**1**

REFERENCE BOOKS

1. **R.B.Kulkarni, U.H.Naik, J.D.Yadhav, S.P.Thorat, A.A.Basade, H.V.Patil, H.T.Dinde A Hand Book Of Computational Mathematics Laboratory Published by Shivaji University Mathematics Society (SUMS), 2005.**
2. **Computational Mathematics : B. P. Demidovich & I. A. Maron translated by George Yankovsky Mir Publishers, Moscow.**
3. **Work Experience in Computational Mathematics : S. G. Baravkar, A.L. Jadhav, S.P. Kilche, Metha Publishing House, Pune and SUMS, 1996.**
4. **Elements of Applied Mathematics Vol.No. 1, P. N. Wartikar and J. N. Wartikar, P.V.G. Parkashan, Pune – 30.**
5. **Dr. J. R. Goyel and K. P. Gupta, Integral transform, Pragati Prakashan, Meerut.**
6. **J. J. Joshi, K. S. Ghuge, S. M. Birajdar etc., Engineering Mathematics- III, OM- Publication.**

Computational Mathematics Laboratory - III

(Computer Programming in C and Numerical Methods)

SEMESTER - III		
Sr.No.	**Topic**	**No. Of Practicals**
1	**C-Introduction : History, Identifiers Keywords, constants, variables, Mathematical operations.**	**1**
2	**Data types: Integer, real, character types, input/output statements, C-program structure, simple C-programs.**	**1**
3	**Control Structures (descision): if, If – else statements, simple illustrative C-programs.**	**1**
4	**Loop Structure (I) : for loop, *-figures, factorial, series sum problems, Fibonacci sequence.**	**1**
5	**Loop Structure (II) : while, do-while loops, exp(x), cos(x), sin(x) by series sum and comparison with lib. Function value.**	**1**
6	**Break, Continue, Go to, switch statements : Illustrative C-programs. Testing a number to be prime or not prime.**	**1**
7	**Arrays 1- dimensional : Max/min of n elements, sorting of an array.**	**1**
8	**Arrays 2- dimensional : Transpose, addition, subtraction, multiplication**	**1**

	in case of matrices.	
SEMESTER - IV		
9	**Function : User defined functions, $^{n}C_{r}$ using function**	**1**
10	**Numerical Integrations :** **(In C Program)** **a) Trapezoidal rule** **b) Simpson's $(1/3)^{rd}$ rule** **c) Simpson's $(3/8)^{th}$ rule**	**2**
11	**Numerical Methods for solution of Linear Equations:** **(Using Calculators)** **a) Gaussian Elimination Method** **b) Gauss – Jorden (Direct)Method** **c) Gauss Seidel (Iterative)Method.**	**3**
12	**Numerical Methods for solution of Ordinary Differential Equations:** **(Using Calculators)** **a) Euler Method** **b) Euler Modified Method** **c) Runge Kutta Second and Fourth order Method.**	**2**

REFERENCE BOOKS

1. **R.B.Kulkarni, U.H.Naik, J.D.Yadhav, S.P.Thorat, A.A.Basade, H.V.Patil, H.T.Dinde A Hand Book Of Computational Mathematics Laboratory Published by Shivaji University Mathematics Society (SUMS), 2005.**
2. **Yashavant Kanitkar, Let Us C ; BPB publication.**

3. S. S.Sastry, Introductory Methods of Numerical Analysis , Prentice Hall, India.

4. M. K. Jain, S. R. K. Iyangar, R. K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International (p) Ltd. 1996.

Microbiology
B.Sc. Part II (Semester Pattern) 2011 – 2012
Theory Syllabus

SEMESTER – IV :

Paper VII

Fundamentals of Industrial Microbiology, Biostatistics & Bioinformatics

Unit – I **9**

Basic concepts of fermentation.

1. Fermentation – Introduction.
2. Types of fermentations – Batch, continuous, dual and multiple
3. Typical Fermentor design – Parts and their functions.
4. Factors affecting fermentation process.

Unit – II **9**

Selection of industrial microorganisms

1. Primary and secondary screening
2. Strain improvement
3. Scale up of fermentations
4. Microbiological assays

Unit – III **9**

1- Biostatistics

1. Introduction
2. Data presentation – Tables and Graphs (Line and Histogram)

3. Central tendency : Mean, Median and Mode
4. Applications.

2- Bioinformatics : Introduction and applications.

Unit – IV **9**

Bioinstrumentation :

1. Principles and applications of i) lyophilization, ii) laminar air flow.
2. Principle, working and applications of -
   i) Electrophoresis (Agarose gel, PAGE)
   ii) UV-visible spectrophotometer.

SHIVAJI UNIVERSITY, KOLHAPUR
Syllabus General Microbiology
B.Sc. Part II (Semester Pattern) 2011 – 2012
Theory Syllabus

SEMESTER-IV:

Paper VIII
Basics of Immunology and Medical Microbiology

Unit – I **9**

1. Immunity i) Defintion ii)Types: Innate Immunity, Acquired Immunity – Active & passive
2. Non Specific defense mechanisms of the vertebrate body
   i) First line of defense
   ii) Second line of defense

Unit – II **9**

1. Introduction to the organs of immune system
2. Types of Lympohoid organs –Primary and secondary lymphoid organs.
3. Cells of the immune system-Broad categories of lymphocytes and their role.
   i) B cells – Plasma cells, memory cells.
   ii) T cells – CD_4^+ and CD_8^+ and natural killer cells.

Unit – III **9**

1. Antigen : Chemical nature, types of antigens, factors affecting antigenicity.
2. Antibody : Chemical nature, basic structure of an immunoglobulin molecule, types of antibodies – properties and functions.
3. Theories of antibody production.

4. Immune Response : Primary and secondary immune responses.
5. Mechanism of antigen – antibody reaction.
6. Serological tests
   (a) Agglutination test - Widal test, Passive agglutination test - RPR
   (b) Precipitation test - Gel diffusion tests
   (c) Complement fixation test
   (d) Fluroscent antibody test
   (e) ELISA (Direct test)

Unit – IV **9**

1. **Cellular microbiology** – Quorum sensing & bacterial pheromones,

2. Microbial diseases :

Causative agents, spread, pathogenesis, symptoms, microbiological diagnosis, prevention and control, treatment of the following diseases :

(i) Enteric fever
(ii) Staphylococcal wound infections
(iii) Infections caused by Proteus species
(iv) Tuberculosis
(V) Dengue fever

PRACTICAL SYLLABUS
B.Sc. Part II : Microbiology Practical Course

1. **Micrometry.**
2. **Stains and staining procedures :**
   i) Spore staining (Dorners method) ii) Flagella staining (Bailey's method)
   iii) Nucleus staining (Giemsa's method) using yeast cells.
3. **Preparation of media :**
   Triple sugar iron agar, Tributyrin agar, Blood agar, Gelatin agar, Amino acid decarboxylation medium, Amino acid deamination medium, Arginine broth, Christensen's medium, Peptone nitrate broth, Hugh and Leifson's medium, Egg-Yolk agar, Mannitol salt agar.
4. **Biochemical tests :**
   (i) Gelatin hydrolysis test. (ii) Amino acid decarboxylation test
   (iii) Amino acid deamination test (iv) Arginine hydrolysis test
   (v) Urea hydrolysis test (vi) Nitrate reduction test
   (vii) Huge and Leifson's test (viii) Oxidase test
   (ix) Lipase detection test. (x) Coagulase test

(xi) Lecithinase test

5. **Effect of environmental factor on microorganisms :**
   (i) Temperature (ii) pH
   (iii) Heavy metals – Copper (iv) Antibiotics – Penicillin, Streptomycin
   (v) Salt (NaCl)
6. **Primary Screening of -**
   (i) Antibiotic procedures – crowded plate technique
   (ii) Amylase procedures
7. **Isolation and identification of pathogenic microorganisms from clinical sample.**
   (a) *Salmonella species* (b) *S. aureus* (c) *Proteus species*
8. **Determination of Blood groups – ABO and Rh.**
9. **Determination of growth phases of *E. coli* by Optical density.**
10. **Widal test – qualitative slide test**
11. **RPR test.**
12. **Biostatistics –** Measures of central tendency: Mean, Median and Mode

Practical Examination

(A) The practical examination will be conducted on two consecutive days for six hours per day per batch of the practical examination.

(B) Each candidate must produce a certificate from the Head of the Department in her/his 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.

(C) Candidates have to visit at least one place of microbiological interest (pharmaceutical/ industry/dairy/research institute etc.) and submit the report of their visit at the time of examination. The Head of the Department should duly certify the report.

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

	Marks
Q.1 Determination of lag phase / Biostatistics	5
Q.2 Isolation and identification of pathogen from clinical sample	20

Q.3 Serology / blood groups	5
Q.4 Primary screening technique	10
Q.5 Biochemical tests	10
Q.6 Staining / Micrometry	10
Q.7 Effect of environmental factors	10
Q.8 Spot tests (on culture media)	10
Q.9 Journal	10
Q.10 Tour report	10

Total marks – 100

Nature of question paper and distribution of marks for B.Sc. Part II Microbiology Theory Examination

Q.1 Objective type	8
(The multiple choice – 8 questions)	
Q.2 Attempt Any Two	16
(A) Descriptive question	
(B) Descriptive question	
(C) Descriptive question	
Q.3 Attempt Any 4 out of 6 (Short Notes)	16
	40
Internal evaluation-	10
	Total 50

Books Recommended for Theory paper :

1. Foundation in Microbiology – by Kathleen Park talaro, Arther Talaro.
2. Introduction to Microbiology – John I. Ingraham, Catherine A. Ingraham A. Ingraham A. Ingraham, Ronald M; Second edition.
3. Basic and Practical Microbiology – Atlas.
4. Zinsser's Microbiology – by Wolfagang K. Joklik, (1995) Mc Graw-Hill Co.
5. Microbial Genetics – by Stanley R. Maloy, David Freifelder and John E. Cronan.
6. Molecular Genetics of Bacteria – by Larry Snyder, Wendy Champness.
7. Dreamland's Operate Computers Yourself (for beginners) Series Part – 2.
8. biostatistics : a foundation for analysis in the Health sciences by – Wayne W. Daniel John Wiley & Sons. Inc.
9. Biostatistics in Theory and Practice – T. K. Saha, Emkay Publi. New Delhi.
10. Statistics for biologists – R. C. Campbell.

11. Microbiology – Pelczar, Reid and Chan
12. Fundamentals of Microbiology – Frobisher et al.
13. Fundamental principles of Bacteriology – A. G. Salle.
14. Industrial microbiology – Prescott and Dunn.s
15. Industrial microbiology – Casida, E.
16. Industrial microbiology – Miller and Litsky
17. General Microbiology – R. Y. Stainer
18. Chemical Microbiology – A. H. Rose.
19. General Microbiology – Vol. I and Vol. II – Pawar and Diganawala
20. Text book of Microbiology – Ananthnarayan
21. Biochemistry – Lehninger.
22. Outlines of Biochemistry – Cohn and Stumph
23. Principles and Applications of statistics in Biosciences – By Kamat D. V. Maxam Prakashan – Mumbai – 400 059
24. A Text book of microbiology – R. Dubey, D. K. Maneshwari, S. Chand Co. Ltd. Ramnagar New Delhi 110055
25. Bioinformatics : A primer, Narayan P.
26. Text Book of Bioinformatics, Subramanian C.
27. Bioinformatics methods and applications by Rastogi, Mediratta N. I.
28. Clinical Microbiology – Ramnik Sood.
29. Medical Lab Technology – Mukharji Vol. II
30. Medical Lab Technology – Godkar

Books recommended for Practicals :

1. Medical Microbiology – Cruickshank et al. Vol. II.
2. Manual of Diagnostic Microbiology – Wadher and Boosreddy.
3. Diagnostic Microbiology – Fingold.
4. Introduction to Microbial technique – Gunasekaran.
5. Biochemical methods – Sadashivam and Manickam.
6. Bacteriological techniques F. J. Baker.
7. Laboratory Fundamentals of Microbiology – Alcamo, I. E.

List of the minimum equipments for B.Sc. II Microbiology course :

All the equipments that are required for B.Sc. Part II Microbiology course and in addition, the following equipments.

