

Syllabus for the S.Y.B.Sc. Program: B.Sc.Course : BOTANY

Course Code	SEM III- Title	Credits
USBO302	<u>FORM AND FUNCTION II</u>	2 Credits (45 lectures)
<p><u>Unit II : Cell Biology</u></p> <ul style="list-style-type: none"> • Ultra Structure and functions of the following cell organelles: <ul style="list-style-type: none"> ○ Mitochondrion(membranes, cristae, F1 particles and matrix) ○ Peroxisomes and Glyoxysomes ○ Ribosomes (prokaryotic, eukaryotic and subunits) • Cell Division and its significance <ul style="list-style-type: none"> ○ Cell Cycle, structure of Interphase Nucleus(nuclear envelop, chromatin network, nucleolus and nucleoplasm) ○ Mitosis & Meiosis ○ Differences between Mitosis and Meiosis • Nucleic Acids: Types, structure and functions of DNA and RNA 		15 Lectures
<p><u>Unit III : Cytogenetics</u></p> <ul style="list-style-type: none"> • Variation in Chromosome structure (Chromosomal Aberrations) Definition, Origin, Cytological and Genetic Effects of the following: Deletions, Duplications, Inversions and Translocations. • Sex determination, Sex linked, sex influenced and sex limited traits : Sex determination- Chromosomal Methods: heterogametic males and heterogametic females. Sex determination in monoecious and dioecious plants. Genic Balance Theory of sex determination in <i>Drosophila</i>, Lyon's Hypothesis of X chromosome inactivation. Sex linked- eye colour in <i>Drosophila</i>, Haemophilia, colour blindness Sex influenced- baldness in man • Extranuclear Genetics Organelle heredity- <ul style="list-style-type: none"> ○ Chloroplast determines heredity - Plastid transmission in plants, Streptomycin resistance in <i>Chlamydomonas</i>. ○ Male sterility in maize 		15 Lectures
<p><u>Unit III : Molecular Biology</u></p> <ul style="list-style-type: none"> • DNA replication : Modes of Replication, Messelson and Stahl Experiment, DNA replication in prokaryotes and eukaryotes- enzymes involved and molecular mechanism of replication. • Protein Synthesis: <ul style="list-style-type: none"> ○ Central dogma of Protein synthesis ○ Transcription in prokaryotes and eukaryotes: promoter sites, initiation, elongation and termination. ○ RNA processing: Adenylation & Capping. 		15 Lectures

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Course Code	SEM IV-Title	Credits
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USBO402	<u>FORM AND FUNCTION II</u>	2 Credits (45 lectures)
<p><u>Unit I : Anatomy</u></p> <ul style="list-style-type: none"> • Normal Secondary Growth in Dicotyledonous stem and root. • Growth rings, periderm, lenticels, tyloses, heart wood and sap wood. • Mechanical Tissue system <ul style="list-style-type: none"> ○ Tissues providing mechanical strength and support and their disposition ○ I-girders in aerial and underground organs • Types of Vascular Bundles. 		15 Lectures
<p><u>Unit II : Plant Physiology and Plant Biochemistry</u></p> <ul style="list-style-type: none"> • Respiration: Aerobic: Glycolysis, TCA Cycle, ETS & Energetic of respiration; Anaerobic respiration. • Photorespiration • Photoperiodism: Phytochrome Response and Vernalization with reference to flowering in higher plants, Physico-chemical properties of phytochrome, Pr-Pfr interconversion, role of phytochrome in flowering of SDPs and LDPs; • Vernalization mechanisms and applications. 		15 Lectures
<p><u>Unit III : Ecology and Environmental Botany</u></p> <ul style="list-style-type: none"> • Biogeochemical Cycles- Carbon, Nitrogen and Water. • Ecological factors: Concept of environmental factors. Soil as an edaphic factor, Soil composition, types of soil, soil formation, soil profile. • Community ecology- Characters of community - Quantitative characters and qualitative characters 		15 Lectures

