



# ANDHRA UNIVERSITY TRANS-DISCIPLINARY RESEARCH HUB

## ADVANCED PHARAMACOGNOSY AND PHYTOCHEMISTRY

### 1. Introductory Pharmacognosy

Historical development, modern concept and scope of Pharmacognosy. 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.

### 3. Sources of crude drugs

Plants, animals and minerals: marine products: plant tissue culture.

### 4. 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.

**5. Techniques in microscopy** Details of mountants, clearing agents, chemomicroscopic (microchemical) reagents.

**6. 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.

**7. 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.

**8. Pharmaceutical aids** Biological sources, chemical constituents, adulterants

and uses of: Starches, acacia gum, tragacanth, sterculia, guar gum, pectin,

arachis oil, castor oil, sesame oil, cotton seed oil, olive oil, cotton, silk, wool,

regenerated fibers, asbestos, kaolin, prepared chalk, kieselghur.

**9. Animal products** Biological sources, chemical constituents, adulterants and uses of: Shellac, cochineal, cantherides, woolfat, lard, beeswax, honey, musk, lanolin, gelatin.

**10. Plant products** Introduction to plant bitters, sweeteners, nutraceuticals, cosmeceuticals and photosensitizing agents.

**11. Toxic drugs** Study of allergens, hallucinogens, narcotics, toxic mushrooms

**12. Enzymes** Biological sources, preparation, characters and uses of: diastase, papain bromelain, ficin, yeast, pancreatin, urokinase, pepsin, trypsin, pencillinase, hyaluronidase and stryptokinase.

**13. Natural pesticides and insecticides** Introduction to herbicides, fungicides, fumigants and rodenticides tobacco, pyrethrum, & neem.

**14. 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.

**15. 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.

**16. 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.

**17. Carbohydrates & lipids** Biological sources, salient morphological features, chemical constituents, and uses of: Plantago, bael, chalmooogra oil, neem oil, shark liver oil, cod liver oil, guggul lipids.

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

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

**20. 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.

**21. 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.

**22. Alkaloids** Nature, classification, biological sources, morphology, chemical constituents, adulterants and uses of: Areca nut, belladonna, hyoscyamus, 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.

**23. Herbarium** Preparation of herbarium sheets and their importance in authentication of plants.

**24. 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.

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

**26. 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.

**27. 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.

**28. Worldwide trade of crude drugs and volatile oils** Study of drugs having high commercial value and their regulations pertaining to trade.

**29. Plant Biotechnology** History and scope of plant tissue culture, growth media, plant growth regulators: callus and suspension culture, Biotransformation, immobilization, hairy root culture. Transgenic plants and their applications, plant tissue culture as source of secondary metabolites.

**30. Herbal cosmetics** Importance of herbals as shampoos (soapnut), conditioners and hair darkeners, (amla, henna, hibiscus, tea), skin care (aloe, turmeric, lemon peel, vetiver).

**31. 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*).

**32. 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.

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



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## MODEL QUESTION PAPER

**Time: 3 hours**

**Marks:100**

**Answer any Five Questions.**

1. a) Biosynthesis of Shikmic acid pathway.  
b) Biosynthesis of Lysergic acid.
2. a) Briefly explain the Pharmacognostic studies of a crude drug.  
b) Write about the Indian and aromatic plants with suitable examples.
3. a) Briefly explain the quality control of herbal drugs.  
b) Stas Otto Method.
4. a) Describe the life cycle of Ergot  
b) Explain any two herbal formulations with suitable examples.
5. a) What are transgenic plants. Briefly explain their applications.  
b) Describe any two unaniformulations with suitable examples.
6. a) Briefly explain the isolation, identification, and estimation of diosgenin.  
b) Write about the intellectual property rights for Phytopharmaceuticals.
7. Explain the significance of Pharmacognosy in various systems of medicine
8. a) Explain the deterioration of herbal drugs by insects.

**b) Explain briefly about streptokinase**