

**B o t a n y**

**B. Sc. Part I (Pass Course Syllabus)**

Scheme

Min. Pass Marks : 54

Max. Marks- 150

Paper I: 3 Hrs. Duration Max. Marks 50

Paper II: 3 Hrs. Duration Max. Marks 50

Paper III: 3 Hrs. Duration Max. Marks 50

Practical Min. Marks: 18 4Hrs. Duration Max.Marks 50

Duration of examination of each theory paper- 3 hours

Duration of examination of practicals- 4 hours

Note :

1 There will be 5 questions in each paper. All questions are compulsory. Candidate has to answer all questions in the main answer book only.

2 Q. No. 1 (objective/ short answer type) will have 20 questions covering entire syllabus.

3 Each paper is divided into four units. There will be one question from each unit. These Q. No. 2 to 5 will have internal choice.

**Raj Rishi Bhartrihari Matsya University Alwar**

**Syllabus – Botany**

**B. Sc. Part I**

**Cell Biology Genetics and Plant Breeding**

**(2 Hrs. or 3 Periods / week)**

Duration- 3 Hours Max. Marks 50

**Unit-1**

Cell biology- Introduction to modern tools and techniques of cell biology (light microscopy and electron microscopy) structure and functions of different cell organelles of eukaryotic and prokaryotic cells (cell wall, plasma membrane, nucleus, mitochondria, chloroplast, ribosome, peroxisome, lysosome, golgi body etc.)

Study of chromosome, nucleosome model, Type of chromosomes, (sex chromosome, polytene, lambrush), chromosomal aberrations, deletion, duplication, translocation, inversion, aneuploidy and polyploidy.

**Unit-2**

Nucleic acid: DNA, RNA Structures and their functions, DNA replication (Involved enzymes, primer, okazaki fragments), Basic mechanism of transcription and translation. Extranuclear genome (mitochondrial, plastid DNA), plasmids,

Transposons.

Cell division : cell cycles, mitosis and meiosis; function of spindle apparatus, synaptonemal complex, chiasmata and crossing over.

**Unit-3**

Genetic inheritance: Mendel's law of inheritance and their exceptions allelic (complete dominance, Codominance, incomplete dominance), nonallelic interactions (complementary genes, epistasis and duplicate genes) linkage and crossing over. Elementary idea of chromosome mapping. Cytoplasmic inheritance –

shell coiling in snails, kappa particles in paramecium, multiple allelism, ABO blood groups in man.

Plant breeding : Introduction objectives and general methods (introduction acclimatization, selection, hybridization) of plant breeding. Hybrid vigour and inbreeding depression. Mutation and polyploidy in plant breeding, National and International agricultural research institutes. Methods of Breeding in self pollinated and cross pollinated crop plants, Green revolution.

**Suggested laboratory exercises:**

1. Demonstration of centrifuge machine, electrophoresis, simple microscope and compound microscope, laminar air flow.
2. Study of electron microphotographs of virus, bacteria and eukaryotic cells for comparative cellular organization.
3. Study of electron micrograph of eukaryotic cells for various cell organelle.
4. Study of cell structure from onion, hydrilla and spirogyra.
5. Study of cyclosis in stamina hairs of tradescantia sp.
6. Study of plastids for pigment distribution in lycopersicon and cassia and capsicum.
7. Study of different stages of mitosis and meiosis in root tip cells and flower buds respectively of onion.
8. Permanent slides/ photographs of different stages of mitosis and meiosis, sex chromosome, bar bodies.
9. To solve genetic problems based upon mendel's law of inheritance (monohybrid, dihybrid, back cross, test cross and all variations)
10. Hybridisation, emasculation, Bagging, tagging
11. Methods of vegetative propagation, budding, grafting, layering
12. Model preparation, field visits.

