B. Sc. III Medical (Botany) V & VI Sem Syllabus

SEMESTER-V

Paper – I Plant Physiology

Internal Assessment-05
Max. Marks – 45
Time– 3 Hrs.

Note: Five questions to be attempted in all, selecting two questions from each unit. Question No. 1 will be compulsory (short answer type). Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

UNIT-I

Plant-water Relations: Importance of water to plant life; physical properties of water; Imbibition, Diffusion, Osmosis and Plasmolysis; absorption and transport of water; transpiration-types, physiology of stomata, factors affecting transpiration, importance of transpiration.

Mineral Nutrition: Essential macro and micro elements and their role; mineral uptake; deficiency symptoms.

Transport of Organic Substances: Mechanism of phloem transport; source-sink relationship; factors affecting translocation.

UNIT-II

Photosynthesis: Significance; historical aspects; photosynthetic pigments; action spectra and enhancement effects; concept of two photosystems; Z-scheme; photo-phosphorylation; Calvin cycle; C4 pathway; CAM plants; photorespiration.

Respiration: ATP–the biological energy currency; aerobic and anaerobic respiration; Krebs cycle; electron transport mechanism (chemi-osmotic theory); redox -potential; oxidative phosphorylation; pentose phosphate pathway.

Seed dormancy; plant movements; the concept of photoperiodism; physiology of flowering; florigen concept; physiology of senescence; fruit ripening.

Suggseted Readings:

1. Dennis,D.T., Turpin, D.H., Lefebvre,D.D. and Layzell (eds.). 1997: Plant Metabolism (2nd Edition), Longman, Essex, England.
2. Galston, A.W. 1989: Life Processes in Plants, Scientific American Library, Springer-Verlag, New York, USA.
3. Hopkins, W.G., 1995: Introduction to Plant Physiology, John Wiley & Sons, Inc., New York, USA.
4. Mohr, H. and Schopfer, P. 1995: Plant Physiology. Springer-Verlag, Berlin Germany.
5. Salisbury, F.B. and Ross, C.W. 1986: Plant Physiology. CBS Publishers and Distributors, New Delhi.
6. Taiz, L. and Zeiger, E. 2003: Plant Physiology. Panima Publishing Corporation, New Delhi.

SEMESTER-V

Paper - II Ecology

Internal Assessment-05
Max. Marks – 45
Time– 3 Hrs.

Note: Five questions to be attempted in all, selecting two questions from each unit. Question No. 1 will be compulsory (short answer type). Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

UNIT-I

Introduction to Ecology: Definition; scope and importance; levels of organization.

Environment: Introduction; environmental factors- climatic (water, humidity, wind, light, temperature), edaphic (soil profile, physico-chemical properties), topographic and biotic factors (species interaction).

Adaptations of plants to water stress and salinity (morphological and anatomical features of hydrophytes, xerophytes and halophytes).

Population Ecology: Basic concept; characteristics; biotic potential, growth curves; ecotypes and ecads.

UNIT-II

Community Ecology: Concepts; characteristics (qualitative and quantitative-analytical and synthetic); methods of analysis; ecological succession.

Ecosystem: Structure (components) and functions (trophic levels, food chains, food webs, ecological pyramids and energy flow)

Biogeochemical Cycles: carbon and nitrogen; hydrological (water) cycle.

Phyto-geography: Phyto-geographical regions of India; vegetation types of India (forests).

Environmental Pollution: Sources, types and control of air and water pollution.

Global Change: Greenhouse effect and greenhouse gases; impacts of global warming; carbon trading.

Suggested Readings:

1. Odum, E.P. 1983: Basic Ecology, Saunders, Philadelphia.
2. Kormondy, E.J. 1996: Concepts of Ecology, Prantice-Hall of India Pvt. Ltd., New Delhi.
3. Mackenzie, A. et al. 1999: Instant Notes in Ecology, Viva Books Pvt. Ltd., New Delhi.

SEMESTER-VI

Paper – I Biochemistry and Plant Biotechnology

Internal Assessment-05
Max. Marks – 45
Time– 3 Hrs.

Note: Five questions to be attempted in all, selecting two questions from each unit. Question No. 1 will be compulsory (short answer type). Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

UNIT-I

Basics of Enzymology: Discovery and nomenclature; characteristics of enzymes; concept of holoenzyme, apoenzyme, coenzyme and co-factors; regulation of enzyme activity; mechanism of action.

Growth and development: Definitions; phases of growth and development; Plant hormones-auxins, gibberellins, cytokinins, abscissic acid and ethylene, history of their discovery, mechanism of action; photo-morphogenesis; phytochromes and their discovery, physiological role and mechanism of action.

Lipid metabolism: Structure and functions of lipids; fatty acid biosynthesis; B-oxidation; saturated and unsaturated fatty acids; storage and mobilization of fatty acids.

UNIT-II

Nitrogen metabolism: Biology of nitrogen fixation; importance of nitrate reductase and its regulation; ammonium assimilation.

Genetic engineering and Biotechnology: Tools and techniques of recombinant DNA technology; cloning vectors; genomic and cDNA library; transposable elements; aspects of plant tissue culture; cellular totipotency, differentiation and morphogenesis; biology of Agro-bacterium; vectors for gene delivery and marker genes.