1. Serological Waterbath - one
2. U. V. Chamber - one
3. Micrometer slides - four per batch
4. Computers - two per batch (Microsoft 2000)

5. Internet facility

EQUIVALENCE FOR THEORY PAPERS.
(From June-2009)

Pre Revised Syllabus		Revised Syllabus	
Paper No.	**Title of the Paper**	**Paper No.**	**Title of the Paper**
	Paper III **Cytology Physiology & metabolism**		**Paper V : Cytology, Physiology and Metabolism** **Paper VI: Microbial genetics**
	Paper IV **Applied Microbiology**		**Paper VII;\: Fundamentals of Industrial Microbiology, Biostatistics & Bioinformatics** **Paper VIII: Basics of Immunology and Medical Microbiology**

SHIVAJI UNIVERSITY, KOLHAPUR
SYLLABUS OF INDUSTRIAL MICROBIOLOGY
FOR B.SC-II (VOCATIONAL) 2011-12
THEORY SYLLABUS

SEMISTER IV

PAPER-VII
FERMENTATION TECHNOLOGY

Industrial Production, Raw materials, Microorganisms, Fermentation process, Recovery and Applications :

Unit-I
Antibiotics 09

1. Streptomycin
2. Tetracycline
3. Rifampicin

Unit-II
Organic Acids
10

1. Lactic Acid
2. Citric Acid
3. Gluconic Acid
4. Itaconic Acid

Unit-III
Enzymes 09

1. Amylases
2. Cellulases
3. Proteases

Unit-IV 09

A) Solvents
   1. Glycerol
   2. Acetone-butanol

B) Amino acids
   1. Lysine
   2. Glutamic Acid

SHIVAJI UNIVERSITY, KOLHAPUR
SYLLABUS OF INDUSTRIAL MICROBIOLOGY
FOR B.SC-II (VOCATIONAL) 2011-12
THEORY SYLLABUS

SEMISTER IV

PAPER-VIII

INDUSTRIAL PRODUCTION OF BIOFERTILIZERS

Unit-I
Biofertilizers: 09

A) Concept & it's need in organic farming

B) Rhizobium Biofertilizer
   1. Classification
   2. Characteristics
   3. Host Rhizobium interaction
   4. N_2 fixation in root nodules
   5. Production of carrier based biofertilizer
   6. Methods of application

Unit-II 09

A) Azotobacter Biofertilizer

   1. Classification
   2. Characteristics
   3. N_2 fixation process
   4. Production of carrier based biofertilizer
   5. Methods of application

B) Azospirillum Biofertilizer
   1. Characteristics
   2. Association with plants
   3. Production of carrier based biofertilizer
   4. Methods of application

Unit-III
09

A) Azolla & BGA Biofertilizers

1. Azolla:
   a. Characteristics
   b. Production of carrier based biofertilizer
   c. Methods of application
2. BGA:
   a. Characteristics
   b. N_2 fixation process
   c. Production of carrier based biofertilizer
   d. Methods of application

B) VAM Biofertilizer

1. Characteristics & types of association
2. Production of carrier based biofertilizer
3. Methods of application

Unit-IV 09

A) PSB Biofertilizer (Phosphate solubilising Bacteria)
   1. Mechanism of phosphate solubilisation
   2. Production of carrier based biofertilizer
   3. Methods of application

B) Quality control of Biofertilizers as per FCO (Fertilizer Control Order)
   1. Introduction of FCO specifications for biofertilizers
   2. Sampling procedure
   3. Method of analysis
   4. Standards of biofertilizers
   5. Biostability of product biofertilizer

B.Sc.II INDUSTRIAL MICROBIOLOGY PRACTICAL COURSE

1. Estimation of following fermentation products by suitable assay method.
   a. Antibiotics – Streptomycin & Tetracycline
   b. Organic Acids – Lactic Acid & Citric Acid
   c. Enzymes – Amylase (Khandeparker's method)
      Cellulase (DNSA method)
   d. Amino acids – Glutamic acid
2. Production, extraction, purification of Citric acid.
3. Production of Amylase by,
   a. Surface culture method
   b. Submerged culture method
4. Immobilization of Amylase by using Sodium Alginate method.
5. Isolation of Cellulolytic microorganisms from soil.
6. Production of enzyme Cellulase.
7. Microbiological analysis of Cheese, Butter, milk powder
   a. SPC
   b. Detection for the presence of *E.coli* & *Staph. aureus*
8. Isolation and identification of Lactic acid bacteria from Curd.

9. Preparation of fermented food
    a. Idli
    b. Curd
10. Production of sauerkraut.
11. Isolation of Fungi from spoiled cheese.
12. Isolation of bacteria from spoiled milk.
13. Isolation of *Aspergillus* from spoiled food.
14. Isolation of Azotobacter from soil.
15. Isolation of Azospirillum from soil.
16. Isolation of Rhizobium from root nodules.
17. Isolation of Phosphate solubilising bacteria from soil.
18. Isolation of VAM fungi from soil. (Demonstration).
19. Production of Biofertilizers using nitrogen fixing and phosphate solubilising isolates and packaging.
20. Determination of heterocyst frequency of blue green algae.
21. Microbial limit test for PSB market fertilizer product.

B.Sc. II INDUSTRIAL MICROBIOLOGY
LIST OF REFERENCE BOOKS FOR THEORY & PRACTICAL

1. Food Microbiology by Frazier.
2. Food Microbiology by H.A. Modi. (Vol.I & II)
3. Industrial Microbiology by A.H. Patel.
4. Industrial Microbiology by Prescott & Dunn.
5. Soil Microbiology by Subbarao.
6. Agriculture Microbiology by Rangaswamy.
7. Methods in Food and Dairy Microbiolgy by Harrigon.
8. Biofertilizers – Vyas & Vyas (Ekta Publication).
9. F.K. Baker – Bacteriological Techniques.
10. Milk & milk products – Winton & Winton
11. Pharmaceutical Microbiology – Hugo & Russell.
12. Citric acid Biotechnology – J. Achrekar.
13. Enzyme Biotechnology – G. Tripathi.
14. Biofertilizers – Arun Sharma.
15. Industrial Microbiology – Agrawal / Parihar
16. Biotechnology – S.S. Purohit.
17. Agriculture Microbiology – G. Rangaswami & D.J. Bagyaraj
18. Textbook of Biotechnology – G.R. Chhatwal.
19. Pharmaceutical Biotechnology – Purohit/ Kakrani/ Saluja.
20. Practical Microbiology – R.C. Dubey and D.K. Maheshwari
21. Experimental Microbiology – Rakesh J. Patel & Kiran R. Patel. (Vol.I & II)
22. Fertilizer Control Order – 1985 ammended upto June 2006

NATURE OF QUESTION PAPER AND DISTRIBUTION OF MARKS FOR B.Sc. II INDUSTRIAL MICROBIOLOGY FOR EACH PAPER

THEORY PAPER

Q.1 Objective Type (The multiple choice – 8 questions)	08
Q.2 Any 2 out of 3 (A) Descriptive question (B) Descriptive question (C) Descriptive question	16
Q.3 (A) Write short answers (Any 4 out of 6)	16
	40
Internal Evaluation	10
Total	**50**

SHIVAJI UNIVERSITY,KOLHAPUR.
B.Sc. II INDUSTRIAL MICROBIOLOGY
PRACTICAL EXAMINATION.

(A) The practical examination will be conducted on three consecutive days for not less 4 hrs and 15 minutes on each day of the 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 the lines laid down from time to time by Academic Council on the recommendations of Board of Studies and that the journal had been properly maintained. Every candidate must have recoded 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 QUESTION PAPER AND DISTRIBUTION OF MARKS FOR PRACTICAL EXAMINATION

Q.1 Estimation of Lactic acid/ Citric acid from fermentation broth 10

Q.2 Isolation of Azotobacter/ Rhizobium/ PSB 20

Q.3 Bioassay of Streptomycin/ Tetracycline 20

Q.4 Assay of Amylase/ Cellulase 10

Q.5 Isolation of bacteria from spoiled food 10

Q.6 Determine the SPC/ Detect the presence of *E. coli*/ *Staph. aureus* in the given dairy product 10

Q.7 Spotting 10

Q.8 Journal 10

EQUIVALENCE FOR THEORY PAPERS.
(From June-2011)

Pre Revised Syllabus		Revised Syllabus	
Paper No.	**Title of the Paper**	**Paper No.**	**Title of the Paper**
	Paper III **INDUSTRIAL PRODUCTION OF FERMENTED FOOD S & BIOFERTILISERS**		**Paper V** **INDUSTRIAL PRODUCTION OF FERMENTED FOOD** **PAPER VIII** **INDUSTRIAL PRODUCTION OF BIOFERTILISERS**
	Paper IV **FERMENTATION TECHNOLOGY & QUALITY CONTROL OF FOOD PRODUCTS**		**PAPER VII** **FERMENTATION TECHNOLOGY** **PAPER VI** **QUALITY CONTROL OF FOOD PRODUCTS**

B.Sc.II Physics
Semester - IV

Paper - VII Optics and Lasers

UNIT I

Cardinal points :

(10)

Cardinal points of an optical system, graphical construction of image using cardinal points, Newton's formula, relation between f and f' for any optical system, relation between lateral, axial and angular magnifications.

UNIT II

1. Interference of light:

(5)

Michelson's interferometer & it's applications to measure i) wave length of' light iii) refractive index of thin film Construction & working of Fabry - Perot Interferometer, (derivation of expression for intensity is not necessary), application – determination of difference in wavelengths. superiority of F-P interferometer over Michelson's interferometer

2. Diffraction of light:

(5)

Fresnel's half period zones, Radii of zone, zone plate, multiple foci, Fresnesl's diffraction at a straight edge, expression for fringe width.

3. Optical fibers:

(3)

Structure and types of fibers, Numerical aperture (definition only) and pulse dispersion in step index fiber, fiber Optic communication system (Qualitative treatment only). Advantages of optical fiber.

UNIT III

1. Resolving Power:

(6)

Geometrical and spectral resolution, distinction between magnification and resolution, Rayleigh's criterion for the limit of resolution, modified Rayleigh's criterion, resolving power of plane diffraction grating, resolving power of a prism.

2. Laser system:

(6)

Spontaneous & stimulated emission, absorption, Einstein coefficients (only definitions), population inversion, optical & electrical pumping, properties of lasers, Ruby laser, Helium-Neon laser, uses of laser, idea of holography (qualitative treatment only).

UNIT IV

Lect.

Polarization of light:

(10)

Concept of polarization, double refraction, Huygens explanation of double refraction through uniaxial crystals, Nicol prism, phase retardation plates, production of elliptically and circularly polarized light, detection of plane, elliptically and circularly polarized light, optical rotation - laws of rotation of plane of polarization, polarimeter.

Semester - IV

Paper - VIII Relativity and Modern Physics

UNIT I

Relativity:

(12)

Inertial frame of reference, Galilean transformation, ether hypothesis. Michelson- Morley experiment, postulates of the special theory of relativity, Lorentz transformations, length contraction, time dilation, velocity addition theorem, variation of mass with velocity, mass energy equivalence.

UNIT II

Wave particle duality:

(10)

De Broglie hypothesis and derivation of wavelength of matter wave, explaination of wave packet,group velocity,phase velocity,relations between them,Davission and Germer experiment,Bohr's quantum codition on the basis of matter waves,Heisenberg' uncertainity principle (statement only) momentum – position,energy-time,Gamma ray microscope,application of uncertainty principle-non existence of electron in the nucleus

UNIT III

Vector atom model:

(12)

Space quantization, electron spin hypothesis, quantum numbers, Pauli's exclusion principle, effect of magnetic field on atom - magnetic moment due to orbital motion of an electron, normal Zeeman effect, explanation of normal Zeeman effect using magnetic quantum number, Stern Gerlach experiment.

UNIT IV

1. X rays:

(6)

Explaination ofContinuous and characteristics x-ray spectra, Bragg's law, intensity of x-rays, Mosley's experimental work, Mosley's diagram,Mosyleyslar.

Scattering of radiations, Compton effect, expression for change in wavelength, experimental verification of Compton effect.

Lect.

2. Nuclear Energy Sources:

(5)

Neutron induced reactions, nuclear fission energy released in fission, chain reaction, Nuclear reactor, Atomic Energy in India.

Reference Books :

Semester III Paper- V

1. Mathematical Physics by Rajput-Gupta.
2. Physics volume I - Halliday & Resnick.
3. Elements of properties of matter by D.S.Mathur.
4. Properties of Matter-Newman & Searl
5. Textbook of sound - Brijalal-Subramanyam.
6. Sound by F. G. Mee.
7. Sound by Khanna and Bedi.

8. Sound by Wood A.B.

Semester III Paper- VI

1. Schaums outline series- programming with C, second edition, Byron S.Doltfried (Tata McGraw-Hill.)
2. Programming with ANSI, C. Balgurswami.
3. Let us C, Yashvant Kanitkar (BPB Publication, New Delhi.)
4. Principles of EIectronics, V.K.Mehata & Shahu Mehata (S.Chand.)
5. Electronics Principles: III Edition, Malvino (Tata McGraw Hill).
6. Digital principles and Applications: IV Edition, Malvino and Leach.
7. Industrial Electronics, G. K. Mithal

8 Op-Amps and Linear Integrated Circuits, Ramakant A. Gayakwad.

9. Atext book of Applied Electronics, R.S. Sedha

Semester IV Paper- VII

1. Geometrical & Physical optics by D. S. Mathur.
2. A Text book of optics (New edition) by Subrahmanyam & Brijlal.
3. Fundamentals of optics by Jenkins and White.
4. Optics (second edition) by Ajay Ghatak.
5. Laser and Non liner optics by B.B. Laud.
6. Optics & Atomic Physics - Satya Prakash.

