SARDAR PATEL UNIVERSITY
Programme: B. Sc. (BOTANY)
Semester: IV
Paper Code: US04CBOT21 (T)
Title of Paper: ARCHEGONIATES, ECONOMIC AND NUTRACEUTICAL BOTANY
Total Credit: 4 (Four Lectures per week)
(Total Marks 100, Internal-30 marks, External 70-marks)
Syllabus with effect from: June 2019

	Paper Code: US04CBOT21 (T)
Unit	**Title of Paper: ARCHEGONIATES, ECONOMIC AND NUTRACEUTICAL BOTANY**
1	**Archegoniates**: Introduction to Archegoniates: Unifying features of archegoniates; Transition to land habit; Alternation of generations. **Bryophytes:** General characteristics; Adaptations to land habit; Classification; Range of thallus organization. Type Studies- Classification of Bryophytes (up to family), morphology, anatomy and reproduction of ***Marchantia*****,** ***Pellia*****,** ***Anthoceros*****,** and ***Funaria***. Ecological and economic importance of bryophytes with special reference to Sphagnum
2	**Pteridophytes**: General characteristics; Classification; Early land plants -Rhynia. Type Studies- Classification of Pteridophytes (up to family), morphology, anatomy and reproduction of ***Psilotum, Selaginella, Marsilea*** (Developmental details not to be included). Apogamy, and Apospory, Heterospory and Seed habit, Telome theory, Stelar evolution. **Gymnosperms**: General characteristics, Type study-classification of Gymnosperms (up to family), morphology, anatomy and reproduction of ***Pinus*** and ***Gnetum*** (Developmental details not to be included). Ecological and economic importance.

	Paper Code: US04CBOT21(T) **contd….**
Unit	**Title of Paper: ARCHEGONIATES**, **ECONOMIC AND NUTRACEUTICAL BOTANY**
3	**Economic Botany**: Major crops: Introduction with their distribution, botanical name, family, parts used and economic importance of followings: **Cereals**: Wheat and Rice. **Legumes**: Chick pea, Pigeon pea and fodder legumes. **Sources of sugars and starches**: potato, sugarcane. **Spices**: fennel, saffron, clove, and black pepper. **Beverages**: Tea, Coffee. **Sources of oils and fats**: Groundnut, Coconut, Linseed, Soybean, Mustard. **Natural Rubber:** *Hevea sp.* **Drug-yielding plants:** *Cinchona*, *Digitalis*, *Papaver* and *Cannabis*. **Timber plants**: *Teak* and *Pine*. **Fibers**: Cotton, Coir and Jute. **Essential oil** yielding plants: *Rosa*, Vetiveria, *Santalum* and *Eucalyptus*
4	**Nutraceuticals:** Bridging the gap between food and drug. Brief idea about some Nutraceutical rich supplements e.g. Bee pollen, Caffeine, Green tea, Lecithin, Mushroom extract, Chlorophyll, Kelp and Spirulina. Introduction to Nutraceuticals as Science: Historical perspective, classification, scope & future prospects. **Applied aspects of the Nutraceutical Science**. Sources of Nutraceuticals. Properties, structure and functions of various Nutraceuticals: Glucosamine, Octacosanol, Lycopene, Carnitine, Melatonin and Ornithine alpha ketoglutarate and omega fatty acids. Use of grape products, flaxseed oil as Nutraceuticals.

Basic Text & Reference Books:

- College Botany Vol 2 : Gangulee and Kar
- Pharmacognosy : Kokate ,Purohit and Gokhle
- Text Book of Pteridophyta by B. R. Vasistha and N. S. Parihar
- Text book of Gymnosperm by P.C. Vasistha
- Economic botany in the tropics by S.L.Kochhar
- Handbook of Nutraceuticals and Functional foods by Robert E.C.Wildman

SARDAR PATEL UNIVERSITY
Programme: B. Sc. (BOTANY)
Semester: IV
Paper Code: US04CBOT22 (T)
Title of Paper: PLANT ANATOMY, EMBRYOLOGY, TISSUE CULTURE AND BASIC MOLECULAR BIOLOGY
Total Credit: 4 (Four Lectures per week)
(Total Marks 100, Internal-30 marks, External 70-marks)
Syllabus with effect from: June 2019