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Semester III USBOP3		Cr
PRACTICAL Paper II – FORM AND FUNCTION- II		1
Cell Biology		
1	Study of the ultra-structure of cell organelles prescribed for theory from Photomicrographs	
2	Estimation of DNA from plant material (one Std & one Unknown, No Std Graph)	
3	Estimation of RNA from plant material (one Std & one Unknown, No Std Graph)	
Cytogenetics		
4	Study of inheritance pattern with reference to Plastid Inheritance	
5	Study of cytological consequences of chromosomal aberrations (Laggards, Chromosomal Bridge, Ring chromosome, Chromosomal ring) from permanent slides or photomicrographs.	
6	Study of mitosis and meiosis from suitable plant material	
Molecular Biology		
7	DNA sequencing- Sanger's method	
8	Determining the sequence of amino acids in the protein molecule synthesised from the given m-RNA strand (prokaryotic and eukaryotic)	

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SEMESTER IV USBOT P4 PRACTICALS Paper II – FORM AND FUNCTION- II	Cr 1
Anatomy	
1 Study of normal secondary growth in the stem and root of a Dicotyledonous plant	
2 Types of mechanical tissues, mechanical tissue system in aerial, underground organs.	
3 Study of conducting tissues- Xylem and phloem elements in Gymnosperms and Angiosperms as seen in LS and through maceration technique.	
4 Study of different types of vascular bundles.	
5 Growth rings, periderm, lenticels, tyloses, heart wood and sap wood	
Plant Physiology and Plant Biochemistry	
6 Q_{10} - germinating seeds using Phenol red indicator	
7 NR activity – <i>in-vivo</i>	
8 Estimation of proteins by Lowry's method (Prepare standard graph).	
Ecology and Environmental Botany	
9 Study of the working of the following Ecological Instruments- Soil thermometer, Soil testing kit, Soil pH, Wind anemometer.	
10 Mechanical analysis of soil by the sieve method & pH of soil.	
11 Quantitative estimation of organic matter of the soil by Walkley and Blacks Rapid titration method.	
12 Study of vegetation by the list quadrat method	

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S.Y.B.Sc. BOTANY PRACTICAL SKELETON PAPER SEMESTER - III
TIME - 3 hours PAPER – II Total Marks – 50

Q.1. Make a squash/ smear preparation of specimen 'A'. Draw and comment on your observations and show the slides to examiners. (10)

Q.2. To estimate DNA/ RNA from the given sample 'B'. (10)

Q.3. Determine the sequence of bases in a DNA strand by Sanger's method from the given data 'C'

OR

Determine the sequence of amino acids in the polypeptide synthesized from the given m-RNAstrand 'C' (10)

Q.4. Identify and describe the specimen/ photograph - D, E and F (15)

Q.5. Journal/Field Report. (05)

KEY :

- A. – Mitosis/ Meiosis
- B. Germinating seeds/Onion
- C. DNA seq/AA seq.
- D. Cell organelles
- E. Plastid inheritance
- F. Chromosomal aberrations

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S.Y.B.Sc. BOTANY PRACTICAL SKELETON PAPER SEMESTER - IV
TIME - 2 hours 15 min PAPER – II Total Marks – 50

- Q.1. a). Make a temporary stained preparation of T.S. of specimen ‘A’ and comment on the secondary growth/ mechanical tissue system/ Macerate the given material ‘A’ and describe the conducting tissue seen. (10)
- Q.2. Perform the Physiological experiment ‘B’ allotted to you. (13)
- Q.3. Perform the Ecological experiment ‘C’ allotted to you. (13)
- Q.4. Identify and describe the specimen/ slide/ photograph - ‘D’ ‘E’ and ‘F’ . (06)
- Q.5. Viva - Voce. (05)

KEY:

A. – Dicot stem/ dicot root / Mechanical Tissue (*Coleus stem, Typha leaf, Maize stem and Maize root /Annona / Magnolia* for maceration).

B. – Q₁₀ - germinating seeds using Phenol red indicator
NR activity – *in-vivo*
Estimation of proteins by Lowry's method

C- Mechanical analysis of soil by the sieve method & pH of soil
Estimation of organic matter of the soil
Study of vegetation by the list quadrat method

D - Vascular bundles

E. – Growth rings, periderm, lenticels, tyloses, heart wood and sap wood

F. – Ecological Instrument