Semester IV Paper- VIII

1. Introduction of special Relativity by Robert Reshik.
2. Perspectives of modern Physics-Arthur Beiser.
3. Atomic and nuclear Physics by Gupta and Gosh, 2nd Edition.
4. Quantum Mechanics by sing, Bagade, Kamal Shing, Chand & Comp.
5. Introduction to Atomic and Nuclear Physics by H. Semat and Albroght.
6. Atomic Physics by J.B. Rajam.
7. Concepts of modern physics by S.L. Gupta and S. Gupta, Dhanpatrai and Sons.

Note for examination

1. Equal weightage should be given to all units.
2. Two multiple choice questions may be asked from each unit.

B.Sc. Part II (List of Physics experiments)
(w.e.f. June 2011)

Group I :- (General Physics & Sound)

1. Y by searle's method
2. Y by vibration of a bar
3. Modulus of rigidity by torsional oscillations
4. S.T. by Quincke's method
5. S.T. by ripples method
6. Viscosity of liquid by Searle's viscometer.
7. Velocity of sound in air by Kundt's tube and audio oscillator
8. Velocity of sound in air by resonating bottle.

Group II : - (optics)

1. *Biprism - determination of wavelength*
2. Goniometer - Equivalent focal length
3. Goniometer - Cardinal points
4. Determination of' Cauchy's constants
5. Resolving power of grating
6. R.P. of prism.
7. Polarimeter
8. Double refracting prism

Group III: - (Electronics & Computer Programming)

1. Study of transistor series voltage regulator.
2. Colpitt's oscillator.
3. Phase shift oscillator.
4. A)Study of NAND, NOR, Ex-OR, Ex-NOR gates B) Verification of DeMorgans Theorem
5. Sensitivity of C.R.O. and measurement of unknown frequency.
6. C – Programing :- A) Area of Circle B) Area of rectangle
7. C – Programing :- Use of if-else statement B) Use of for statement.
8. C – Programing :- Use of while statement B) Use of do_while statement.

Group lV : - (Electricity)

1. Constants of B. G.
2. Comparison of capacities by De Sauty's method
3. Mutual inductance by B.G. method.
4. Carey Foster Bridge- measurement of low resistance.
5. Calibration of bridge wire by Griffith's method.
6. Frequency of an oscillator by Wien's bridge.

7. High resistance by equal deflection method.
8. Series resonance of LCR circuit.

Note :

1. Study tour may be arranged for B.Sc.II class Physics students.
2. At least eighty percent practical should be performed by the student.
3. Practical examination would be conducted annually.

EQUIVALENCE FOR THEORY PAPERS.
(w.e.f June-2011)

Annual pattern	Semester pattern
Paper III Gen. Physics sound and Acoustics Optics and laser	Semester III Paper V General. Physics ,Sound and Acoustics Semester IV Paper VII Optics and laser
Paper IV Electronics & Computer Programming Relativity & Modern Physics	Semester III Paper VI Electronics & Computer Programming Semester IV Paper VIII Relativity & Modern Physics

B.Sc.II Astro Physics

Semester – IV

Paper – III (Cosmic Electrodynamics)

Lect.

1. HYDRODYNAMICS:

Equation of continuity & conservation of mass, Ideal fluid & Euler's equation of motion, Navier Stokes equation for viscous fluid.

(6)

2. ELECTRODYNAMICS:

Scalar electric potential, Poission & Laplace's equation, Scalar magnetic potential, Vector magnetic potential (A)

(7)

3. MAXWELL'S WAVE EQUATIONS:

Derivation of Maxwell's electromagnetic wave equation & their statements,

Velocity of electromagnetic wave in free space, Plane electromagnetic wave in free space. Energy flow due to a plane electromagnetic wave, Scattering of light, cattering cross-section, Thomson & Rayleigh scattering, Explanation for blue of the sky, red colour of sunset & sunrise.

(11)

4. MAGNETOHYDRODYNAMICS:

Idealized hydromagnetic equation, diffusion & frozening in a magnetic field, Magnetohydrodynamic equation (magnetic pressure & magnetic tension), Confinement of plasma, Low temperature of sunspot region. (9)

5. SUN AS A STAR:

History of sun, sun's interior, the photosphere, the solar atmosphere (chromosphere & corona).

(6)

6 SOLAR ACTIVITY:

Salient features of sunspots, sun's rotation & solar magnetic field, explanation for observed features of sunspots.

(6)

Semester – IV

Paper – IV (GALAXIES & PLANETS)

Lect.

1. GALAXIES:

Types of galaxies, the evolution of galaxies, peculiar galaxies, radio galaxies, Seyfert galaxies, Quasars.

(11)

2 THE MILKY WAY GALAXY

Interstellar medium, Clusters of stars.

(5)

3. COSMOLOGY:

The Big-Bang cosmology, The steady state Universe, The oscillating Universe, The Hubble Law.

(5)

4 THE SOLAR SYSTEM:

The origin of solar system, the early years of solar system, the solar system today.

(5)

5. THE EARTH:

The radioactive heating of the earth, the floating crust, continental drift. (5)

6 THE MOON:

The lunar surface, the lunar interior, theories of moon.
(5)

7. STUDY OF PLANETS:

Mercury, Venus, Mars, Saturn and Jupiter.
(9)

REFERENCE BOOKS:

1. Fundamentals and Frontiers of Astronomy – Jastrow & Thomson.
2. Dynamic Astronomy – Robert T. Dixon
3. Astronomy – Pasachoff.
4. Astronomy – Robert H. Baker.
5. Source Book on space Science – Samuel Glastone.
6. Introductory Astronomy & Astrophysics – Zeilik & Greogary
7. Moons & planets – Willian K. Hartmann.
8. Explorations – Thomas T. Arny.
9. Our solar system – A.W.Joshi, N.Rana.
10. The Structure of Universe – Jayant Naralikar.
11. Theoretical Hydrodynamics – Bansilal.
12. Classical Electrodynamics – Jackson.
13. Cosmic Electrodynamics – J.H.Pidington.
14. Classical Electrodynamics – Gupta Singh Kumar.
15. Fluid dynamics – Rutherford.
16. Astrophysics (Stars & Galaxies) – K.D. Abhyankar.
17. An introduction to stellar structure – S. Chandrashekhar.

LIST OF EXPERIMENTS

PART – I

1. Lummer Brothum Photometer (comparison of intensities)
2. I - V Characteristics of photocell & verification of inverse square law of
   intensity

3. Study of line absorption spectrum and measurement of temperature of
   flame.
4. Study of scattering of light (Diameter of Lycopodium powder).
5. R.P. of telescope.
6. Spherical aberration (Transverse and longitudinal)
7. Velocity of sound in air using C.R.O. & microphone
8. Measurement of terrestial distance using sextant.
9. Measurement of altitude & angular diameter of sun using sextant.
10. Constellation map drawing a) Orion b) Ursa Major c) Auriga d) Taurus
11. Numerical Integration.
12. Numerical Differentiation.
13. Numerical Interpolation.

PART – II

1. Calibration of spectrometer.
2. Study of Balmer lines.
3. Measurement of wavelength using F.P. Etalon.
4. Measurement and identification of spectral lines.
5. Band absorption spectrum of liquid (KMNO4 solution)
6. Study of solar spectrum.
7. Michelson interferometer to measure wavelength.
8. Diffraction grating to measure wavelength of given He-Ne laser Source.
9. D.C. amplifier using Operational amplifier.
10. Study of Lissageous figures using C.R.O.
11. Measurement of earth's magnetic field using earth inductor.
12. Determination of Planck's constant & work function using photocell.
13. To use idea of parallax to determine large distances.

PART – III

Study tour and / or night sky observation

PARCTICAL EXAMINATION:

Each candidate has to perform a total of four experiments two from each part - I and part - II

Practical Mark Distribution:

i. Experiments (20 x 4) = 80

ii. Journal = 10
iii. Report on Part – III = 10
Total = 100

EQUIVALENCE FOR THEORY PAPERS.
(w.e.f June-2011)

Annual pattern	Semester pattern
Paper I Fundamentals of Astrophysics Section I : Elements of Astrophysics Section II : Cosmic electrodynamics	Semester III Paper I (Elements of Astrophysics) Semester IV Paper III (Cosmic electrodynamics)
Paper II Fundamentals of Astronomy Section I : Galaxies and Planets Section II : The Sky and Stars	Semester III Paper II (The Sky and Stars) Semester IV Paper IV (Galaxies and Planets)

B. Sc. Part II, Semester-IV: STATISTICS
Structure of the Course

Paper-VII: Continuous Probability Distributions-II

Unit-1 Gamma and Beta Distributions: (14)

1.1 Gamma distribution: P.d.f. (two parameters);

$$f(x) = \frac{\theta^n}{\Gamma n} e^{-\theta x} x^{n-1},\ x \geq 0,\ \theta > 0, n > 0$$
$$= 0 \qquad ,elsewhere$$

Notation: X~ γ(θ, *n*), Sketch of p.d.f. for various values of parameter, special cases θ = 1, n = 1, m.g.f., c.g.f., mean, mode, variance, moments, cumulants, $\beta_1, \beta_2, \gamma_1$ and γ_2 coefficients, additive property: distribution of sum of i.i.d. exponential variates.

1.2 Beta distribution of first kind:
P.d.f.

$$f(x) = \frac{1}{B(m,n)} x^{m-1} (1-x)^{n-1}, 0 \le x \le 1, m, n > 0$$

$$= 0 \qquad , elsewhere$$

Notation: X~ β_1 (m, n), sketch of p.d.f. for various values of parameter,

symmetric around mean when $m = n$, mean, harmonic mean, mode, variance,

Uniform distribution as a particular case when $m = n = 1$, distribution of (1 – X).

1.3 Beta distribution of second kind: P.d.f.

$$f(x) = \frac{1}{B(m,n)} \frac{x^{m-1}}{(1+x)^{m+n}}, x \ge 0, m, n > 0$$

$$= 0 \qquad , elsewhere$$

Notation X~ β_2 (m, n), mean, harmonic mean, mode, variance, relation between

beta distribution of first kind and second kind, distribution of X+Y, X/Y

and X/(X+Y) where X and Y are independent gamma variates.

Unit-2 Normal distribution: P.d.f. **(10)**

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{\left\{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2\right\}}, -\infty < x < \infty, \quad -\infty < \mu < \infty, \ \sigma > 0$$

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

Notation X~ N (μ, σ^2), sketch of p.d.f. for various values of parameters, standard normal distribution, properties of normal curve, m.g.f., c.g.f., mean, variance, median, mode, mean deviation, quartiles, moments, cumulants, recurrence relation for central moments, $\beta_1, \beta_2, \gamma_1$ and γ_2 coefficients, additive property. Distribution of X^2 if X~N (0,1), distribution of aX+bY+c where X & Y are independent normal r.v.s. Normal distribution as limiting case of binomial and Poisson distribution (without proof). Illustration of applications of normal distribution in various fields.

Unit-3. Exact Sampling Distributions (Chi square distribution): (9)

Definition of chi square as a sum of squares of n i.i.d. standard normal variates, derivation of p.d.f. of chi square distribution with n degrees of freedom (d.f.) using m.g.f., sketch of p.d.f. for various values of parameter, m.g.f., c.g.f., mean variance, moments, cumulants, median, mode, skewness and kurtosis, additive property.

Unit-4. Exact Sampling Distributions (t & F): (12)

4.1 Student's t- distribution: Definition of student's t variate with n d.f. as

$t = \frac{Z}{\sqrt{\chi^2 / n}}$ where Z ~N (0, 1) and χ^2 is chi square variate with n d.f. and Z

and χ^2 are independent r.v.s., derivation of p.d.f., sketch of p.d.f. for various values of parameter, mean, mode, variance, moments, β_1, β_2, γ_1 and γ_2 coefficients.

4.2 Snedecor's F distribution: Definition of F variate as $F = \frac{\chi_1^2 / n_1}{\chi_2^2 / n_2}$,

where χ_1^2 and χ_2^2 are independent χ^2 variates with n_1 and n_2 d.f. respectively, derivation of p.d.f., mean, variance and mode. Distribution of 1/F. Inter relation between t, F and χ^2.

Paper VIII: Statistical Methods

Unit-1: Index Numbers: (10)

1.1 Meaning and utility of index numbers, problems in construction of index numbers.

1.2 Types of index numbers: price, quantity and value.

1.3 Unweighted and weighted index numbers using (i)aggregate method,

(ii) average of price or quantity relative method (A.M. or G.M. is to be used as an average)

1.4 Index numbers using; Laspeyre's, Paasche's and Fisher's formula.

1.5 Tests of index numbers: unit test, time reversal test and factor reversal tests.

1.6 Cost of living index number: definition, problems in construction, construction by using (i) Family Budget and (ii) Aggregate expenditure method.

