

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

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

Course Code	SEM IV-Title	Credits
-------------	--------------	---------

--	--

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

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

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

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)	

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

SEMESTER IV USBOT P4 PRACTICALS Paper II – FORM AND FUNCTION- II	Cr 1
Anatomy <ol style="list-style-type: none">1 Study of normal secondary growth in the stem and root of a Dicotyledonous plant2 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 <ol style="list-style-type: none">6 Q_{10} - germinating seeds using Phenol red indicator7 NR activity – <i>in-vivo</i>8 Estimation of proteins by Lowry's method (Prepare standard graph).	
Ecology and Environmental Botany <ol style="list-style-type: none">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	

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

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

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

UNIVERSITY OF MUMBAI

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