RRBM University, Alwar, (Raj)

Botany

B. Sc. Part II (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	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 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.

Paper -1

Molecular Biology and Biotechnology

Unit -1

Watson and crick model of DNA , Chromatin Structure and gene expression, ,Preliminary account of DNA synthesis and repair, DNA Replication, Types of RNA, Genetic code.

Unit -2

Central dogma, Reverse transcriptase and its application, transcription in eukaryotes, RNA processing, capping , splicing and polyadenylation, Translation. Initiation, elongation and termination. Negative and positive control, attenuation and antitermination, structure of promoter gene.

Unit-3

Biotechnology : Functional definition, Concept of cellular totipotency, Basic aspects of plant tissue culture, basal medium, media preparation and aseptic culture technique, Differentiation morphogenesis, Micropropagation and synthetic seeds Protoplast- culture and somatic hybridization, anther culture and androgenic haploid. Embryo culture and application.

Unit-4

Recombinant DNA technology, techniques used in the technology, restriction enzymes vectors for gene amplification, application of biotechnology and Transgenic plants. Polymerase chain reaction, application of PCR technique, DNA fingerprinting and its use.

Suggested Books

1 Cell and Molecular Biology P.K. Gupta. .

2 Molecular Biology of the Gene. J.D. Watson et al .

3 Plant cell tissue and organ culture OL gamborg and GOE

Practical Exercises:

1 Aseptic culture technique

2 Media preparation

3 Explant culture shoot tip nodal segment

4 Callus culture

5 Protoplast isolation

6 Elementary knowledge of principles and uses of instruments in molecular biology and biotechnology laminar Air Flow Cabinet, Centrifuge Machine, Autoclave, Incubator , Spectrophotometer, pH meter, electrophoresis unit.

7. Quantitative DNA isolation.

8.PCR: DNA Amplification

Paper-II

Plant Physiology And Biochemistry
(2 Hrs or 3 periods/week)

Unit-1

Water : Structure, physico-chemical properties, importance to plant, concept of water potential, absorption and transport of water Ascent of sap, Transpiration, stomatal movement, factors affecting Transpiration, Guttation.

Unit- 2

Mineral Nutrition: Essential micro and macro nutrients, their uptake, hydroponics and nutrient requirement, deficiency and toxicity symptoms, Transport of organic substances. Mechanisms of phloem transport, factors regulating the translocations of nutrients.

Unit-3

Photosynthesis: Pigments, Photosynthetic apparatus, light reaction, photosystem I &II, Z scheme, photophosphorylation, C3 cycle, C4 Cycle and factors affecting the photosynthesis, Respiration: Aerobic and anaerobic respiration, RQ (Respiratory Quotient),Kerbs cycle, electron transport system, oxidative phosphorylation and Factors affecting the process, Fermentation.

Unit-4

Carbohydrates: Introduction, importance, nomenclature classification ,structure & function of mono, di and polysaccharides their properties linkages and glycoprotein.

Proteins; Amino acids structure,electrochemical properties, peptide bonds ,chemical bonds , nomenclature, structure and classification of proteins, physical and chemical properties.

Enzymes; structure, nomenclature & classification of enzymes, Characteristics of enzymes, mechanism of action, multi enzyme regulation of enzyme activity .

Lipids: importance of fatty acids (saturated and unsaturated) Alpha, beta oxidation, Brief introduction and application of secondary metabolites.

Unit -5

Phases of growth and development; seed dormancy, seed germination, plant movement,biological clock- their regulatory factors, photoperiodism & vernalisation; physiology and mechanism of growth , concept of florigen and phytochrome.Plant hormones: auxins, gibberellins, cytokinins, ethylene and ABA: diseases & physiological effects.

Experimental Exercises ;

1. To determine the osmotic potential of vacuolar sap by method

2. To study the permeability of plasma membrane using concentrations of organic solvents.

3. To study the effect of temperature on permeability of cell membrane.

4. To separate chloroplast pigments by solvent method.

5. To separate chloroplast pigments using chromatography.

6 To separate amino acids in a mixture by chromatography.

7. To prepare the standard curve of protein.

8. To demonstrate the tests for proteins in the samples.

9. To demonstrate the enzyme activity catalase,peroxidase, amylase.

10. To demonstrate the tests for different types of carbohydrates and lipids.

11.Bioassay of growth hormone (auxin, cytokinin, gibberellin)

12.Demonstration of the phenomenon of osmosis by use of an osmometer.