1.7 Shifting of base, splicing, deflating and purchasing power of money.

Unit-2: Time Series: (8)

2.1 Meaning and need of time series analysis, components of time series (i) Secular trend, (ii) Seasonal variation, (iii) Cyclical variation and (iv) Irregular variation, Additive and multiplicative model, Utility of time series.

2.2 Measurement of trend : By (i) Inspection (ii) Progressive average method, (iii) Method of moving averages and (iv) Linear trend by least square method.

Unit-3: Tests of Hypothesis: (15)

3.1 Notion of random sample from probability distributions, statistic, sampling distribution of statistic, hypothesis, simple and composite hypothesis, null and alternative hypothesis, test statistic, critical region, idea of one & two tailed test, type I and II errors, level of significance, p- value.

3.2 Large sample tests: Statement of Central Limit Theorem (CLT) for i.i.d. r.v.s. construction of test statistic and identification of its probability distribution.

(a) Tests for proportion: i) H_0: $P = P_0$ ii) H_0: $P_1 = P_2$

(b) Tests for means: i) H_0: $\mu = \mu_0$, ii) H_0: $\mu_1 = \mu_2$.

3.3 Small sample tests: If $X_1, X_2, \ldots, Xn$ is a r.s. from $N(\mu, \sigma^2)$ then $\overline{X}$ and s^2 are independently distributed (without proof), construction of test statistic and identification of distribution of test statistic.

(a) t-tests for means: i) H_0: $\mu = \mu_0$ (σ unknown), ii) H_0: $\mu = \mu_0$ ($\sigma_1=\sigma_2$ unknown) unpaired t test. iii) H_0: $\mu_1 = \mu_2$ (paired t test), iv) H_0: $\rho = 0$

(b) χ^2-tests: (i) test for population variance, (ii) test for goodness of fit, (iii)
tests for independence of attributes (a) m × n contingency table, (b) 2 × 2
contingency table, Yate's correction for continuity.
(c) F-tests: test for equality of population variance.

Unit-4: Statistical Quality Control (SQC): (12)

4.1 Meaning and purpose of SQC, quality of product, process control, product
control, assignable causes, chance causes, Shewhart's control chart:
construction, working, theoretical basis, lack of control situation.

4.2 Control charts for variables: Control chart for process average ($\overline{X}$), control
chart for process variation (R), construction and working of R and $\overline{X}$ chart
for unknown standards, revised control limits, estimate of process s.d.

4.3 Control charts for attributes: Defects, defectives, fraction defective, control
chart for fraction defectives (P-chart) for fixed sample size and unknown
standards, construction, working of chart, revised control limits.

4.4 Control chart for number of defects(C-chart): for standard unknown,
construction and working of the chart, revised control limits.

Practical Course at B. Sc. Part – II

Objectives:
By the end of course students are expected to:
i. Compute probabilities of events related to learvious standard probability distributions.
ii. Compute the expected frequency and test the goodness of fit.
iii. Drawing random sample from standard probability distribution.
iv. Compute the multiple and partial correlation coefficients, index numbers.
v. Construction of control chart.
vi. To Interpret & summarise the computer output.

Practical – II

1. Fitting of Discrete Uniform distribution.
2. Fitting of Binomial distribution.
3. Fitting of Hypergeometric distribution.
4. Fitting of Poisson distribution.
5. Fitting of Geometric distribution.
6. Fitting of Negative Binomial distribution.
7. Model sampling from Discrete Uniform distribution.
8. Model sampling from Binomial distribution.
9. Model sampling from Hypergeometric distribution.
10. Model sampling from Poisson distribution.
11. Model sampling from Geometric distribution.
12. Model sampling from Negative Binomial distribution
13. Fitting of Continuous Uniform distribution
14. Fitting of Exponential distribution
15. Fitting of Normal distribution.
16. Model sampling from Continuous Uniform and Exponential distribution
17. Model sampling from Normal distribution using: (i) Normal table and (ii) Box-Muller transformation.
18. Application of Exponential & Normal distribution.
19. Fitting of Binomial, Poisson & Negative Binomial distribution using MS-EXCEL.
20. Fitting of Exponential & Normal distribution using MS-EXCEL.

Notes: 1. For fitting of all distributions, test of goodness of fit is necessary.

2. For model sampling from all distributions, inverse c.d.f. transformation method has to be used.

Practical - III

1. Bivariate Discrete distribution – I.
(Marginal & conditional distribution, computation of probabilities of events).
2. Bivariate Discrete distribution – II
(Expectations/conditional expectations/ variances / conditional variance/ covariance / correlation coefficient)
3. Fitting of straight lines, second degree and exponential curves of type $Y = a.b^X$, $Y = aX^b$ and $Y = ae^{bX}$
4. Applications of Trinomial distribution.
5. Multiple regression.
6. Multiple and partial correlation.

7. Large sample tests for means.
8. Large sample tests for proportions.
9. Tests for population correlation coefficients. (Using Fisher's Z transformation.)
10. Tests based on Chi square distribution.
(Test for population variance, Test for goodness of fit.)
11. Tests for independence.
12. Tests based on t distribution ($\mu = \mu_0$, $\mu_1 = \mu_2$; paired & unpaired, $\rho = 0$, $\rho_{ij.k} = 0$)
13. Tests based on F distribution. ($\sigma_1 = \sigma_2$, $\rho_{i.jk} = 0$)
14. Index Numbers-I. (computations of index numbers and tests of adequacy)
15. Index Numbers-II (Shifting of base, splicing, deflating, purchasing power
of money)
16. Construction of R and $\overline{X}$ charts.
17. Construction of P and C charts.
18. Time Series.
(Trend by inspection Progressive averages, Moving average & Least square methods.)
19. Fitting of Straight line / Parabola / Exponential curves using MS-EXCEL.
20. Multiple, partial correlation & partial regression coefficients Using MS-EXCEL.

Note:
i. Computer printout is to be attached to the journal.
ii.Observation table and/or calculations using statistical formulae should be done by
MS-EXCEL and verify by using library functions.
iii. Student must complete the entire practical to the satisfaction of the teacher
concerned.
iv. Student must produce the laboratory journal along with the completion certificate
signed by Head of Department, at the time of practical examination.
v There will be a compulsory study tour. It is expected to visit institutions repute industries, laboratories, Govt. or semi Govt. organization etc. A report on the same has to be submitted by every students along with the journal.

Laboratory requirements:

Laboratory should be well equipped with sufficient number of electronic

calculators and computers along with necessary software, printers and UPS.

Nature of Theory question Paper of B. Sc. Part–II, Sem-III and IV

Paper – V, VI, VII and VIII

Q. No.	Nature of question	Marks
1.	8 Multiple choice questions (one mark each)	**08**
2.	Attempt any two out of three (eight marks each)	**16**
	(a)	
	(b)	
	(c)	
3.	Attempt any four out of six (four marks each)	**16**
	(a)	
	(b)	
	(c)	
	(d)	
	(e)	
	(f)	

Nature of Practical Question Paper of B. Sc. Part – II.

a) Each practical paper of 50 marks, containing four questions each of 20 marks and

students has to solve two questions. In only one of four questions there shall be a

sub question of about 10 marks based on MS-EXCL.

b) Evaluation of MS-EXCL based question will be on line and should be demonstrated to the examiner.

c) 5 marks are reserved for journal and 5 marks are for oral for practical paper_-II examination.

d) 5 marks are reserved for journal and 5 marks are on study tour report.

e) Practical examination is of 4 hour duration which includes viva examination and

online demonstration.

f) There should be two subject experts at the time of Practical examination

Reference Books for Paper-V, VI, VII and VIII

1. Hogg R.V. and Criag A.T.: Introduction to Mathematical Statistics (Third edition),

   Macmillan Publishing, New York.

2. Gupta S. C. & Kapoor V.K.: Fundamentals of Mathematical Statistics.

   Sultan Chand & sons, New Delhi.

3. Gupta S. C. & Kapoor V.K.: Applied Statistics.

   Sultan Chand & sons, New Delhi.

4. Mood A.M., Graybill F.A.: Introduction to theory of Statistics. (Chapter II, IV, V,

   VII) and Boes D.C. Tata, McGraw Hill, New Delhi. (Third Edition)

5. Walpole R.E. & Mayer R.H.: Probability & Statistics. (Chapter 4, 5, 6, 8, 10)

   MacMillan Publishing Co. Inc, New York

6. Duncan A.J. : Quality control and Industrial Statistics

   Tataporewala & Sons Co. Mumbai.

7. Mayer P.L.: Introductory probability & Statistical Applications.

   Addison Weseley Publication Co., London.

8. Kapoor J.N. & Saexna H.C.: Mathematical Statistics.

   Sultan Chand & sons, New Delhi.

9. Goon A.M., Gupta A.K.: Fundamentals of Statistics (Vol. II)

   And Dasgupta B. World Press, Calcutta.

10. Rohatgi V.K. : Introduction to Probability theory & Mathematical Statistics.

    Wiley Eastern Limited.

11. Kangji K. : 100 Statistical Tests.

12. Kulkarni M.B., Gore A.P. & Ghatpande S.B.: Common Statistical Tests.

    Satyajeet Prakashan, Pune.

13. Gupta S.D. : Statistical Methods.

    Sultan Chand & sons, New Delhi.

14. Gupta S.C. : Fundamentals of Statistics.
Himalaya Publishing House, Mumbai.
15. Grant E. L. : Statistical Quality Control.
16. Gupta S.P. : Statistical Method.
17. Montgomery D.C.: Introduction to Statistical Quality Control.

Equivalence

Old Paper	**New Paper**
Paper-III: Continuous Probability Distributions	Paper-V: Continuous Probability Distributions-I Paper-VII: Continuous Probability Distributions-II
Paper IV: Statistical Methods and Bivariate Discrete Distributions	Paper VI: Bivariate Discrete Distributions and Multiple Regression Analysis Paper VIII: Statistical Methods

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Zoology

Semester IV

A) Lectures / Contact Hours per unit : 11

B) Contact hours per practical : 04

Paper VII Animal Diversity - IV

45

UNIT I: Study of Chordates

A. Salient features and classification of Reptiles, Birds and Mammals up to orders with suitable examples.

B. Poisonous and non-poisonous snakes.

i. Identification characters.

ii. Poison apparatus.

iii. Venom, antivenom production. effects of venom.

iv. Snake bite and first aid treatment.

10

UNIT II : Study of Rat Part I

i. Systematic position.

ii. Habits and habitat.

iii. Morphology.

iv. Study of digestive system.

v. Study of respiratory system.

10

UNIT III : Study of Rat Part II

i. Study of circulatory system.

ii. Study of excretory system.

ii. Study of central nervous system.

iv. Study of sense organs - eye and ear.

v. Study of reproductive system.

13

UNIT IV : Study of the following general topics

i. Aerial adaptations in birds.

ii. Migration in birds.

iii. Dentition in mammals.

iv. Salient features and affinities of monotremes and marsupials.

12

Paper – VIII Histology and Physiology

45

UNIT I : Histology of mammalian organs Part I

i. Tooth

ii. Tongue

iii. Salivary gland

iv. Stomach

v. Duodenum

vi. Ileum

vii. Liver

viii. Pancreas

11

UNIT II : Histology of mammalian organs Part II

i. Kidney

ii. Testis

iii. Ovary

iv. Uterus

v. Pituitary

11

UNIT III : Physiology Part I

i. Hormones of pituitary gland

ii. Sex hormones

iii. Oestrous cycle

iv. Menstrual cycle

v. Hormonal control of pregnancy parturation and lactation

vi . Hormonal control of testicular activities

11

UNIT IV : Physiology Part II

A. Contraceptives

B.. Invitro fertilization:

i. Technique

ii. Significance

C. Body defence:

i. Immune system: a) Humoral immunity and its mechanism.

b) Cellular immunity and its mechanism.

ii. Organs involved in immune system:

a) Bone marrow

b) Lymphatic Nodes.

12

List of Reference Books:

1. Rat : Rowett
2. Rat : Kshirsagar
3. Studies on the structure and Development of Vertibrates: Goodrich, E.S (Vol I & II)
4. Introduction to Chordates : Manjupuria T.C
5. A textbook of zoology : Parkar, T.J and Haswell, W.A
6. A textbook of vertebrate Zoology : Prasad, S.N
7. The life of vertebrates : Younge, J.Z
8. Comparative Vertebrates Anatomy : Hayman, L.H
9. The anatomy of Garden lizard (Calotes versicolor); Paranjpe, S.Y (Zoology monograph Pub. Uni. Of Poona).
10. Zoology of Chordates: Nigam,H.C.
11. The Text-Book of Vertebrate Zoology: Agarwal, IV, P and Dalela, R.C.
    a. Chordates: Dhami and Dhami.
    b. Rat : Dhami and Dhami.
12. Vertebrates: Kotpal, R.C.
13. Textbook of Histology: Bloom W and Fawcett D.W.

