II/IV B. Pharmacy (4th Semester)

401 PHARMACEUTICAL CHEMISTRY-III (MEDICINAL-I) (Theory) (75 hrs.)

Unit : 01
Brief introduction to medicinal chemistry and development of medicinal chemistry, physicochemical properties of drugs in relation to biological action, drug receptor interaction, transduction mechanism and G-coupled receptors

Unit : 02
Sulphonamides: History, nomenclature, classification based on kinetics, clinical and chemical along with structures, metabolism crystal urea, prodrug concept in sulphonamides, structure activity relation ship(SAR). Therapeutic uses metabolism and synthesis of sulphamethoxazole, trimethoprim, sulphacetamide, sulphapyridine, sulphasalazine, sulphamoxol, sulphafurazole, sulphaguanidine, sulphadoxine, sulphadimidine.

Antiinfective agents: Definition, classification, ideal requirements of antiinfectives, structures, synthesis and uses of important antiinfectives and synthesis of hexylresorcinol, nitrofurazone, chlorobutanol methylparaben.

Unit : 03
Antibiotics: Brief historical background and classification of antibiotics based on spectrum, nature, chemical and mechanism of action.
Penicillins: Historical background, biological sources, nomenclature, classification of penicillins based on source and spectrum of activity along with structures of different penicillins, degradation of penicillins, semi synthetic penicillins, the effect of stereochemistry in designing orally active penicillins, depot penicillin preparations, general method of synthesis of pencillins from 6-Amino penicillanic acid(APA), structure activity relation ship(SAR), mechanism of action, synthesis and therapeutic uses of benzyl penicillin, ampicillin, amoxycillin, carbenicillin, phenoxyethyl penicillin. A note on β-lactamase inhibitors.

5. Cephalosporins: Biological sources, classification based on generation, degradation of cephalosporins, comparison of 6-Aminopenicillanic acid(APA) and 7-aminocephalosporanic acid (ACA), penam and cepham, structure activity relation ship(SAR), advantages over penicillins, structures and synthesis of cephalexin, cephaloridine, cefuroxime, cefatoxime, cefoperazone and cefaclor.
Tetracyclines: Biological sources, structures of the important tetracyclines, important structural units and the three acidity constants in the tetracycline molecule, amphoteric nature, epimerisation, chelation with metals, mechanism of action, spectrum of activity, structure activity relationship (SAR) and therapeutic uses.


Macrolides: Classification, structure activity relationship (SAR) metabolism and toxicity.

Fluoro Quinolone antibacterials: Structure activity relationship (SAR) of quinolones, metabolism and synthesis of norfloxacin, gatifloxacin, nalidixic acid, sparfloxacin, pefloxacin and ofloxacin.

Unit : 04


Anthelmintics: Definition, classification, mechanism of action of anthelmintics, synthesis and therapeutic uses of diethylcarbamazine, mebendazole, niclosamide, pyrantelpamoate, albendazole, piperazine citrate and niridazole

Antiamoebics: Classification and mechanism of action of antiamoebics, synthesis and therapeutic uses of metronidazole, diloxanide furoate, iodoquinol, furazolidone

Unit : 05

Antifungal agents: Introduction, classification, structures, mechanism of action and therapeutic uses of antifungal drugs, structure activity relationship (SAR) ofazole antifungal agents, structures and synthesis of benzonic acid, salicylic acid, clotrimazole, ketoconazole, fluconazole, tolnaftate, miconazole, econazole, griseofulvin and flucytosine.

Anti-Tubercular Drugs: Introduction, classification, structure activity relationship (SAR), mechanism of action, structures of important antitubercular drugs and synthesis of INH, ethambutol, pyrazinamide, ethionamide and PAS

Antileprotics: Introduction, classification, structure activity relationship (SAR), metabolism, mechanism of action, synthesis of dapsone and clofazimine
Unit : 06

Antiviral Drugs: Properties of virus, types of viruses, viral replication, classification of antiviral drugs, chemical structures, mechanism of action and therapeutic uses of amantadine, nucleoside antimetabolites (iodoxuridine, vidarabine, acyclovir, famciclovir), reverse transcriptase inhibitors (zidovudine, lamivudine, stavudine, zalcitabine), nucleoside antimetabolites (ribavirin), nonnucleoside reverse transcriptase inhibitors (nevirapine). A brief note on HIV protease inhibitors. Synthesis of amantidine and idoxuridine.