Suggested Readings:

1. Bhojwani, S.S. 1990: Plant Tissue Culture Applications and Limitations. Elsevier Science Publishers, New York, USA.
2. Lea, P.J. and Leegood, R.C. 1999: Plant Biochemistry and Molecular Biology, John Wiley & Sons, Chichester, England.
3. Nelson, D.L. and Cox, M.M. 2005: Lehninger Principles of Biochemistry. 4th Edition. W.H. Freeman and Company, New York.
4. Old, R.W. and Primrose, S.B. 1989: Principles of Gene Manipulation, Blackwell Scientific Publications, Oxford, UK.
5. Palmer, T. and Bonner, P. 2008: Enzymes-Biochemistry, Biotechnology, Clinical Chemistry (2nd Edition). East West Press Pvt. Ltd., New Delhi.
6. Raghavan, V. 1986: Embryogenesis in Angiosperms: A Developmental and Experimental Study, Cambridge University Press, New York, USA.
7. Rawn, J.D. 2004: Biochemistry. Panima Publishing Corporation, New Delhi.

SEMESTER-VI

Paper – II Economic Botany

Internal Assessment-05
Max. Marks – 45
Time – 3 Hrs.

Note: Five questions to be attempted in all, selecting two questions from each unit. Question No. 1 will be compulsory (short answer type). Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

UNIT-I

Origin, distribution, botanical description, brief idea of cultivation and uses of the following:

Food plants- Cereals (Rice, Wheat and Maize).

Pulses- (Gram, Arhar and Pea).

Vegetables- (Potato, Tomato and Onion).

Fibers- Cotton, Jute and Flax.

Oils- Groundnut, Mustard and Coconut.

UNIT-II

Morphology of plant part used, brief idea of cultivation and uses of the following:

Spices- Coriander, Ferula, Ginger, Turmeric, Cloves.

Medicinal Plants- *Cinchona*, *Rauwolfia*, *Atropa*, *Opium*, *Cannabis*, Neem.

Botanical description and processing of:

Beverages- Tea and Coffee.

Rubber- *Hevea*.

Sugar- Sugarcane.

General account and sources of timber; energy plantations and bio-fuels.

Suggested Readings:

1. Kocchar, S.L. 1998: Economic Botany in Tropics, 2nd edition, MacMillan India Ltd., New Delhi.
2. Sambammurthy, A.V.S.S. And Subramanyam, N.S. 1989: A Textbook of Economic Botany, Wiley Eastern Ltd., New Delhi.
3. Sharma, O.P. 1996: Hills Economic Botany (Late Dr. A.F. Hill adapted by O.P. Sharma), Tata McGraw Hill Co. Ltd., New Delhi.
4. Simpson, B.B. and Conner-Ogorzaly, M. 1986: Economic Botany- Plants in our World, McGraw Hill, New York.

Paper-III Practicals : Plant physiology, Biochemistry, Biotechnology, Ecology, & Economic Botany.

Int. Assessment-10

Max. Marks - 90

Time- 6 hrs. (Two Sessions)

1. Devise an experiment to demonstrate the physiological process (as per the list). Perform it and show it to the examiners. 15

2. Comment on the physiological/Biochemistry experiment (Specimen/ set-up / Model / Chart). 10

3. Test for carbohydrates / Proteins / Fats / Peroxidase activity. 5

4. Ecological experiment/Ecological Specimens A & B (as per the list) 10

5. Identify and Classify spots 1, 2, 3, and 4 from the point of view of economic importance and morphology of the plant part used. 20

6. Applied Botany experiment (as per the list). 8

7. Note Book, Collection and field report. 6 + 6 = 12

8. Viva-voce. 10

List of Practicals

A. Physiology/Biochemistry

1. Demonstration of Imbibition by plaster of Paris method.
2. Demonstration of Osmosis by potato osmoscope method.
3. Demonstration of Plasmolysis and Deplasmolysis
4. To study the Structure of stomata (Dicot & Monocot)
5. To study the Osmotic pressure of onion scale/ Rhoeo leaf peel by plasmolytic method.
6. Comparison of Stomatal and Cuticular Transpiration by four leaf /Cobalt chloride method.
7. Demonstration of transpiration by Ganong's/ Farmer's potometer.
8. To separate of photosynthetic pigments by thin layer/paper chromatography.
9. Demonstration of Ascent of sap/Transpiration pull.
10. To study the rate of photosynthesis under varying CO_2 concentration using Wilmott's bubbler.
11. To study the effect of light intensity on oxygen evolution during photosynthesis using Wilmott's bubbler.
12. Demonstration of aerobic respiration.
13. Demonstration of anaerobic respiration.
14. To study the evolution of heat during respiration
15. Demonstration of Manometric determination of R. Q.
16. Demonstration of phototropism, geotropism and hydrotropism.
17. Determination of peroxidase activity.
18. Simple tests for the detection of Carbohydrates(Monosaccharides, Disaccharides and Starch); Proteins and Fats.

B. Ecology

1. Determination of pH of soil and water samples by using Universal Indicator.
2. Study of physical properties of soil-soil density, water holding capacity etc.
3. Study of community structure by quadrat / line transact method.
4. Determination of density, abundance and frequency of species by quadrat method.
5. Morphological and anatomical features of hydrophytes, xerophytes and parasites in relation to their habitats.
6. To prepare a report on local visit to an industry to identify the source and types of Pollutants.

B. Utilization of plants & Applied Botany

1. Study of plant parts / products from the point of view of economic importance (as per theory syllabus).
2. To prepare any one of the tissue culture medium.
3. To prepare the slants and Petri plates for plant tissue culture.
4. Study of techniques of sterilization, culturing and sub-culturing of cell, tissues and organs.
5. Demonstration of anther culture, protoplast isolation and culture using suitable models / charts / photographs etc.
6. Brief introduction to the components and working of the instruments (oven, autoclave, incubator, centrifuge, laminar air flow and spectrophotometer)