

3.3 PHARMACOGNOSY AND PHYTOCHEMISTRY (THEORY)

75 hours ; 3 hours/week

1. Isolation and purification of phytoconstituents: a) Different methods of extraction: maceration, percolation and supercritical fluid extraction. Choice of suitable solvents, processing and drying methods. b) Preliminary phytochemical screening of various secondary metabolites in plant extracts. c) Chromatographic methods applied for the isolation and purification of phytoconstituents. **10 hours; 10-12 marks**

2. Evaluation of crude drugs: Organoleptic, Microscopical, Physical, Chemical, Spectroscopic and Biological methods **4 hours; 5-10 marks**

3. Biogenesis of Phytopharmaceuticals: a) Techniques employed in the elucidation of biosynthetic pathways b) Detailed study of basic metabolic pathways, Shikimic acid pathway and Isoprenoid pathway c) Biosynthesis of - Tropane, Quinoline, Opium and Indole alkaloids, Anthraquinone glycosides and Steroids. **12 hours; 12-15 marks**

4. Glycosides: a) Definition, properties, chemical tests, classification and general method of extraction of glycosides b) **Definition, properties, chemical nature and uses of the following:** i) Cardiac glycosides ii) Anthracene glycosides iii) Saponins iv) Cyanogenetic glycosides v) Flavonoids vi) Lactones and bitter glycosides vii) Isothiocyanate glycosides viii) Steroidal glyco-alkaloids c) **Source, diagnostic characters, chemical constituents, uses and adulterants of** i) Digitalis ii) Squill iii) Senna iv) Aloes v) Cochineal vi) Ginseng vii) Liquorice viii) Wild Cherry bark ix) Bio-flavonoids (Lemon & Orange peel) x) Gingko xi) Milk-thistle xii) Chirata xiii) Dioscorea xiv) Mustard xv) Solanum nigrum. **15 hours; 15-20 marks**

5. Alkaloids: a) Definition, properties, chemical tests, classification and general method of extraction of alkaloids b) Source, diagnostic characters, chemical constituents, uses and adulterants of i) Lobelia ii) Tobacco iii) Datura iv) Atropa v) Cinchona vi) Ipecac vii) Opium viii) Rauwolfia ix) Ergot x) Aconite xi) Kurchi xii) Ephedra xiii) Colchicum xiv) Tea xv) Taxus. **15 hours; 15-20 marks**

6. Essential oils : a) Definition, properties, chemical nature, classification and general method of extraction of volatile oils b) Source, diagnostic characters, chemical constituents and uses of: i) Clove ii) Cinnamon iii) Fennel iv) Caraway v) Eucalyptus vi) Mentha vii) Nutmeg viii) Lemon grass oil c) Analysis of the following: Clove oil, Cinnamon oil, Eucalyptus oil, Mentha oil and lemon grass oil. **10 hours; 10-12 marks**

7. Tannins: a) Definition, properties, classification, general method of extraction and estimation of tannins. b) Source, chemical constituents, chemical tests, uses and adulterants of i) Pale and Black catechu ii) Nutgal iii) Arjuna iv) Myrobalan v) Bahera. **3 hours; 2-5 marks**

8. Carotenoids: a) Definition, properties and classification of carotenoids. b) Source, chemical nature and uses of α and β -Carotenes, Lycopene, Xanthophyll. **2 hours; 2-5 marks**

9. Marine Pharmacognosy: Novel medicinal agents from marine sources **2 hours; 2-5 marks**

10. Natural allergens, photosensitizing agents and fungal toxins **2 hours; 2-5 marks**

PHARMACOGNOSY AND PHYTOCHEMISTRY (PRACTICALS)

75 hours ; 3 hours/week

1) Study of Powder microscopy of the following crude drugs*

Digitalis, Squill, Senna, Liquorice, Wild Cherry bark, Cinchona, Ipecac, Rauwolfia, Kurchi, Ephedra, Clove, Cinnamon.

2) Qualitative general and specific chemical tests for the following phytoconstituents*

Alkaloids: Quinine, Atropine, Caffeine,

Glycosides: Senosides, Aloin, Flavonoids, Saponins and Cardiac glycosides

Tannins: Tannic acid, Pale catechu and Black catechu.

