PHARMACOGNOSY

1. Introductory Pharmacognosy

Historical development, modern concept and scope of Pharmacognosy. The significance of Pharmacognosy in various systems of medicine practiced in India *viz:* Ayurveda, Unani, Homeopathic and Siddha.

2. Classification of crude drugs

Based on alphabetical, morphological, pharmacological, chemical, taxonomical and chemotaxonomic methods: organized and unorganized drugs: official and unofficial drugs. Plants, animals and minerals: marine products: plant tissue culture.

3. Factors influencing quality of crude drugs

Exogenous factors: temperature, rainfall, daylight, altitude and soil. Endogenous factors: Mutation, polyploidy, & hybridization in medicinal plants. Production factors including collection, drying, storage and transport methods.

Study of morphological and histological characters of crude drugs, Ergastic cell inclusions, anatomical structures of both monocot and dicot stems, leaves and roots: barks, fruits and seeds.

4. Techniques in microscopy

Details of mountants, clearing agents, chemomicroscopic (microchemical) reagents.

5. Introduction to phytoconstituents

Definition, classification, chemical tests and pharmaceutical importance of: carbohydrates and their derivatives, fats and proteins, alkaloids, glycosides, flavonoids, steroids, saponins, tannins, resins, lipids and volatile oils.

Evidence Based Pharmacy Academy

6. Principles of plant classification

Diagnostic features and medicinal significance of important plants with special reference to:

Algae: Rhodophyceae (Agar, Alginic acid, Diatoms).

Fungi: Ergot, Yeast and penicillium.

Gymnosperm: Pinaceae (Turpentine, Colophony), Gnetaceae (Ephedra).

Angiosperm: Apocynaceae, Asteraceae, Lamiaceae, Rubiaceae, Rutaceae, Solanaceae, Scrophulariaceae, Leguminosae, Papaveraceae, Acanthaceae and Apiaceae.

Pteridophytes: Male fern.

7. Pharmaceutical aids

Biological sources, chemical constituents, adulterants and uses of: Starches, acacia gum, tragacanth, sterculia, guar gum, pectin, arachis oil, castor oil, sesame oil, cottonseed oil, olive oil, cotton, silk, wool, regenerated fibers, asbestos, kaolin, prepared chalk, kieselguhr.

8. Animal products

Biological sources, chemical constituents, adulterants and uses of: Shellac, cochineal, cantharides, woolfat, lard, beeswax, honey, musk, lanolin, gelatin.

9. Plant products

Introduction to plant bitters, sweeteners, nutraceuticals, cosmeceuticals and photosensitizing agents.

10. Toxic drugs

Study of allergens, hallucinogens, narcotics.

11. Enzymes

Biological sources, preparation, characters, and uses of: diastase, papain bromelain, ficin, yeast, pancreatin, urokinase, pepsin, trypsin, penicillinase, hyaluronidase and streptokinase.

12. Natural pesticides and insecticides

Introduction to herbicides, fungicides, fumigants and rodenticides tobacco, pyrethrum, & neem.

13. Adulteration and evaluation of crude drugs

Different methods of adulteration: Evaluation of drugs by organoleptic, microscopic, physical, chemical and biological methods. Deterioration of herbal drugs by insects.

14. Quantitative microscopy

Definition and determination of stomatal index, stomatal number, palisade ratio, vein islet number, vein termination number, lycopodium spore method. Micrometers and measurement of microscopic characters.

15. Biogenetic pathways

Formation of primary and secondary metabolites. Study of Calvin cycle, TCA cycle, Shikimic acid pathway, Embden-Mayerhoff pathway, acetate hypothesis, isoprenoid pathway. Biosynthesis of carbohydrates, lipids and volatile oils.

16. Carbohydrates & lipids

Biological sources, salient morphological features, chemical constituents, and uses of: Plantago, bael, chaulmoogra oil, neem oil, shark liver oil, cod liver oil, guggul lipids.

17. Tannins

Biological sources, morphology, chemical constituents, chemical test and uses of: Pale catechu, black catechu, nutgalls, *Terminalia belerica, Terminalia chebula, Terminalia arjuna.*

18. Volatile oils

Biological sources, morphology, chemical constituents, adulterants and uses of: Black pepper, turpentine, mentha, coriander, cardamom, cinnamon, cassia, lemon peel, orange peel, lemongrass, citronella, cumin, caraway, dill, spearmint, clove, anise, star anise, fennel, nutmeg, eucalyptus, chenopodium, ajowan, sandalwood.