	Paper Code: US04CBOT22 (T)
Unit	**Title of Paper: PLANT ANATOMY, EMBRYOLOGY, TISSUE CULTURE AND BASIC MOLECULAR BIOLOGY**
1	**Plant Anatomy:** Structure of epidermal cells; Structure, function and types of Stomata. Structure, distribution, types and function of Laticifers. Structure, distribution, functions and ecology of Nectaries. Structure and activity of Vascular Cambium. Structure and function of Periderm. Secondary growth of stem of *Leptadenia* and *Boerhaavia.*
2	**Plant Embryology:** Introduction, History (contributions of G. B. Amici, W. Hofmeister, E. Strasburger, S. G. Nawaschin, P. Maheshwari, B. M. Johri, W.A. Jensen, J. Heslop Harrison) and scope. Induction of flowering; flower as a modified determinate shoot. Structure of Microsporangium and Megasporangium Structure and development of male and female gametophyte Pollination: Self and cross pollination, Pollination in Commelina, Sunflower and Fig. Double fertilization. Endosperm.
3	**Plant Biotechnology** Scope and importance of Biotechnology Application of Biotechnology in medicine, agriculture and industry Biotechnology in biodiversity conservation. **Plant Tissue culture :** Definition, principle of totipotency of cell Laboratory and Aseptic conditions, equipments. General process of Tissue culture Protoplast culture

	Paper Code: US04CBOT22 (T) contd……
Unit	**Title of Paper: PLANT ANATOMY, EMBRYOLOGY, TISSUE CULTURE AND BASIC MOLECULAR BIOLOGY**
4	**Basic Molecular Biology:** **Nucleic acids:** Historical perspective. DNA as the carrier of genetic information (Griffith's, Hershey & Chase, Avery, McLeod & McCarty, Fraenkel Conrat's experiment). **DNA**: Structure of DNA: Miescher to Watson and Crick- historic perspective, Salient features of double helix structure of DNA, Types of DNA, Types of genetic material, denaturation andrenaturation, cot curves; Organization of DNA in Prokaryotes, Viruses, and Eukaryotes. Organelle DNA: mitochondria and chloroplast DNA. **RNA**: Types and Structure of RNA. A brief introduction to Central dogma of molecular biology.

Basic Text & Reference Books:

- Plant anatomy: A. Fahn
- College Botany Vol 1: Gangulee, Das and Dutta
- Plant tissue culture and biotechnology: Kavi Kishore P.B.
- Genetics: P.S. Verma and Agarwal
- Text book of Env. Biotechnology: P.K.Mahapatra

SARDAR PATEL UNIVERSITY
Programme: B. Sc. (BOTANY)
Semester: IV
Paper Code: US04CBOT23 (P)
(Practical paper based on US04CBOT21)
Title of Paper: Botany Practical
Total credit-2 (four lectures per week)
(Total Marks-50, External-50 marks)
Syllabus with effect from: June 2019

No.	**Paper Code: US04CBOT22 (P)** AIM
1	To study *Marchantia.* (Morphology of thallus, whole mount of rhizoids & Scales, V. S. of thallus through Gemma cup, whole mount of Gemmae, V. S. of Antheridiophore, V. S. of Archegoniophore, L. S. of Sporophyte through permanent slides).
2	To study *Pellia* (Morphology of thallus, V. S. of thallus, V. S. of thallus passig through reproductive structures, L. S. sporophyte through Permanent slides).
3	To study *Anthoceros*. (Morphology of thallus, dissection of sporophyte (to show stomata, spores, pseudoelaters, columella) (temporary slide), V. S. of thallus (permanent slide)).
4	To study *Funaria*. (Morphology, whole mount of leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, longitudinal section of capsule and protonema)
5	To study *Psilotum.* (Study of specimen, transverse section of synangium through permanent slide).
6	To study *Selaginella.* (Morphology, whole mount of leaf with ligule, transverse section of stem, whole mount of strobilus, whole mount of microsporophyll and megasporophyll (temporary slides), longitudinal section of strobilus (permanent slide).
7	Study of life history of *Marsilea* through permanent slides.
8	To study *Pinus*. (Morphology (long and dwarf shoots, whole mount of dwarf shoot, male and female cones), transverse section of Needle, transverse section of stem, longitudinal section of / transverse section of male cone, whole mount of microsporophyll, whole mount of Microspores).
9	To study *Gnetum*. (Morphology (stem, male & female cones), transverse section of stem, vertical section of ovule (permanent slide)).