3) Determination of proximate values *

i) Moisture content

ii) Ash values

iii) Extractive values

4) Quantitative microscopy**

i) Determination of Stomatal number and Stomatal index

ii) Determination of Starch grains dimensions and length of fibres using eye piece micrometer and camera lucida methods

iii) Determination of percentage purity of crude drugs by using Lycopodium spore method

5) Determination of total polyphenolic content by Folin-cu method**

6) Demonstration experiments

i) Soxhlet extraction

ii) Extraction of essential oils by Clevenger's apparatus

Note: ** Denotes major experiments * Denotes minor experiments

SCHEME OF EXAMINATION

1. Synopsis	10 marks
2. Quantitative Microscopy	25 marks
3. Powder Microscopy	15 marks
4. Minor experiment	10 marks
5. Viva-Voce	10 marks
Total	70 marks

PHARMACOGNOSY AND PHYTOCHEMISTRY REFERENCE BOOKS

1. Evans WC. 2002. Trease and Evans Pharmacognosy, 15th ed. Elsevier Science Ltd, Philadelphia.
2. Kokate CK, Purohit AR, and Gokhale S.B., 2010. Pharmacognosy 45th ed. Nirali Prakashan, Pune.
3. Tyler V.E and Brady R., 1981. Text book of Pharmacognosy, 8th ed. Lea and Febiger, Philadelphia.
4. Wallis T.E., 1985. Textbook of Pharmacognosy, 5th ed. J.A., Churchill Limited, London.
5. Jean Bruneton, 1999. Pharmacognosy, Phytochemistry & Medicinal Plants, 2nd ed. Lavoisier Publishing House, UK.
6. Pridham J.B and Swain T., 2012. Biosynthetic pathways in higher plants, 1st ed. Academic Press, New Delhi.
7. Pulok Mukherjee, 2002. Quality control of herbal drugs, 1st ed. Business horizons, New Delhi.
8. Biren Shah N and Seth A.K., 2010. Text Book of Pharmacognosy and Phytochemistry, 1st ed. A Division of Reed Elsevier India Private Ltd, New Delhi.
9. Ashutosh Kar, 2013. Essentials of Pharmacognosy, 1st ed. Ahuja Book House Pvt Ltd, Delhi.
10. Khadabadi S.S., Deore S.L and Bavskar B.A., 2010. Pharmacognosy and Phytochemistry: A Comprehensive approach, 1st ed. Pharma Med Press, Hyderabad.
11. Bhakuns and Rawat, 2005. Bioactive Marine Natural Products, 1st ed. Anmaya Publishers, New Delhi.
12. Harborne J.B., 1998. Phytochemical methods, 3rd ed. Springer (India) Pvt Ltd, New Delhi.
13. Iyengar M.A 2001. Study of Crude Drugs, 14th ed. Manipal Power Press, Manipal.
14. Iyengar M.A and Nayak S.G.K., 2001. Anatomy of Crude Drugs, 8th ed. Manipal Power Press, Manipal.
15. Iyengar M.A 2001. Pharmacognosy of Powdered Crude Drugs, 6th ed. Manipal Power Press, Manipal.
16. Kokate C.K., 1994. Practical Pharmacognosy, 4th ed. Vallabh Prakashan, New Delhi.
17. Khandelwal K.R., 2006. Practical Pharmacognosy Techniques and Experiments, 16th ed. Nirali Prakashan, Pune.
18. Wallis T.E., 2011. Practical Pharmacognosy, 4th ed. Pharma Med Press, Hyderabad.
19. Indian Herbal Pharmacopoeia 1998 & 1999, Vol I & Vol II. Government of India, Ministry of Health. A Joint Publication of RRL, Jammu and IDMA, Mumbai.
20. National and International Journals- Pharmacognosy Reviews, Pharmacognosy Magazine, Journal of Natural Products, Phytotherapy Research, Phytochemistry.

LIST OF MINIMUM EQUIPMENTS REQUIRED

1. Camera lucida	20
2. Eye piece micrometer	20
3. Stage micrometer	20
4. Microscope	20
5. Clavengers apparatus	05
6. Balance (Digital)	02
7. Muffle furnace	01
8. Hot air oven	01
9. Spectrophotometer	01
10. Soxhlet apparatus	05
11. Heating mantle	10
12. Vacuum pump	02