14. Bailey's Textbook of Histology. Williams and Wilkins, Baltmore and Scientific Book Agency, Calcutta: Copenhaver, W.M.
15. Histology: Lippinocott. Ham, A.W.
16. Histology: Greep, R.O and Well, L.
17. An Atlas of Histology. Heinemann Educational Book Ltd. London And ELBS: Freeman. W.H. And Bracegirdle, B.
18. Microscopic Anatomy of vertebrates, Lea and Febigen. Philadelphia: Kendall, J.I.
19. Histology of Mammals: Athavale, M.V and Latey, A.N.
20. Human Physiology: Chattergee, C. C.
21. Physiology: Guyton and Hall.

Detailed Syllabus of Practicals for B.Sc.Part-II (Zoology) Semester – III & IV (Annual Pattern)

Practical-I (Based on Paper V & VI)

Unit I

A. Classification and mophological peculiarities of the following up to classes.

(Sketches/Photographs may be used)

i. **Arthropoda** - Apus, Daphnia, Balanus, Prawn, Lobster, King crab, Grasshopper, Butterfly, Moth, Millipede, Centipede, Scorpion, Spider, Peripatus.

ii. **Mollusca** - Chiton, Dentalium, Patella, Aplysia, Snail, Slug, Mytilus, Pearl Oyster, Sepia, Octopus.

iii **Echinodermata** - Sea-lily, Brittle-star, Starfish, Sea-urchin.Sea cucumber

iv. **Hemichordata** - Balanoglossus.

B . Amazing invertebrates - Fire fly, Mud wasp, Praying mantis, Sepia

Unit II

A. Crab :

i. Systematic position and external characters

ii. Study of appendages (Demonstration)

iii. Study of nervous system (Demonstration)

B. Cockroach :

i. Systematic position and external Characters.

ii. Sexual dimorphism

iii. Dissection of -

a) Male reproductive system

b)Female reproductive system

iii. Temporary preparation of –

walking leg, thoracic spiracles and gonapophysis

Unit III

A. Pila:

i. Systematic position and external Characters

ii. Dissection of -

a) Digestive system.

b) Nervous system

iii. Temporary Preparation of -

Osphradium, Radula. And Statocyst.

B. Study of Mouth Parts of Insects. -

Cockroach, Honeybee, Mosquito, Housefly, Butterfly

Unit IV

A. Study of foot in Mollusca:

Chiton, Pila, Mytilus, Unio, Sepia.

B. Examples in Genetics (at least 10 examples)

Examples based on Crossing over, Linkage, Interaction of genes and Sex- determination.

C. Detection of Carbohydrates

(Glucose, Maltose, Lactose, starch), Proteins and Lipids.

D. Demonstration of enzyme action:

i. Urea-Urease reaction.

ii. Effect of temperature and pH on enzyme activity.

iii. Action of protease (papaine) on proteins.

E. Study of enzyme action of salivary amylase.

Practical-II (Based on Paper VII & VIII)

Unit I

A . Classification and Morphological Peculiarities of the following up to orders:

(Sketches/Photographs may be used)

i. **Reptilia** - Chameleon, Gecko, Cobra, Crocodile.

ii. **Aves** - Duck, Kite, Woodpecker, Sparrow, Sunbird,Vulture, Kingfisher, Fowl.

iii. **Mammals**- Platypus, Bat, Scaly ant eater, Loris, Rabbit, Tiger, Whale

B. Rat : (Demonstration Practical)

Study of the following Systems:

i. Digestive System.

ii. Respiratory System.

iii. Arterial System.

iv. Venous System.

v. Excretory System.

vi. Reproductive System.

Unit II

A . Dissection of –

i. Brain of Rat/fowl

B.. Temporary Preparation of :

i. Blood of mammal.

ii. Pecten of fowl.

iii. Sclerotic Plate of fowl.

iv. Collumella of fowl.

v. Hyoid Apparatus of fowl.

Unit III

A . Identification of the following Poisonous and Non-Poisonous snakes.

Cobra, Pit viper, Russell's viper, Saw Scaled viper, Krait, Sea snake, Rat snake, Water snake.

B . Beak and Leg modifications with reference to :

Parrakit, Woodpecker, Kingfisher, Heron, Duck, Sparrow/Pigeon, Hawk/Kite , Owl.

C. Dentition in Mammals with reference to:

Rabbit, Sheep, Rat, Dog, Man.

Unit IV

A . Study of histology of following mammalian organs :

i. Tooth (V.S.) ii. Tongue iii. Salivary gland iv. Stomach v Duodenum.

vi. Ileum vii. Liver viii. Pancreas ix. Kidney x. Testis xi. Ovary xii Pituitary gland xiii. Uterus.

B . Preparation of Haemin crystals.

C. Study of Vaginal smear of Rat.

D . Study of abnormal constituents of urine.

E . Study of Blood groups.

F . Visit to Sea-shore/any suitable place to study animal diversity.

Nature of theory question paper

Semester III

Paper – V Animal Diversity III

Q.1 Eight Multiple choice questions (one mark each)

8 marks

Q.2 Attempt any two (Eight marks each)

16 marks

i.

ii.

iii.

Q. 3 Attempt any four (Four marks each)

16 marks

I.

II.

III.

IV.

V.

VI.

Total - 40

Paper – VI Genetics And Biological Chemistry

Q.1 Eight multiple choice questions (one mark each)

8 marks

Q.2 Attempt any two (Eight marks each)

16 marks

i.

ii.

iii.

Q. 3 Attempt any four (Four marks each)

16 marks

I.

II.

III.

IV.

V.

VI.

Total - 40

Semester IV

Paper – VII - Animal diversity IV

Q.1 Eight Multiple choice questions (one mark each)
8 marks

Q.2 Attempt any two (Eight marks each)
16 marks

i.

ii.

iii.

Q. 3 Attempt any four (Four marks each)
16 marks

I.

II.

III.

IV.

V.

VI

Total - 40

Paper – VIII – Histology & Physiology

Q.1 Eight Multiple choice questions (one mark each)
8 marks

Q.2 Attempt any two (Eight marks each)
16 marks

i.

ii.

iii.

Q. 3 Attempt any four (Four marks each)

16 marks

I.

II.

III.

IV.

V.

VI

Total - 40

Distribution of Marks for Practical Examination: (Annual Pattern)

Practical- I

1. Dissection-……..…….

13

2. Temporary Preparation/Mounting……

07

3. Biochemical Tests/ Enzyme Action……

07

4. Genetics Example……

08

5. Identification……

10

6. Journal……

05

Total

50

Practical- II

1. Dissection-…….…….

13

2. Temporary Preparation/Mounting……..

07

3. Physiological Experiment……...

07

4. Submission of Excursion Report and Viva-voce based on it. ……

08

5. Identification……...

10

6. Journal…….

05

Total 50

B.Sc. II: Zoology Equivalence to old Syllabus:

Old : Paper III – Animal Diversity III, Genetics & Biological Chemistry.

New : Semester III Paper –V Animal Diversity III

New : Semester III Paper – VI Genetics & Biological Chemistry.

Old : Paper IV – Animal Diversity IV, Histology & Physiology.

New : Semester IV Paper – VII Animal Diversity IV

New : Semester IV Paper – VIII Histology & Physiology

Fisheries Semester II

Paper III - Inland Fisheries

UNIT- I

1. Freshwater Habitat :

5

1.1 Introduction.

1.2 Characters and classification of :

Ponds, Lakes, Streams, Rivers and Reservoirs.

2. Freshwater Ecosystems in Ponds, Lakes, Rivers and Reservoirs.

8

With respect to:

2.1 Food chain.

2.2 Food web.

2.3 Primary productivity.

UNIT- II

3. Inland Capture Fisheries:

10

3.1 Riverine capture fisheries.

3.2 Reservoir capture fisheries.

3.3 Lacustrine capture fisheries.

UNIT- III

4. Fishing Craft and Gear Technology:

12

4.1 Fishing Crafts:

Rafts, Catamaron, Canoes, Machwa, Trawler.

4.2 Fishing Gears :

Hooks and Lines, Cast net, Gill net, Trap net,

Rampani net and Trawl net.

UNIT- IV

4.3 Maintenance of Fishing Crafts and Gears.

3

5. Water Pollution:

7

5.1 Types of water pollutants.

5.2 Effects of pollutants on fishes.

5.3 Preventive measures.

45

Paper IV (Aquaculture)

UNIT- I

1. Introduction to Aquaculture:

5

1.1 Basic Aquaculture- Definition and scope.

1.2 History of Aquaculture- Origin and growth.

1.3 Present national and global scenario.

1.4 Comparison of aquaculture and agriculture.

2. Types of aquaculture:

7

2.1 Semi Intensive, Intensive and Extensive aquaculture.

2.2 Pond culture.

2.3 Pen and cage culture.

2.4 Running water culture.

UNIT- II

3. Criteria for selection of candidate species of aquaculture.

3

4. Major candidate species for freshwater aquaculture.

3

5. Prerequisites of site selection:

4

5.1 Topography

5.2 Soil type.

5.3 Water supply.

UNIT- III

6. Layout Fish farm:

4

6.1 Construction of pond.

6.2 Types of ponds.

7. Physico- chemical conditions of fish pond:

7

7.1 Physical conditions: Depth, Temperature, Turbidity , Light.

7.2 Chemical conditions: Oxygen, Carbon dioxide, P^H , Organic and inorganic contents.

UNIT– IV

8. Freshwater Plankton:

6

8.1 Definition and classification

8.2 Importance of plankton

8.3 Morphological study of :

a) Phyto- plankton

b) Zoo-plankton

9. Aquarium Fishery:

6

9.1 Setting of an aquarium.

9.2 Common aquarium fishes:

a) Angel fish.

b) Gold fish.

c) Guppy fish.

d) Gourami.

e) Swordtail Fish.

f) Molly. ---------

45

List of Recommended Books :

1) Fish and Fisheries of India : V. G. Jhingran. Hindustan Publication Corp. (India), Delhi.

2) Tropical Fish Farming : D. K. Belsare. Environmental Publi. Karad, Maharashtra.
3) Aquaculture : J. E. Bardach. J. H. Ryther and W. O. McLarney.
4) Textbook of Fish Culture : Breeding and Cultivation of Fish. Mare. Huet.
5) Freshwater Fish Pond Culture and Management. M. Chakrof.9
6) Text Book of Aquaculture. M. S. Reddy.
7) Encyclopaedia of Fishes and Fisheries of India. A. K. Pandey. G. S. Sandhu Vol. IV.
Anmol Publi. New Delhi.
8) A Handbook of Fish Farming : S. C. Agarwal, Narendra Publication House, Delhi.
9) A Textbook of Fishery Science and Indian Fisheries : C. B. Shrivastav. Kitab Mahal,
New Delhi.
10) A Manual of Freshwater Acquaculture : R. Santhanam. N. Sukumaran and P. Natrajan.
11) Methods of Physical and Chemical Analysis of Water : Gotterman et.al.
12) An Introduction to Fishes : S. S. Khanna. Central Book Depot. Allahabad.
13) Manual of Methods in Fish Biology : S. P. Biswas.
14) Manual in Fishery Science : K. R. Reddy and M. G. Babare.
15) Aquarium System : 1981 : A. D. Hawkins. Academic Press.
16) Aquarium Fishes and Plants : K. Bajaj and R. Zukal Himalayan Publication.
17) Freshwater Aquarium : J. A. Dawas. Robort Royce. Ltd.

Practical course in Fisheries for B.Sc. II (Annual)

Practical- I

UNIT -I

1. Taxonomy of fin fishes;

Classification of the following fishes up to families:

Scoliodon, Prisdtis, Torpedo, Chimaera, Polypterus, Acipenser, Amia, Lepidosteus,

Harpodon, Eel, Labeo, Clarias, Exocoetus,Hippocampus,Ophiocephalus, Anabas,

Pleuronectus, Echeneis,Tetradon and Antennarius.

2. Taxonomy of shell fishes:

i. **Crustacea**: Prawn, lobster and crab.

ii. **Mollusca**: Unio, Pearl oyster and Sepia.

UNIT-II

3. Morphology of Scoliodon and Labeo.

4. Dissection of Labeo:

4.1 Digestive system.

4.2 Heart and major blood vessels.

4.3 Respiratory system.

4.4 Brain.

4.5 Weberian ossicles.

4.6 Mountings: Cycloid scale and swim bladder.

5. Dissection of accessory respiratory organs in:

5.1 Anabas.

5.2 Clarias.

5.3 Saccobranchus.

UNIT-III

6. Study of Fin:

6.1 Paired fins: Pectoral and pelvic fins.

6.2 Unpaired fins: Dorsal, ventral and different types of caudal fins.

7. Mounting of the following scales:

Placoid, cycloid and ctenoid scales.

8. Study of different types of swim bladders.

UNIT –IV

9. Economic importance of the following:

Sponges, Prawn,Oyster, Bivalve, Scoliodon, Pomphret, Harpadon, Sardine, Labeo.