13.To demonstrate root pressure.

14.To demonstrate rate of transpiration by use of a potometer.

15.Photosynthesis by inverted funnel method, Molls experiment.

16.To demonstrate anaerobic and aerobic respiration.

17. RQ by Ganong's respirometer.

18.Measurment of growth using an auxanometer.

Paper III

Pteridophytes, Gymnosperms & palaeobotany

(2 Hrs. or 3 periods /Week)

(Teaching hours-15 hours for each unit)

Unit-1

General characters of pteridophytes, classification by smith & important characteristics of Psilopsida Lycopsida, Sphenopsida, Pteropsida, Stelar system in pteridophytes, Eusporangiate and Leptosporangiate development of sporangia Alternation of generation, Distribution ,structure and life history of Lycopodium Equisetum

Unit-2

Distribution, structure and life history of Selaginella Marselia and seed habit. Characteristics of seed plants. Differences between gymnosperms and

angiosperms, general characters, classification of (Andrew Bierhrost) and Economic importance of gymnosperms.

Unit-3

Systematic position, distribution, morphology of vegetative and reproductive parts, anatomy, reproduction and life cycle of following genera; pinus and Ephedra.

Unit-4

Fossilization; type of fossils, techniques of study of fossils, geological time scale, Applied aspects of paleobotany- use in coal and petroleum examples, primitive land plants ; Rhynia .

Fossil pteridophytes: Lepidodendron, calamites.

Fossil gymnosperm- Williamsonia.

Suggested Laboratory Exercises:

1. Study of external morphology, anatomy of vegetative and reproductive parts of lycopodium,Selaginella, Equisetum, marsilea.

2. Study of external morphology, anatomy of vegetative and reproductive parts of Cycas, Pinus and Ephedra.

3. Study of Fossils and slides of Fossils.

4. Preparation of charts of geological time scale and validity of members by students.

5. Field visits/ Lab visits .

Suggested Readings

Bold, H.C.: Alexopoulos, C.J. and Delevoryas, T. ,Morphology of plants and Fungi (4td ed) , Harper and Foul Co New York. 1980

Gifford EM and Foster AS Morphology and Evolution of Plants, W.H. Freeman S.C. Company New York 1988 Raven Evert R.F. and Eichhom, S.C. Biology of Plants (5thEd)

Freeman and Co Worth Publication New York, US 1999 OP Pteridophytes, Today and Tomorrow Publication 2000

Sarbhai R..C and Saxena R.C,. A text book of Botany, Publication Meerut 1990.

Sporne K.R., The Morphology of Gymnosperms B 1 Kolkata Delhi 2002

Vashista P.C. Pteridophytes, S. Chand & Co. New Delhi.

Wilson, N.S. and Rothman G.W. Paleobotany and Plants (2nded) Cambridge University Press UK 1993.

Botany Practical Examination
B. Sc. Part –II

Skeleton Paper

MM 50 Time- 4 Hrs

S.No	Practical	Regular	Ex/NC
1 (a)	Comment on the Tissue culture or Biotechnology technique.	5	5
1 (b)	Exercise based on molecular biology.	5	5
2	Perform the given physiological experiment and write the principle, procedure, results based on observations and precautions involved.	7	7
3	Perform the bio- chemical test of the given sample and discuss the observation giving reasons	3	3
4	Make a suitable preparation of material (vegetative/ reproductive part) Draw a labelled sketch, identify giving reasons. [Pteridophyta]	5	5
5	Make a suitable preparation of material (vegetative/reproductive part) Draw a labelled sketch. Identify giving reasons. [Gymnosperm]	10	15
6	Comment upon spots.	5	5
7	Viva -Voce	5	5
8	Practical record	5	-
	Total	50	50