19. Resinous drugs

Classification, formation, sources, chemical constituents, identification test, adulterants and uses of: benzoin, Peru balsam, tolu balsam, colophony, myrrh, asafoetida, jalap, colocynth, ginger, turmeric, capsicum, cannabis, podophyllum.

20. Glycosides

Nature and classification. Biological sources, morphology, chemical constituents, adulterants and uses of: Digitalis, strophanthus, squill, thevetia, oleander, cascara, aloe, rhubarb, senna, quassia, dioscorea, quillaia, glycyrrhiza, ginseng, gentian, wild cherry, withania, bitter almond. Biosynthesis of cardiac and anthraquinone glycosides.

21. Alkaloids

Nature, classification, biological sources, morphology, chemical constituents, adulterants and uses of: Areca nut, belladonna, hyoscymous, stramonium, duboisea, coca, coffee, tea, cinchona, opium, ipecac, nux vomica, ergot, rauwolfia, vinca, kurchi, ephedra, colchicum, vasaca, pilocarpus, aconite, *Solanum xanthocarpum.* Biosynthesis of tropane, cinchona and opium alkaloids.

22. Extraction and Isolation Techniques

General methods used for the extraction, isolation and identification of alkaloids, lipids, glycosides, flavonoids, saponins, volatile oils and resins. Application of column, paper and thin layer chromatographic techniques, for the isolation of phytopharmaceuticals.

23. Phytopharmaceuticals

Isolation, identification and estimation of: caffeine, eugenol, digoxin, piperine, tannic acid, diosgenin, hesperidin, berberine, calcium sennosides, rutin, glycyrrhizin, menthol, ephedrine, quinine, andrographolides and guggul lipids.

24. Quality control and Standardization of herbal drugs

Quality control of herbal drugs as per WHO, AYUSH and Pharmacopoeial guidelines- Extractive values, ash values, chromatographic techniques (TLC, HPTLC and HPLC) for determination of chromatographic markers. Determination of heavy metals, insecticides, pesticides and microbial load in herbal preparations.

25. Herbal formulations

Principals involved in Ayurveda, Sidha, Unani, Chinese and Homeopathic systems of medicines. Preparation of Ayurvedic formulations like aristas, asava, ghutika, tailia, churna, avaleha, ghrita and bhasmas: Unani formulations like majooms, Safoofs. Determination of alcohol contents in arishtas & asavas.

26. Worldwide trade of crude drugs and volatile oils

Study of drugs having high commercial value and their regulations pertaining to trade.

27. Herbal cosmetics

Importance of herbals as shampoos (soapnut), conditioners and hair darkeners, (amla,

henna, hibiscus, tea), skin care (aloe, turmeric, lemon peel, vetiver).

28. Traditional herbal drugs

Common names, sources, morphology, active constituents and uses (traditional, folklore), pharmacological and clinical uses of: *punarnava (Boerhaviadiffusa),* shankhpushpi (Convolvulus *microphylla),* lehsun *(Allium sativum),* guggul *(Commiphora mukul),* kalmegh *(Andrographis peniculata),* tulsi *(Ocimum sanctum),* valerian *(Valerian officinalis),* artemisia *(Artemisia annua),* chirata *(Swertia chirata),* ashoka *(Saraca indica).*

29. Plants based industries and research institutes in India

Knowledge about the herbal products being manufactured by premier herbal industries and thrust area of the institutes involved in plant research.

30. Patents

Indian and International patent laws, proposed amendments as applicable to herbal/natural products and processes: Intellectual Property Rights with special reference to phytoconstituents.

31. Ayurvedic system of medicine

Theory, basic concept, diagnosis, various branches of treatment in ayurveda, types of the drug formulation in Ayurveda and important Ayurvedic drugs and their uses, formulation of asavas, arishtas, watika, churna, tailas, ghruta, lep.

32. Homeopathic system of medicine

Theory, basic concept, diagnosis, treatment, source of homeopathic medicines and important homeopathic drugs and their uses