No.	**Paper Code: US04CBOT23 (P) contd…..** AIM
10	To study economic important plants (part1). 1. Cereals: Wheat (habit sketch, L. S/T.S. grain, starch grains, micro- chemical tests), Rice (habit sketch, study of paddy and grain, starch grains, micro-chemical tests). 2. Legumes: Soybean, Groundnut, (habit, fruit, seed structure, microchemical tests). 3. Sources of sugars and starches: Sugarcane (habit sketch; cane juice- micro-chemical tests), Potato (habit sketch, tuber morphology, T.S. tuber to show localization of starch grains, w.m. starch grains, micro-chemical tests.
11	To study economic important plants (part2). 4. Spices: Black pepper, Fennel and Clove (habit and sections). 5. Beverages: Tea (plant specimen, tea leaves), Coffee (plant specimen, beans). 6. Sources of oils and fats: Coconut- T.S. nut, Mustard–plant specimen, seeds; tests for fats in crushed seeds. 7. Essential oil-yielding plants: Habit sketch of Rosa, Vetiveria, Santalum and Eucalyptus (specimens/photographs).
12	To study economic important plants (part3). 8. Rubber: *Hevea sp.* specimen, photograph/model of tapping, samples of rubber products. 9. Drug-yielding plants: Specimens of Digitalis, Papaver and Cannabis. Tobacco: specimen and products of Tobacco. 10. Woods: *Tectona*, *Pinus*: Specimen, Section of young stem (Photograph). 11. Fiber-yielding plants: Cotton (specimen, whole mount of seed to show lint and fuzz; Whole mount of fiber and test for cellulose, Jute (specimen, transverse section of stem, test for lignin on transverse section of stem and fiber).
13	Botanical excursion

Title of Paper: Botany Practical

Total credit-2 (four lectures per week) (Total Marks-50, External-50 marks)

Syllabus with effect from: June 2019

No.	AIM **Paper Code: US04CBOT24 (P)**
1	Study of Epidermal system: (types of epidermis; types of trichomes-through permanent slides/charts/specimen/micrographs).
2	Study the types of stomata through peeling and imprints.
3	Study of laticifers in Papaya, *Euphorbia* and *Calotropis*.
4	Study of Cyathial nectary using free hand sectioning.
5	Study of vascular cambium and phloem tissue in T.S. (free hand sectioning).
6	Study of secondary tissues in the stem of *Leptadenia* and *Boerhaavia* (free hand sectioning).
7	To study the structure of Anther. (Wall and its ontogeny; Tapetum (amoeboid and glandular); MMC, spore tetrads, uninucleate, bicelled and dehisced anther stages through slides/micrographs, male germ unit (MGU) through photographs and schematic representation).
8	To study the Pollen grains. (Fresh and acetolyzed, showing ornamentation and aperture, psuedomonads, polyads, pollinia ultrastructure of pollen wall through slides/photographs/fresh material/ micrograph).
9	To Study of Pollen viability: (Tetrazolium test, Germination test: Calculation of percentage germination in different media using hanging drop method).
10	To study the structure and types of Ovule. (Types-anatropous, orthotropous, amphitropous/campylotropous, circinotropous, unitegmic, bitegmic; Tenuinucellate and crassinucellate; Special structures: Endothelium, obturator, hypostase, caruncle and aril through permanent slides/specimens/photographs).
11	To study the Female gametophyte. (ultrastructure of mature egg apparatus, Types through permanent slides/ photographs).
12	To dissect out embryo from suitable materials.
13	Histochemical localization of Tannin, Gum, Sugar, Mucilage, Starch, Lipids, Cellulose and Proteins.
14	Preparation of LB medium and raising E. Coli.
15	DNA isolation from cauliflower head.
16	To study the steps for Preparation of MS medium.
17	To study the steps for Isolation of protoplasts.