BOTANY
BSc Part I (Pass Course Syllabus)

Scheme

Min. Pass Marks : 36

Paper I	3 hrs. duration	Max. Marks: 200
Paper II	3 hrs. duration	Max. Marks: 50
Paper III	3 hrs. duration	Max. Marks: 50
Practical Min.Marks: 18	4 hrs, 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.

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RAJ RISHI BHARTRIHARI MATSYA UNIVERSITY, ALWAR

Syllabus-Botany

B.Sc.- Part-I

Cell Biology Genetics and Plant Breeding

(2 hrs or Three Periods/week)

Duration: 03 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, golgibody etc.)

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

Unit- 2

Techniques in cell Biology cell signalling and cell receptors. 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 spindal apparatus, synaptonimal complex, chiasmata and crossing over.

Unit- 3

Genetic inheritance Mendals law of inheritance and their exceptions: allelic (Complete dominance, co-dominance, incomplete dominance), nonalleleic 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.

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Unit-4

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 spp.
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 chromosomes, polytene chromosomes and salivary gland 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 Prepration, field visits.

Suggested Readings:-

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).

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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. U.S.A. (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) (2hrs/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.

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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 MLOs (blights, 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

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7. Culture techniques of fungi and bacteria.

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 text book of Botany, Rastogi Publication, Meerut, 1990.

Sharma, O.P.: Fungi, Today and Tomorrow Printers and Publishers, New Delhi, 2000.

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

Bilgrami, K.S. and Dube, H.C.: A text book 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.: Introduction of Bacteria, McGraw Hill Co. Ltd., New York, 1985.

Madahar, C.L.: Introduction of Plants Virus, S. Chand and Co., New Delhi, 1978.

Palzar 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. : Introduetion of Bacteria, Vikas Publication, 1998.

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

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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 McGraw-Hill Education, 2003.

Paper III
Algae, Lichens and Bryophyta
(2 hrs/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 Bryophtya. Classification (Eichler); Habitat, Range of thallus structure, Reproduction (Vegetative and Sexual); Alternation of generations; Economic importance.

Type Studies

Hepaticopida—*Riccia*, *Marchantia*

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Unit-4

Type Studies

Anthocerotopsida- *Anthoceros.*

Bryopsida- ***Funaria***

Lichens- General characters, habitat, Structure; reproduction and 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.*
3. Study of lichens.

Suggested Readings

Bold, H.C. Alexopoulous, C.J. and Delevoryas, T.: Morphology of Plant and Fungi (4th Ed.) Harper & Foul Co., New Work, 1980.

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

Gilbart, M.Smith: Crypogamic 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 BotanyVol I & II, Ratan Prakashan Mandir, Meerut, 1980.

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

Vashista, B.R.: Botany for Degree Students (Algae, Bryophytes) S. Chand & Co., New Delhi, 2002.

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BOTANY PRACTICAL EXAMINATION B.Sc PART-I

SKELETON PAPER

M.M. 50 **TIME: 4 Hours**

S.No.	Practical	Regular	ExNC
1(a)	Prepare the acetocarmine stained slide of the material "A" provided to you. Draw a well labelled diagram of anyone stage of nuclear division. Identify it giving reasons.	5	6
1(b)	Comment and solve the problem allotted to you along with suitale reasons.	4	5
2	Make suitably stained glycerine-preparation of any one alga from the given mixture "B" Draw its labelled diagram; 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 labelled diagram. Identify giving reasons.	5	5
5	One Microbiology experiment for comments. Or Gram staining.	4	5
6	Comment upon spots (1-6)	12	12
7	Viva-Voce	5	5
8	Pratical records + Visits Lab/ Models/ Project Reports	5	-
	TOTAL	50	50

Note: For NC spots may be 1-8.

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