10. Estimation of total glycogen, protein and lipid in fish organs.

[Note: Sketches, photographs may be used]

Practical II

UNIT-I

1. Estimation of the following chemical factors from water sample.

1.1 Dissolved oxygen.

1.2 Free carbon dioxide.

1.3 Alkalinity

1.4 Hardness

2. Determination of primary productivity

UNIT-II

3. Study of Crafts and Gears:

3.1 Crafts - i. Raft. ii. Catamaran. iii. Dugout canoe. iv. Trawler

3.2 Gears - i. Drag net. ii. Cast net. iii. Gill net. iv. Rampani net.

v. Trawl net.

UNIT-III

4. Study of planktons:

4.1 Quantitative estimation of planktons.

4.2 Quantitative study of zoo-planktons.

5. Study of life cycle in Labeo.

UNIT-IV

6. Aquarium fishery:

6.1 Demonstration of tank fabrication.

6.2 Setting of an aquarium.

6.3 Aquarium fishes: i) Angel. ii) Gold fish. iii) Guppy.

iv) Gouramy. v) Molly. vi) Swordtail fish.

7. Visit to fish seed production center and local fish market and submission of the report.

Distribution of Marks for Theory Examination for Fisheries Paper I, II, III and IV

Q. 1) Objective – Multiple choice (Eight questions) **8 Marks**

Q.2) Attempt any two out of three (8 marks each) **16 Marks**

a) Long answer question

b) Long answer question

c) Long answer question

Q. 3) Short answer questions (Any four out of six) (Four marks each) **16 Marks**

Distribution of Marks for Practical Examination

Practical – I

1. Dissection – Major	12
2. Dissection – Minor	08
3. Temporary Mounting	05
4. Estimation of glycogen / protein / lipid	10
5. Identification	10
6. Journal	05
	50

Practical – II

1. Estimation of dissolved O2/ Free CO2/Hardness	10
2. Estimation of Alkalinity/Primary Productivity	10
3. Mounting / Quantitative estimation of Planktonic Forms	05
4. Identification	10
5. Tour Report	10
6. Journal	05

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	50

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B.Sc. II : Fisheries Equivalence to Old Syllabus

Old Paper – I : Fishery Biology I and Fish Physiology I

New Paper, Sem-I – Paper I : Fishery Biology I and Paper II Fish Physiology I

Old Paper – II : Inland Fisheries and Aquaculture

New Paper , Sem-II – Paper III : Inland Fisheries and Paper IV Aquaculture

Biotechnology – (optional & Vocatinal)

Topic No.	Semester IV Biophysics & Enzyme Technology	Lecture 45
	Unit I	
1	Spectroscopy :- Principle, working, application 1. Florescence spectroscopy 2. Infra red spectroscopy 3. Atomic absorption spectroscopy 4. Raman Spectroscopy	13
	Unit II	
2	2.1 Enzyme- definition , types of enzyme Depending on location- Extra cellular, Intracellular. Depending on substrate – Inducible, Constitutive. 2.2 Concept of -: coenzyme, cofactor, Isozyme, Ribozyme. 2.3 IUB Classification of Enzyme . 2.4 Active site of enzyme. Mechanism of action of enzyme by Lock and Key, Induced fit hypothesis. 2.5 Factors affecting enzyme activity - Temperature, P^H, Substrate concentration, inhibitors, enzyme concentration 2.6 Factors affecting catalytic efficiency of enzyme- proximity and orientation, Strain and Distortion, Covalent catalysis, Acid base catalysis.	12
	Unit III	
3	3.1 Concept of steady state kinetics, derivation of Km. Determination of km by Linewiver Burk plot and Eadie Hofstee plot. 3.2 Allosteric enzyme – Definition, Properties, model explaining mechanism of action Sequential, Symmetry Model. Functions of allosteric enzyme. 3.3 Regulation of enzyme activity- - Irreversible changes in covalent structure of enzyme, Reversible changes in covalent structure of enzyme, Feed back or end product inhibition	13
	Unit IV	
4	4.1 Definition, Methods of immobilization –on surface and within support .Advantages and disadvantages of immobilized enzyme, 4.2Applications of free and immobilized enzyme	10

References:

1. Biophysics by danies
2. Biophysics by Nath Upadhyay

3.Enzyme structure and function by Dixon
4.Biotechnology by R.C. Dubey
6. Enzymology by Plummer
7.Biochemistry by Lub

UNIT	Semester IV:- r-DNA technology	Lect.
	Unit I	45
1	1.1 Introduction to r-DNA technology:- Restriction enzymes and their types, Restriction and modifications, Enzymes to modify ends of DNA – Alkaline phosphatase,S1 nuclease ,DNA ligase ,endonuclease III, Terminal transferase 1.2Cloning vectors:- Plasmids, Bacteriophages, cosmids,phagemids, Animal vectors , Plant vectors, Shuttle vectors , Binary vectors 1.3 Construction of c-DNA and genomic library	12
	Unit II	
2	2.1 Isolation and purification of nucleic acid – DNA , RNA and Plasmids 2.2 Methods of purification of DNA:- Electro-elution from the gel, Agarose gel electrophoresis, PAGE electrophoresis. 2.3 Probes- Preparation , Labelling and Applications	10
	UnitIII	
3	3.1 Techniques in r-DNA technology a) Blotting techniques :- Southern, Nothern and Western Blotting techniques b) PCR and its types c) DNA sequencing techniques- i) Maxam and Gilbert's method ii) Sangers method 3.2 Techniques of insertion of DNA into vectors:-Blunt ends,cohesive ends , adaptors, Linkers, poly dA-dT tail	11
	Unit IV	
4	4.1 Selection of transformed cells:- Replica plate technique , Colony Hybridisation, Hybrid arrested translation and Hybrid selection translation 4.2. Applications of gene cloning method a) Novel protein generation- r-Insulin b) r-Vaccines – DNA vaccines ,Subunit vaccines,r-vector vaccines, Multisubunit vaccines 4.3 Safety measures and biological risk for r-DNA work-Hazards in genetic engineering	12

Reference

1) Principles of gene manipulation by Old and Primrose
2) Intoduction to biotechnology –B.D. Singh
3) Gene cloning by Christopher Howe
4) Textbook of Biotechnology by R.C Dubey
5) Biotechnology by Jogdand

Laboratory exercise in basic biotechnology II

Sr. No.	Name Of Practical	Lect.45
1	Isolation of chromosomal DNA from E.coli	
2	Isolation of plasmid DNA	
3	Separation of plasmid DNA by Agarose Gel electrophoresis	
4	Amylase assay by DNSA method	
5	Effect of temperature on enzyme activity	
6	Effect of pH on enzyme activity	
7	Effect of substrate concentration on enzyme activity	
8	Effect of inhibitor on enzyme activity	
9	Effect of activator on enzyme activity	
10	Dot ELISA test	
11	Quantitative Widal test	
12	Radial immunodiffusion	
13	Measurement of cell size by micrometry	
14	Subcellular fractionation of mitochondria, nuclease	
15	RPR test	
16	Radioimmunoassay	
17	Restriction digestion	
18	Ligation	

B.Sc. Part – II Computer Science

(Sem-IV)

Paper – VII : Relational Management Systems

Unit – I : Relational Data Model, Security and Integrity (10)

Introduction to Relational Model: Attributes and Domain, Database Schema and instances, concept of primary, super, candidate key, integrity constraints and its types (general, domain, entity). Security: Database security, database environment threats, Relational Algebra: Selection, Projection, composition of relational operation, union, intersection, self difference operation, Cartesian product.

Unit – II : SQL and PL-SQL.

(10)

Sub queries and Nesting Sub queries, Join: Equi join, Simple Two table Join, Outer join, Self join, Views, indexes, sequence, synonyms, Comparison between SQL & PL-SQL, Structure of PL-SQL, IF-ELSE Construct, Loop Statement- For Loop, While Loop.

Unit – III: Cursor And Triggers. (8)

Definitions of Cursor & Trigger, Types of cursor- Implicit, Explicit, Open, Close cursor, Syntax of trigger, Type of trigger

Unit – IV: Introduction to MySQL (12)

Creating a Database and Tables, Inserting, Selecting, Ordering, Limiting, Grouping, Analyzing and Manipulating Data, Changing, Deleting, Searching, Database and Table Schema Statements, Data Manipulation Statements and Functions, Table Statements and Functions, Replication Statements and Functions, Aggregate Clauses, Aggregate Functions, String Functions, Date and Time Functions, Mathematical Functions, Flow Control Functions, Exception Handling.

References :

1. Database System Concepts- Korth Silberschetz.
2. Commercial Application Devlopment Using Developer 2000 - Ivan Bayross.
3. Structure Query Language - Osborne.
4. Structure Query Language - Martin Gruber.
5. MySQL The Complete Reference By Vikram Vaswani
6. Learning MySQL by O'reilly
7. MySQL in Nut Shell by Dyer 2nd Edition

Paper – VIII : Advanced Object Oriented Programming Using C++

Unit - V: Inheritance:

(10)

Definition, defining derived classes, types of inheritance single, multilevel, multiple, mixed, etc. Making private members inheritance, virtual base class, abstract class.

Unit – VI: Polymorphism:

(10)

Pointer to object, compile time, run time, concept of function polymorphism, virtual functions, rules for virtual function, pure virtual function.

Unit – VII: File handling :

(10)

File stream class- ifstream, efstream, fstream, opening and closing a file, file modes, error handling functions, input output operations – read(), write(), etc.

Unit – VIII : Introduction to UML:

(10)

An overview of UML, applications of UML in various domains, relationship in the UML, Model elements, symbols used(user, class, usecase, generalization, aggregation), representation of classes and objects.

References:

1) OOP using C++ By E. Balagurusamy

2) Programming with C++ By D. Ravichandran

3) C++ Program By Yashavant Kanetkar

4) Let Us C++ By Yashawant Kanetkar.

5) Object Oriented Programming in C++ - By Thampi & Mantha - Dreamtech

6) Mastering C++ -By Venugopal.

Nature of Practical Question Paper:

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.

The practical examination will be conducted at the end of year (i.e. end of Sem- IV). The practical paper will contain the questions from Sem- III and Sem- IV syllabus papers. The practical examination will be carried out of 50 marks. There will be four questions for each practical paper. The student has to solve any TWO questions. The practical question paper will based on Paper-V, Paper-VI, Paper-VII and Paper-VIII. In practical question paper there shall be **four** questions each of twenty marks, a student has to attempt any **two** questions. Five marks are reserved for the Certified Journal and 5 marks for the oral examination. Practical examination be of four hours duration which includes paper work, on line implementation and viva examination.

Sr. No.	Name of Practical Paper	Based on Theory paper	Duration per week per batch of 20 students	Marks
Sr. No.	**Name of Practical Paper**	**Based on Theory paper**	**Duration per week per batch of 20 students**	**Marks**
1.	Practical Paper II	Paper–V & VII	4	50
2.	Practical Paper III	Paper-VI &VIII	4	50

(Sample Questions for practicals)

Practical Paper II:(Based on Theory paper V of sem-III)

1. Sample case studies on System Analysis and Design
    a. Payroll System
    b. Inventory Management System
    c. College Library System
    d. Bazaar Management System
    e. College Information System
    f. Store Management System

    (The detail system study is to be expected.)

Practical Paper II:(Based on Theory paper VII of Sem- IV)

2. Create emp table and dept table with appropriate field and apply following integrity constraint on appropriate fields.
    i. Primary key.
    ii. Foreign key.
    iii. not null
    iv. default
    v. check
3. Create student table with appropriate field and do following things.
4. Insert 10 appropriate records.
    i. Update record
    ii. Delete records.
    iii. Alter table

iv. Drop table.

5. Use any tables and do select operations using Operators, clauses and aggregate function.
6. Use any tables and do sub query & Join operations.
7. Illustrative Example using PL/ SQL.
8. Illustrative Example on Trigger and cursor.
9. Illustrative examples on MySQL.

Practical Paper III: :(Based on Theory paper VI of Sem – III and VIII of Sem-IV)

1. Write a program to generate Fibonacci Series.
2. Write an object program in C++ to read a set of nos. up to n where n is defined by the programmer and print the content of the array in sorted order.
3. Write an Object orienting program in c++ which to store and display the information of employee.
4. Write a program in C++ to generate the following pyramid of nos. using polymorphism.

```
2
2 4
2 4 6
2 4 6 8
2 4 6 8 10
```

5. Write a program in C++ that creates a text file. After creation read the same file and display only vowels on the screen.

Pattern of Theory Question Paper:

Instructions on the theory question paper:

1. All questions are compulsory.
2. Write the answers of the both sections in the same answer book.
3. Figures to the right indicate full marks.