### Suggested Reading

1. Alberts B. Bray, D.J. Raff, M Roberts K and Wasson L.D. Molecular Biology of cell, Garland Publishing Co. Inc. New York (2001) .
2. Choudhary ,H.K. Elementary Principles of Plant Breeding, Oxford and IBM Publishing Co. New Delhi 1989.
3. Gupta P.K. Cytology Genetics, Evolution, and plant Breeding, Rastogi Publishing Meerut (2009).
4. Miglani G.S. Advanced Genetics, Narosa Publishing House New Delhi (2000).
5. Russel P.J. Genetics ,The Benjamins / Cummins Publishing Co inc USA (1998)
6. Shukla R.S. and Chandel P.S. Cytogenetics Evolution and plant Breeding S. Chand & Co Ltd New Delhi (2000).
7. Singh R.B. Text Book of Plant Breeding, Kalyani Publishers Ludhiana(1999)

### Paper II

#### Microbiology, Mycology and Plant Pathology

(Teaching Hours -15 Hours for each unit) (2 Hrs. or 3 periods/ Week)

#### Unit-1

**Microbiology** : Meaning and scope, History and development in the field of microbiology.

**Eubacteria** : general account, occurrence, morphology (structure, shapes) flagella, capsule, nutritional types, endospore, reproduction (binary fission, transformation, conjugation, transduction), economic and biological importance, Cyanobacteria, Oscillatoria and Nostoc- occurrence, morphology reproduction and importance.

Mycoplasma – occurrence, morphology reproduction and importance

### Unit-2

Virus- General characteristics and importance. structure of TMV and Pox virus, structure and multiplication of bacteriophage.

Fungi : General characters, occurrence thallus organization, reproduction, economic importance, classification of fungi (Alexopoulos and Ainsworth's).

Plant diseases- Biotic and abiotic diseases, important symptoms caused by fungi, bacteria, viruses and MLO (brights, mildews- downy and powdery, rusts, smuts, canker, mosaic, little leaf, galls etc).

### Unit-3

Brief account structure importance and life history and/or disease cycle and control of the following.

Albugo and white rust; Sclerospora and downy mildew /Green ear disease of Bajra; Aspergillus; Claviceps and Ergot; Peziza.

### Unit-4

Brief account; structure, importance and life history and/or disease cycle and control of the following.

Puccinia and rusts of wheat (Black, orange, yellow); Ustilago and loose smut of wheat and covered smut of barley; Agaricus; Alternaria and Early blight of potato.

#### Suggested Laboratory Exercises:

1. Study of bacteria using curd or any other suitable material. Gram's staining of bacteria.
2. Study of Oscillatoria and Nostoc.
3. Study of Mycoplasma, TMV, Poxvirus, Bacteriophage (photographs/3-D models.)
4. Study of symptoms of plant diseases- downy mildew of bajra/ Green ear of bajra, powdery mildew, mosaic of bhindi.
5. Study of specimen, -permanent slides and by making suitable temporary slides Albugo- White rust, Sclerospora- downy mildew, Green ear, Aspergillus, Claviceps- ergot, ustilago- loose smut of wheat, covered smut of barley, Agaricus, peziza and Alternaria -early blight of potato.
6. Media preparation potato dextrose agar, Nutrient agar .
7. Culture techniques of fungi and bacteria .
8. Field visits, Model preparation

## Suggested Books:

Alexopoulos C. J. and Mims C.W. Introductory Mycology, John Wiley and sons New York 2000.

Dube H.C. Fungi, Rastogi Publication Meerut 1989.

Sarabhai, R.C. and saxena R.C. A textbook of botany, Rastogi Publication, Meerut 1990.

Sharma O.P. Fungi Today and tomorrow, printers and publishers New Delhi 2000.

Vashishta, B.R. Botany for Degree Student- Fungi ,S. Chand & Co. New Delhi 2001.

Bilgrami, K.S. and Dube, H.C. A textbook of Modern Plant Pathology, Vikas Publications, New Delhi 2000.

Biswas, S.B. and Biswas, A.: An Introduction to Viruses, Vikas Publications, New Delhi 2000.

Clifton, A. An Introduction of Bacteria , McGraw Hill Co. Ltd. New York, 1985.

Mandahar ,C.L. Introduction of plants Virus, S. Chand and Co. New Delhi, 1978.

Pelczar, M.J. Jr Chan E.C.S. and Krieg ,N.R. Microbiology, McGraw Hill Edu. Pvt. Ltd. London 2001. Purohit, S.S. Microbiology Agro.

