



**UNIVERSITY OF LUCKNOW
LUCKNOW
M.Sc. Pharmaceutical Chemistry (Core)
Pharmacology and Drug Design
Semester II, Paper I, PH2CO4**

Unit I

1. General principles of pharmacology:

- a. Biological response to drugs, passage of drugs across membranes.
- b. Pharmacokinetic principles: absorption, distribution, metabolism and excretion of drugs. Dose of drugs and routes of administration.
- c. Pharmacodynamic principles: dose response relationships, mechanism of drug action, unusual and adverse responses of drugs, structurally specific and nonspecific drugs. Ferguson's principle. Drug interactions-synergism, antagonism, drug addiction and drug dependence, drug tolerance, drug hypersensitivity.

Unit II

2. General Principles of Drug Therapy

- a. Relationship between chemical structure, lipid solubility and biological activity of drugs. Stereochemistry and biological activity.
- b. Drug action-receptor theories. Drug metabolism. different pathways.
- c. Drug design: various factors of drug design, rational drug design. Methods of lead discovery: optimization of the lead, natural and synthetic sources of lead compounds.
- d. Bioisosterism. Prodrug and soft drug concept. Drug synthesis.
- e. Combinatorial synthesis (basic concepts). Retrosynthetic analysis of benzocaine, saccharin, salbutamol and benzodiazepines.

Unit III

3. Drugs acting on CNS

- a. **General anaesthetics:** Inhalation anaesthetics - ether, enflurane, halothane, nitrous oxide, cyclopropane. Intravenous anaesthetics - thiopentone sodium, ketamine.
- b. **Hypnotics, sedatives and anxiolytic agents:** Anxiolytic agents-benzodiazepines, buspirone and meprobamate.
- c. **Anticonvulsants:** convulsions, types of epilepsy, barbiturates-hydantoins, oxazolidinediones, succinimides and benzodiazepines.
- d. **Analeptics:** xanthines, amphetamines, nikethamide and ethamivan.
- e. **Centrally acting muscle relaxants:** glyceryl ethers-mephenesin, alkane diol derivatives-meprobamate, benzodiazepines-librium, diazepam and baclofen.



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- f. **Antiparkinson's agents:** dopamine agonists, dopamine releasing agents and synthetic anticholinergics. Drugs for Alzheimer's disease: cholinergic agonists and acetylcholine esterase inhibitors.

4. Synthesis of the following drugs

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|--------------------|-----------------|
| • Besiperidine | • Ketamine |
| • Buspirone | • Levodopa |
| • Chlordiazepoxide | • Mephenesin |
| • Denzimol | • Meprobamate |
| • Diazepam | • Nikethamide |
| • Enflurane | • Phenobarbital |
| • Ethamivan | • Tacrine |
| • Ethinamide | • Topiramate |
| • Ethosuximide | • Trimethadione |
| • Etomidate | |

Unit IV

5. Analgesics

a. **Narcotic analgesics .**

- i. Morphine and its analogues, phenyl(ethyl) piperidines, diphenyl heptanones and benzocaine derivatives.

b. **Antipyretics and NSAIDs:**

- i. Basic idea of COX I & II inhibitors, salicylates aspirin, p-aminophenol derivatives-paracetamol, phenacetin, pyrazolidinediones phenyl butazone, oxyphenbutazone, anthranilic acid derivatives-mefenamic acid, flufenamic acid, indoleacetic acid derivatives-indomethacin, arylacetic/propionic acid derivatives (ibuprofen, ketoprofen, flubiprofen and diclofenac), oxicams (piroxicam and tenoxicam).

6. Synthesis of the following drugs-

- | | |
|-------------------|-------------------|
| • Allopurinol | • Methadone |
| • Celicoxib | • Pethidine |
| • Diclofenac | • Phenyl butazone |
| • Flufenamic acid | • Piroxicam |
| • Levorphanol | |



**UNIVERSITY OF LUCKNOW
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M.Sc. Pharmaceutical Chemistry (Core)
Pharmacognosy
Semester II, Paper II, PH2CO5**

Unit I

1. Pharmacognosy

- a. Pharmacognosy of the official drugs frequently used in pharmacy: their sources and constituents. Eg:- senna, belladonna, digitalis, stramonium, vasaka, cinnamon, cinchona, ergot, cannabis, ipecacuanha, rauwolfia, liquorice, ginger, cloves, pyrethrum, santonica, nutmeg, nuxvomica, cardamom, umbelliferous fruits like Cumin, Fennel, Caraway, Opium, Aloes, Asafoetida, Vinca rosea, Brammi (two varieties).

2. Fixed oils and essential oils:

- a. Used in pharmacy-their sources. Extraction, constituents, composition analysis of fixed oils. Elementary study of adulteration of fixed oils.
- b. Fixed Oils: Castor oil, Olive oil, Shark liver oil.
- c. Essential Oils: Eucalyptus oil, Turpentine oil.

3. A brief study of the substances used as pharmaceutical necessities

- a. Starches, Gum Acacia, Gum Tragacanth, Agar Agar, Gelatin, Talc, Kaolin. Bentonite.

Unit II

4. Metallic compounds used in pharmaceutical chemistry

- a. Calcium lactate, calcium gluconate, iron gluconate, iron fumerate, ferric ammonium citrate, ferrous sulphate, aluminium hydroxide gel, calamin, zinc oxide, zinc stearate, magnesium stearate, talc, yellow mercuric oxide, trivalent and pentavalent antomionials, selenium sulfide, lithium salts, gold, platinum and bismuth compounds.

5. Metal toxicity

- a. Cadmium, lead, copper and mercury.

UNIT III

6. Pharmaceutical Legislation in India.

- b. Legal aspects of trade in drugs. The drug Act and Drug rules. The Pharmacy Act. The dangerous Drug Act and Rules. The Drugs and Cosmetic Act and rules
- c. Introduction to Pharmacopeias B.P, I.P. and general standard analysis,
- d. Intellectual Property Rights (IPR), Patents, Trademarks, Copy rights, Patent Acts relevant sections (basic ideas only)



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Pharmacognosy
Semester II, Paper II, PH2CO5

Unit IV

7. Diagnostic Agents and Tests

- a. Radiopaques - organo iodo compounds. Compounds used in function tests, dyes, radio isotopes, RIA, ELISA.
- b. Dyes used in pharmacy: fluorescein, mercurochrome, acridine dyes. Colouring agents: official colours, colour code.
- c. Liver and gastric function tests and kidney function tests



UNIVERSITY OF LUCKNOW
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M.Sc. Pharmaceutical Chemistry (Core)
Chemistry of Natural Products and Biomolecules
Semester II, Paper III, PH2CO6

UNIT I

Steroids

classification and nomenclature of steroids. Reactions, structure elucidation, stereochemistry and biosynthesis of cholesterol. Structure and semi synthesis of steroid hormones-testosterone, estrogen and progesterone. Biosynthesis of steroids.

UNIT II

Alkaloids

General methods of structure elucidation of alkaloids. Structure elucidation and synthesis of papaverine, quinine and morphine. Stereoselective synthesis of reserpine. Biosynthesis of alkaloids.

UNIT III

Vitamins

Classification, structure and synthesis of vitamins A, C, B1 and B2.

-lactam antibiotics: structure determination of penicillins and cephalosporins, synthesis of penicillins and chloramphenicol. a brief study of macrolide antibiotics, aminoglycoside antibiotics, polyene antibiotics, fluoroquinolones.

UNIT IV

Natural colouring species

Anthocyanins and carotenoids, structure and synthesis of cyanin, flavone, quercetine and -carotene.