Equivalence to the Old Syllabus:

Sr. No.	Title of the old Syllabus	Sr. No.	Semester and Paper No.		Title of the New Syllabus
1.	Paper – III: Introduction To Software Engineering And Relational Database Management System.	1.	Semester – III	Paper V	Fundamentals of Software Engineering
		2.	Semester – IV	Paper VII	Relational Management Systems
2.	Paper – IV: Object Oriented Programming (C++) And Introduction to UML.	3.	Semester – III	Paper VI	Introduction to Object Oriented Programming Using C++
		4.	Semester – IV	Paper VIII	Advanced Object Oriented Programming Using C++

B.Sc. II Food Science & Quality Control
Semester- IV
Paper VII Quality Control of Food and Food Products

Unit1. Sensory Evaluation of Food (6)

1.1 Different aspects of sensory science and evaluation with their application

1.2 Sensory assessment of Food quality

a) appearance of food
b) odor and smell
c) flavor
d) texture and taste

Unit2. Colorimetry and Spectrophotometry (13)

2.1 Principle, working and applications

2.2 Colorimetry – the Beer-Lamberts law, Measurement of extraction

coefficient

2.3 Spectrophotometry

a) Absorptiometrc analysis –absorption spectra

b) Types of Spectrophotometers

Unit3. Fluorimeter and Chromatography (12)

3.1 Fluorimetry – Principle, working and application of Fluorimeter

3.2 Introduction of Chromatography

3.3 Principles and application of Paper chromatography

3.4 Principles and application of Thin layer chromatography

3.5 Principles and application of Gas liquid chromatography

Unit4 . Food standards, laws and Regulation (8)

4.1 Food laws and regulation

4.2 HACCP- A Food safety assurance system

References

1) Instrumental analysis by Skoog ,Holler and Crouch

2) Instruental methods of chemical analysis by Chatwal, Anand

3) Analytical chemistry by Cristian

4) Analytical Chemistry by Higson

5) Charalambous, G. and Inglett,G.1981.The Quality of Foods and Beverages.Academi Press,New York

6) Ranganna, S.1986. Handbook of Analysis and Quality Control for fruits and Vegetable products. Tata McGraw Hill. New Delhi

7) Amerine ,M.A Pangborn, R.M., and Rosseler,E.B. 1965. Principles of Sensory Evalution of Food . Academic Press,NewYork

Semester- IV

Paper-VIII Cereals and Legume Processing

Unit1. Introduction of cereals and pulses (6)

1.1 Morphological characters
1.2 Important cereals and pulses
1.3 Post harvest losses of cereal grains
1.4 Chemical changes in grains
1.5 Storage and handling

Unit2. Processing of Cereals (10)

2.1 Introduction of milling
2.2 Rice milling
2.3 Byproducts of rice milling
2.4 Wheat milling and its byproducts
2.5 Corn milling and its byproducts

Unit 3 Processing of pulses (12)

3.1 Decortication of pulses

3.2 Toxic factors in legumes

3.3 Effect of processing of legumes on their nutrient composition, quantity and quality

3.4 Pulse milling

3.5 Byproduct utilization of legume processing

Unit 4 Oil seed technology (10)

4.1 Introduction

4.2 General methods of extraction

a) Rendering

b) Processing with mechanical press

c) Solvent extraction

References

1) Food science by Potter
2) Post harvest Biotechnology of oilseed by D.K.Salunkhe
3) Oilseed Processing Technology by B.D. Shukla
4) Post harvest Biotechnology of Cereals by D. K. Salunkhe
5) Post harvest Technology of Cereals, Pulses and oilseed by A. Chakrawarthy
6) Technology of Cereals by Kent
7) Food Chemistry by Meyer
8) Food Science by Shrilaxmi
9) Chemical changes in food during processing by Richardson
10) Mathews, R.H. Ed. 1989. Legumes –Chemistry, Technology and Human Nutrition Marcel Dekker

Practical Course

List of Practical -

Practicals based on paper V,VI,VII and VIII

1) Preparation of Pineapple jam
2) Preparation of apple jam
3) Preparation of jelly
4) Preparation of marmalade
5) Preparation of Amala candy
6) Preparation of pickles
7) Preparation of orange squash
8) Preparation of Soymilk
9) Preparation of flavoured Soymilk
10) Preparation of Cake
11) Preparation of Wheathalwa
12) Preparation of Potato chips
13) Study of cut out examination of canned food
14) Determination of iodine value of an oil)
15) Isolation of casein from milk
16) Determination of titratable acidity and pH of milk
17) Isolation of *Staphylococcus* species from food sample
18) Isolation of *Salmonella* species from food sample
19) Isolation of Halophilic bacteria from food sample
20) Screening and isolation of amylase producing microorganism
21) Extraction of gluten content from wheat flour
22) Extraction of fat by Soxhlet method
23) Estimation of ash content of food sample
24) Estimation of total sugar by phenol H_2SO_4
25) Estimation of reducing sugar by DNSA method
26) Estimation of vitamin C by DCPIA method
27) Determination of saponification value of an oil
28) Estimation of fructose by Resorcinol method
29) Determination of an acid value of an oil

30) Study of preservation of food sample by low temperature
31) Identification of packaging materials
32) Estimation of starch by Anthrone method
33) Isolation of starch from potatoes
34) Study of thin layer chromatography
35) Study of paper chromatography
36) Determination of pH value of various food samples
37) Visit to Rice and milling industry
38) Visit to oil processing industry

Practical Examination of 100 Marks -

1. The practical examination will be conducted on two days for not less than five hours on each day of practical examination
2. Each candidate must produce a certificate from the Head of the department in his / her college stating that he / she has completed practical course in satisfactory manner on the lines laid down from time to time by A. C on the recommendation of BOS and that laboratory journal has been properly maintain
3. Candidate have to visit at list two places of interest (food industry/ Dairy/ Research lab) and submit the report of their visit at the time of the examination. The report duly certified by Head of the department.

Distribution of marks for practical examination -

Q. 1	Spotting	10 Marks
Q. 2	Preparation of product	20 Marks
Q. 3	Preparation of product	20 Marks
Q. 4	Estimation of chemical component	15 Marks
Q. 5	Determination of chemical component	15 Marks
Q. 6	Journal	10 Marks
Q. 7	Tour report	10 Marks
		100 Marks

B.Sc.II Biochemistry

SEMISTER IV

Paper-III
(Biochemical Techniques)

1) **Chromatography:**
(10)

Definition and classification, Principle, technique and applications of Paper, Thin layer, Ion exchange, Gel permeation chromatography. The discussion should include selection of matrix, preparation of plates, column packing, sample application, mechanism of separation, important applications and advantages of each one of the methods.

2) **Electrophoresis**:
(07)

Definition of the terms electrophoresis - electrophoretic mobility, Factors affecting electrophoretic mobility, Principle, technique and applications of Paper, PAGE and SDS –PAGE. The discussion should include preparation of gel plates, sample application, mechanism of separation, development of plates, important applications and advantages of the method.

3) **Absorption spectroscopy**:
(07)

Beer Lambert's law, its mathematical derivation, meaning of the terms- transmittance, absorbance, molar and specific absorbance, Limitations of Beer Lambert's law.
Construction, working and applications of colorimeter and spectrophotometer. Advantages of spectrophotometer over colorimeter, Absorption spectra of proteins, nucleic acids, cytochrome and NAD^+

4**) Enzyme immobilization:**
(08)

Definition, Types - Adsorption on carriers, covalent binding, intermolecular cross linking, gel entrapment, Industrial applications of immobilization.

5) Electron microscopy:
(03)
Principle, construction, working and applications.

6) Immunotechnology:
(07)
Natural and acquired immunity, Lymphoid system (B and T cells), Structure of IgG, Interferons, Hybridoma technology and production of monoclonal antibodies and its applications, Enzyme Linked Immuno Sorbant Assay(ELISA) technique and its significance.

Paper-IV

(Biotechnology and Bioinformatics)

1) Molecular biology : (12)
Nucleic acids : Definition, types and distinction between DNA and RNA,

Components of nucleic acids - nucleosides and nucleotides, Representation of primary structure of polynucleotide chain, Watson Crick model of DNA, Structure and functions of mRNA, rRNA and tRNA(yeast^{ala}), Mechanism of replication, transcription and translation of DNA in prokaryotes, Genetic code, Regulation of gene expression, Constitutive and Inducible genes, Operon concept (E.coli lac operon model).

2) **Genetic engineering and biotechnology** : (12)

Introduction, Tools and techniques in genetic engineering.

Restriction endonucleases- class I & II with an example each. (EcoRI and Hae III)

Reverse transcriptase, S1 nuclease,DNA ligases, Alkaline phosphatase,

Cloning vectors: Plasmid PBR-322, Cosmids and Lambda phage.

Construction of cDNA, Gene cloning technique, Use of synthetic linkers & homopolymer tails, Production of human insulin by rDNA technology.

Basic technique and applications of PCR.

Blotting techniques-southern, northern and western blotting and their application,

Applications of genetic engineering.

3) Biochemistry of diabetes mellitus : (05)

Meaning and types of diabetes mellitus, Structure of insulin, Factors affecting insulin secretion, metabolic effects of insulin, mechanism of insulin action . metabolic changes in diabetes, long term effects of diabetes, hypoglycemic drugs

.

4) **Biochemistry of AIDS** : (05)

Structure of HIV, Transmission of HIV, Immunological abnormalities in AIDS, Lysis of CD4 cells, Natural course of AIDS - acute & chronic, Crises phases. Graphical representation, Anti-AIDS drugs - AZT(Zidovudine) & DDI (Didanosine) : their structure and mechanism of action.

5) **Bioinformatics :** (08)

Introduction to bioinformatics, Databases,

Classification of databases (Primary, Secondary, Composite)

Sequences & Nomenclature, IUPAC symbols, nomenclature of DNA & protein sequences & directionality of sequences.

Types of sequences used in bioinformatics (Genomic DNA, cDNA,)

Information sources (NCBI, GDB, MGD).

Data retrieval tools (ENTREZ, OMIM, PubMed)

Database similarity searching (BLAST).

Use of bioinformatics tools in analysis of biological data.

List of books

1. Outlines of Biochemistry- Cohn and Stumph
2. Principles of Biochemistry-White, Handler and Smith.
3. Biochemistry-O.P.Agrawal.
4. Text book of Biochemistry-West, Todd and Manson.
5. Biochemistry-Lubert stryer.
6. Text book of Biochemistry and Human Physiology- G.P.Talwar.
7. Review of physiological chemistry-H.A.Harper.
8. Hawk's physiological chemistry- Oser.
9. Introduction to Chromatography theory and practice - Shrivastava.
10. Chromatography- B.K.Sharma.

11. Biochemistry- S.C. Rastogi.

12. Text book of Biochemistry-R.C. Dubey.

13. Text book Biochemistry- A.V.S.S.Ramarao.

15. Biochemistry-J.H. Weil.

16. Biochemistry-Zubey.

17. Fundamentals of Biochemistry-Voet,Voet & Pratt.

18. Fundamentals of Biochemistry-J.L.Jain.

19.Biochemistry-U.Satyanarayan.

20. Theory and Problems in Biochemistry-P.W.Kuchel and Ralston.

21. Nutritional Biochemistry-Dr.S.Ramkrishna & dr.S.Vyankatrao.

22. Cell and molecular biology-P.K.Gupta.

23. Elements of Biotechnology-P.K.Gupta.

24. A Text Book of Biotechnology –R.C.Dubey.

25. Genetic engineering-Sandhya Mitra.

26. Basic Biotechnology-S.Ignacimuthu.

27. Biotechnology-B.D.Singh.

28. Biotechnology-M.P.Arora.

29. Introduction to Bioinformatics-T.K.Attwood & D.J.Parry-Smith

30. Bioinformatics Principle and applications-Harshawardhan P.Bal.

31. Immunology.- Kuby.

Practical Course

The practical course is to be covered in two days per week (total eight periods per week). At the end of the year there should be practical examination of 100 marks conducted in two consecutive days for not less than six hours on each day. Figures shown to the right indicate number of practicals required.

Practil Course-I

1. a) Fundamentals of Biochemical analysis.

(1)

b) Control and Accuracy.

(1)

2. **Separation methods**:

a) Paper chromatographic separation & identification of amino acids from binary mixture.

(1)

b) Paper chromatographic separation & identification of carbohydrates from binary mixture.

(1)

c) Uptake of Na ions by cation exchange resin .

(1)

3. **Isolations :**

a) Isolation and characterization of starch from potatoes.

(1)

b) Isolation and characterization of casein from milk.

(1)

c) Isolation and characterization of albumin from egg.

(1)

4. **Colorimetric estimations** :

a) Verification of Beer Lambert's law and estimation of copper sulphate. (1)

b) Estimation of protein by Biuret method.

(1)

c) Estimation of inorganic phosphate by Fiske-Subbarow method. (1)

d) Estimation of glucose from blood, Folin-Wu or o-Toluidine method. (1)

e) Estimation of RNA by Bial's orcinol method.

(1)

f) Estimation of creatinine in urine.