Bot. Publication Jodhpur 2002. Sharma, P.D. Microbiology and Pathology, Rastogi publication Meerut 2003.

Singh, V. and Srivastava, V. Introduction of Bacteria, Vikas Publication 1998.

James, G. Cappuccino and Natalie Sherman: Microbiology A laboratory Manual, (10 Ed) Benjamin Cummings 2013.

Aneja, K.R. Experiments in Microbiology Plant Pathology and Biotechnology, New Age International (P) Ltd Publishers New Delhi 2003.

Mehrotra, R.S. and Aggarwal, Ashok. Plant pathology, Tata Mc Graw Hill Education 2003.

## Paper III

## Algae Lichens and Bryophyta

(2 Hrs. or 3 periods/week )

(Teaching Hours -15 Hours for each unit)

## Unit-1

General characters, Classifications (Smith), Diverse Habitat, Range of Thallus structure, photosynthetic pigments and food reserves. Reproduction (Vegetative , Asexual , Sexual) Types of the life cycle, Economic importance.

## Unit-2

Type Studies-

**Cyanophyceae –Oscillatoria, Nostoc**

Chlorophyceae- Volvox, Chara

Xanthophyceae -Vaucheria

Phaeophyceae – Ectocarpus

Rhodophyceae- Polysiphonia

## Unit-3

General characters, Origin and evolution of bryophytes, Classification (Eichler), Habitat, Range of thallus structure, Reproduction (Vegetative and Sexual); Alternation of generations; Economic importance.

Type Studies-

Hepaticopsida – Riccia, Marchantia

## Unit-4

Type Studies-

Anthocerotopsida – Anthoceros

Bryopsida –Funaria

Lichens- General characters, habitat, structure, reproduction , economic and ecological importance of lichens.

**Suggested Laboratory Exercises:**

1. Study of classwork material by making suitable temporary slides and study of permanent slides of Volvox, Chara, Vaucheria, Ectocarpus, Polysiphonia.
2. Study of external morphology and preparation of suitable sections of vegetative/reproductive parts of Riccia, Marchantia, Anthoceros, Sphagnum.

**Suggested Readings :**

Bold, H.C. Alexopoulos, C.J. and Delevoryas, T. Morphology of plant and fungi, (4th Ed) Harper & Forul Co. New Work 1980.

Ghemawat, M.S, Kapoor J.N and Narayan H..S. A textbook of Algae, Ramesh Book Depot, Jaipur, 1976.

Gilbart, M. Smith. Cryptogamic Botany Vol I & II (2nd Ed) Tata McGraw Hill Publishing Co Ltd New Delhi 1985.

Kumar H.D. Introductory Phycology Affiliated East- West Press Ltd. New York 1988.

Puri P. Bryophytes Atmaram & sons Delhi Lucknow 1985.

Sarabhai R.C. and Saxena R.C. A text book of Botany, Vol I & II Ratan Prakashan Mand Meerut 1980.

Singh V. Pande P.C. and Jain D.K. A text book botany, Rastogi & Co Meerut 2001.

Vashita B.R. Botany for Degree Students (Algae, Bryophytes) S. Chand & co New Delhi 2002.



## Botany Practical Examination B.Sc. Part -I

## Skeleton Paper

MM 50 Time : 4 Hrs

S. No	Practical	Regular	Ex/NC
1(a)	Prepare the acetocarmine stained slide of the material "A" provided to you. Draw a well labelled diagram of any one stage of nuclear division. Identify it by giving reasons.	5	6
1(b)	Comment and solve the problem allotted to you along with the suitable reasons.	4	5
2	Make suitably stained glycerine- preparation of any one alga from the given mixture "B" Draw its labelled diagram and assign it to its systematic Position giving reasons.	5	6
3	Make suitable preparation of the reproductive structure of material "C" Draw labelled diagram , identify giving reasons.	5	6
4	Make suitable stained preparation of material 'C' (vegetative/reproductive) Draw diagram, Identify giving reason.	5	5

5	One Microbiology experiment for comment, or Gram Staining.	4	5
6	Comment upon spots (1-6)	12	12
7	Viva-Voce	5	5
8	Practical records +Field/ Lab Visits	5	-
	Total	50	50

Note- For NC spots may be 1-8

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