(1)

g) Estimation of urea from blood by DAM method.
(1)

Practical Course - II

5. **Volumetric Estimations :**

a) Estimation of glycine by formal titration.
(1)

b)Estimation of lactose in milk by Fehling's or Benedict's method. (1)

c) Estimation of total chlorides in urine by Volhard's method (1)

d) Estimation of vitamin-C in biological samples & tablet by 2 ,6di-chlorophenol indophenol method.
(1)

e) Determination of saponification value of oil.
(1)

f) Determination of iodine number of oil.
(1)

6.Immobilization of baker's yeast cells by gel entrapment for invertase activity.
(1)

7.Estimation of amylase (diastase) activity in urine.
(1)

9. **Qualitative Analysis**

A) Detection of Carbohydrates – Xylose, Glucose, Fructose, Sucrose, Maltose, Starch.
(3)

B) Detection of normal and abnormal constituents of urine.
(2)

C) Determination of blood groups.
(1)

D) Detection of enzymes (any four)
(2)

Urease, Amylase, Invertase, Phenol oxidase, Alkaline-Phosphatase.

10. **Demonstration Experiments(Any Three)**

a) Bioinformatics experiment

To determine three dimensional structure of proteins by visualizing softwares- RasMol.
(1)

b) Extraction of lipids from egg yolk by Soxhlet method.
(2)

c) Separation of indicators or serum proteins by paper electrophoresis. (1)

d) Enzyme kinetics – Effects of following parameters on amylase activity.

i. Substrate concentration
ii. Temperature
(3)

There shall be a study tour for not more than four days to visit industries and institutions of biochemical importance. One teacher will accompany a batch of 16 students. As per university rules T.A. and D.A. should be paid to the teacher.

List of the Laboratory equipments:

1.Colorimeter
2. pH meter
3. Electrophoresis apparatus
4. Computer with printer.
5. Electrophoresis apparatus
6. Water bath / Incubator
7. Mixer
8. Oven
9. Chemical balance / Singlepan balance
10. Suction pump
12. Centrifuge machine
13. Heating mantle with magnetic stirrer
14. Soxhlet extraction apparatus.
15. Micropipetes
16. Glassware

Reference Books for Practicals

1. Practical Biochemistry-David Plummer (Tata McGraw Hill)

2. Biochemical methods- Sadashivam and Manikam

3. Introductory Practical Biochemistry-Sawhney S.K. and Randhir Singh (Narosa publication).

4. Hawk's Physiological Chemistry-Oser.

5. Viva and Practical Biochemistry-Dr. A. C. Deb (New central book Limited).

6. Introduction to Practical Biochemistry - P. D. Boyer (Wiley International).

Nature of Question paper for semester pattern

Nature of Question Paper

SEMISTER - III

Paper-I (Biomolecules) (Total marks 40)

Q.1. Objective type question
08 marks
(Multiply type question)
Q.2. Essay type question
(Any Two Out of Three)
16 marks
Q.3. Short notes
(Any Four out of six)
16 marks

Paper-II (**Metabolism and Nutrition)** (Total marks 40)

Q.1. Objective type question
08 marks
(Multiply type question)
Q.2. Essay type question

(Any Two Out of Three)
16 marks
Q.3. Short notes
(Any Four out of six)
16 marks

SEMISTER IV

Paper- I (Biochemical Techniques) (Total marks 40)

Q.1. Objective type question
08 marks
(Multiply type question)
Q.2. Essay type question
(Any Two Out of Three)
16 marks
Q.3. Short notes
(Any Four out of six)
16 marks

Paper-II (Biotechnology and Bioinformatics) (Total Marks 40)

Q.1. Objective type question
08 marks
(Multiply type question)
Q.2. Essay type question
(Any Two Out of Three)
16 marks
Q.3. Short notes
(Any Four out of six)
16 marks

Distribution of Marks for Practical Examination (Total marks 100)

1. Colorimetric experiments 14 marks.

2. Isolations 12 marks

3. Chromatographic separations / Immobilization 12 marks

4. Volumetric experiments 15 marks.

5. Qualitative analysis 22 marks
   a) Carbohydrate detection

   b) Detection of enzymes/ Blood groups

   c) Urine analysis/ Diastase activity

6. Oral 10 marks

7. Study tour report & Journal 15 marks

Total : 100 marks

B.Sc. Pollution

SEMESTER-IV

Paper-III:

(Air Pollution)

Unit 1. General: Definition of air pollution; Classification of air pollutants, Units and expression of air pollution data Sources of Air Pollution: Natural, industrial, automobiles and domestic

(8)

Unit 2. Study of Air Pollutants: Dust; Suspended Particulate Matter (SPM); Carbon monoxide; Sulphur oxides; Nitrogen oxides; Ammonia; Hydrogen sulphide; Fluorides; Asbestos; Hydrocarbons

(7)

Unit 3. a)Secondary Air Pollutants: Photochemical reactions; Formation of free radicals; Ozone, PAN and Photochemical smog

(7)

b) Effect of air pollution on vegetation (particulates and SO_2) and biomonitoring of air pollution

(6)

Unit 4.a) Effect of air pollutants on Man, animals and property

(6)

b)Air Pollution Control from Stationary Sources: Source correction methods; Particulate pollution control by mechanical collectors, cyclones, bag filters and electrostatic precipitators; Gaseous pollution control by scrubbers, absorbers and combustion

(8)

Paper-IV:
(Water Pollution-II)

Unit 1. Effect of Water Pollution of Life: Phytoplankton; Zooplankton; Benthic macroinvertebrates
and fish; Concept of toxicity, Toxicity testing and pathogenicity

(11)

Unit 2. Long Term Effects of Pollution: Concepts of bioaccumulation and biomagnification; Pesticides and heavy metals in food chains

(7)

Unit 3. a) Mixed Pollution: Interaction of pollutants like synergism, antagonistic and additive effects

(5)

b) Drinking Water Purification: Raw quality of water; Methods of water purification

(7)

Unit 4. Control of Water Pollution: Physico-chemical methods of waste treatment such as sedimentation, flotation, coagulation and flocculation, filtration, neutralization, ion exchange, reverse osmosis, oxidation, reduction and carbon adsorption, etc.; Biological waste treatment
by activated sludge, trickling filters and oxidation ponds.

(12)

Practical Course –I

1. Determination of minimum size of the quadrat by species area curve method

(1)

2. Determination of frequency and relative frequency of grassland species by quadrat method

(1)

3. Determination of density and relative density of grassland species by quadrat method

(1)

4. Estimation of biomass of grassland community

(2)

5. Determination of Importance Value Index of grassland species

(1)

6. Determination of frequency of grassland species by line transect method

(1)

7. Determination of frequency of grassland species by belt transect method

(1)

8. Determination of total phytoplankton density by haemocytometer

(1)

9. Determination of zooplankton density by Sedgwick-Rafter Cell

(1)

10. Determination of frequency distribution in any calculated parameter

(1)

11. Determination of standard deviation and coefficient of variation

(1)

12. Determination of species diversity index in a grassland ecosystem

(1)

13. Study of benthic macroinvertebrates in freshwaters and calculation of Sequential Comparison Index

(1)

14. Quantitative determination of sulphur dioxide in air by iodometric titration method

(1)

15. Quantitative determination of ammonia in air

(1)

16. Estimation of dust-fall in air by slide and beaker method

(2)

17. Study of sulphation rate candle

(1)

18. Fumigation of sulphur dioxide on plants and study of visible injury

(2)

Practical Course-II

1. pH determination in water

(1)

2. Estimation of dissolved oxygen in water

(1)

3. Estimation of TDS in water

(2)

4. Estimation of BOD in water

(2)

5. Estimation of COD in water

(1)

6. Estimation of chloride in water

(1)

7. Estimation of hardness in water

(1)

8. Estimation of inorganic phosphorus in water

(1)

9. Estimation of nitrates in water

(2)

10. Determination of total alkalinity in water

(1)

11. Determination of light penetration by Secchi disc

(1)

12. Determination of residual chlorine in water

(1)

13. Study of chlorophyll disintegration by water pollutants

(2)

Note:

A. Every candidate/student must have recorded his/her observations on the above practicals in the laboratory Journal and written report on each exercise performed. Such journal is to be checked regularly and signed by a teacher in-charge. The Head of Deptt. has to certify the same stating that the student has completed in a satisfactory manner the practical course as recommended by the Board of Studies and the Journal has been properly maintained throughout the year.

B. The journal, duly certified by the Head of Deptt. has to be submitted by every candidate at the time of practical examination. The same will be considered for assessment by the examiners.

List of Books

1. APHA, *Standard Methods for Examination of Water and Wastewater*, APHA, U.S.A.
2. Arceivala, S.J. *Wastewater Treatment and Disposal: Engineering and Ecology in Pollution Control*, Marcal Dekkar.
3. Goel, P. K. *Water Pollution: Causes, Effects and Control*. New Age International Publishers, New Delhi.
4. Gopal, B. & N. Bhardwaj*, Elements of Ecology*, Vikas Publishing House.
5. Hillary, E. *Ecology 2000*.

6. Kudeiva, V.P. *Water Pollution*, Pragati Prakashan, Meerut.
7. Ladbetter J.O. 1972. *Air Pollution*, Marcel Dekker.
8. Liptak, B.G. *Environmental Engineers Handbook, Vol. I, Air Pollution*, Chilton Book Company, U.S.A.
9. Liptak, B.G. *Environmental Engineers Handbook, Vol. II, Water Pollution*, Chilton Book Company, U.S.A.
10. Mason, F.C. *Biological Effects of Water Pollution*.
11. Nemerow, N.L. *Theories and Practice of Industrial Waste Treatment*, Addision-Wesley, Reading, U.K.
12. Odum, E. P. *Fundamentals of Ecology*. W.B. Sunders.
13. Pratap Mowli, P. and Subbaya, N.V. *Air Pollution and Control*, Divyajyoti Prakashan, Jodhpur.
14. Rao, M.N. and Rao, H.V.N. 1989. *Air Pollution*, Tata McGraw Hill, New Delhi.
15. Santara, S. C. *Environmental Science*. New Central Book Agency, Kolkata.
16. Trivedy R.K. & Goel, P.K. *An Introduction to Air pollution*, B. S. Publications, Hyderabad.
17. Trivedy R.K. & Goel, P.K. *Chemical and Biological Methods for Water Pollution Studies*, Environmental Publications, Karad
18. Trivedy, R.K. 1995. *Encyclopedia of Environmental Pollution and Control*, Environ Media, Karad.
19. Trivedy, R.K., Goel, P.K. and C.L. Trisal 1987. *Practical Methods in Ecology and Environmental Science*, Environmental Publications, Karad.
20. W.H.O. *Water Pollution Control in Developing Countries*, W.H.O., Geneva.

Pattern and distribution of Marks for Practical Examination (Total Marks 100)

Practical-I

Q. 1. Determination of phytosociological parameter in grassland 10 Marks

Q. 2. Study of ecosystem component 10 Marks

Q. 3. Estimation of air pollutants 10 Marks

Q. 4. Data analysis 10 Marks

Q. 5. Journal 10 Marks

Total Marks: 50

Practical-II

Q. 1. Determination of physical parameter in water 10 Marks

Q. 2. Estimation of chemical parameter in water 10 Marks

Q. 3. Analysis of water characteristics 10 Marks

Q. 4. Spotting 10 Marks

Q. 5. Viva-voce 10 Marks

Total Marks: 50

Total Marks assigned to Practical-I and Practical-II: 100

टिपः–	1. बी.ए. भाग–2 भूगोल, व गृहशास्त्र या विषयाच्या अभ्यासक्रमांसाठी सामाजिकशास्त्रे विद्याशाखांनी निश्चित केल्याप्रमाणे प्रश्नपत्रिकेचे स्वरूप राहील.	
	2. विज्ञान विद्याशाखेअंतर्गत पदवी अभ्यासक्रमांना प्रात्यक्षिक परीक्षा वार्षिक पदधती अनुसार घेण्यात येतील व पदवी अभ्यासक्रमांच्या द्वितीय आणी तृतीय वर्षाच्या प्रात्यक्षिक परीक्षा विद्यापीठामार्फत घेण्यात येतील.	
	3. शैक्षणिक वर्ष 2011–12 पासुन विज्ञान विद्याशाखेअंतर्गत सत्र पध्दतीनुसार पदवी अभ्यासक्रमांसाठी सर्व विषयाच्या प्रश्नपत्रिकेचे समान स्वरूप खालीलप्रमाणे निश्चित करण्यात आले. (Except Chemistry)	
	Nature of Question Paper	
Q.No.1	Multiple Choice based objective type (four options for each question be given)	8 Marks
Q.No. 2	Attempt any two of the following out of three	16 Marks
Q.No. 3	Shot notes (4 out of 6)	16 Marks
	Total	40 marks

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

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 – III & IV

Organic and Inorganic Chemistry (Paper – VI & VIII)

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**