Anticancer Drugs: Introduction, classification, mode of action, structures of important anticancer drugs, metabolism and synthesis of chlorambucil, cyclophosphamide, melphalan, cytarabin, 6-thioguanine, thiopeta, busulphan, procarbazine, carmustine, 5-fluorouracil, 5-mercaptopurine, methotrexate. A brief account of vinca alkaloids and taxol.

TEXT BOOKS:
4. Lippincott Williams and Wilkins: Remington Pharmaceutical Sciences
**MODEL QUESTION PAPER**

**PHARMACEUTICAL CHEMISTRY-II, (MEDICINAL -I)**

**Time :** 3 hours  
**Max.Marks :** 80

**SECTION - A**

**Answer any four questions**  
(4 X 10 = 40 marks)

1. Outline the importance of any two physicochemical parameters in relation to biological activity. Explain with suitable examples.
2. Classify sulfonamides with examples, discuss the SAR and mention their mode of action.
4. What are antimalarials? Classify them with examples and discuss the SAR? Add a note on the current status of malaria in India.
5. What are antifungal agents? Give the classification, mechanism and SAR ofazole antifungal agents?
6. What are antineoplastic agents? Classify them with examples. Discuss the mode of action of alkylating agents?

**SECTION - B**

**Answer any TEN questions**  
(10 x 4 - 40 marks)

7. Explain briefly how partition coefficient influences biological activity?
8. Define and classify receptors with suitable examples?
9. Outline the synthesis and uses of sulfamethoxazole.
10. What is crystal urea? Suggest the preventive measures of crystal urea.
11. Write a short note on β-lactamase inhibitors
12. Give an account of epimerisation and chelation of tetracyclins.
13. Outline the synthesis and mode of action of Albendazole.
14. Give the structure and chemical name of any two antiamoebic agents.
15. Give the synthetic scheme for flucytocine
16. Write short notes on anti-tubercular agents.
17. Give a brief note on chemistry of DNA polymerase inhibitors.
18. Write short notes on plant products used in cancer chemotherapy.
III/IV B.Pharmacy (4th Semester)

402 PHYSICAL PHARMACY-II (Theory) (75 hrs.)

Study of the applications of physicochemical principles to pharmacy with special reference to the following:

**Unit : 01**

**Solubility and Distribution phenomena** : Solvent-Solute interactions, solubility of gases in liquids, liquids in liquids, solids in liquids, distribution of solutes in immiscible solvents. Introduction to phenomena of diffusion: Ficks first law and second law.

**Complexation** : Types of Complexes, methods of analysis, complexation and drug action.

**Unit : 02**


**Unit : 03**


**Unit : 04**

**Colloids and macromolecular systems** : Types of colloidal systems, properties of colloidal Systems, solubilization.

**Micromeritics** : Particle size and size distribution, methods of determination of particle size, particle shapes and surface area. Derived properties of powders.

**Unit : 05**

**Rheology** : Newtonian and Non-Newtonian systems. Thixotropy, its measurement and applications in formulations. Determination of viscosity using rotational viscometers and its applications.

**Unit : 06**

**Coarse Dispersions** : Suspensions, emulsions and semisolids:

**Suspensions** : Interfacial properties of suspended particles, settling in suspensions, formulation of suspensions.

**Emulsions** : Theories of emulsification, physical stability of emulsions, preservation of emulsions.

Rheological properties of emulsions, suspensions and semisolids.
01. Effect of phase volume ratio on stability of an emulsion.
02. Micromeritics – I
03. Micromeritics – II
04. Determination of partition coefficient of salicylic acid between water and benzene
05. Determination of first order rate constant associated with decomposition of hydrogen peroxide.
06*. Determination of HLB value of Tween-80
07*. Determination of critical micellar concentration of tween-80.
08. Micellar solubilisation of poorly soluble drugs.
09*. Determination of first order rate constant associated with decomposition of ethyl acetate
10. Determination of particle size by stokes method.
11. Accelerated stability testing of a tablet formulation-I.
12. Accelerated stability testing of a tablet formulation – II.
14*. Calibration of eye piece micrometer using stage micrometer and determination of globule size of an emulsion.
15*. Study of adsorption of oxalic acid on charcoal.

TEXT BOOKS:
01. Physical Pharmacy by Alfred Martin
02. Remington’s Pharmaceutical Sciences.
03. Tutorial pharmacy.
SECTION - A
Answer any FOUR questions (4 X 10 = 40 marks)
01. State and explain Nernst’s distribution law. Discuss its application in determination of stability constant of a complex with an example.
02. Discuss the principle and method involved in accelerated stability testing of dosage forms. Give its limitations.
03. With a neat labelled diagram explain the concept of electric double layer at solid liquid interfaces. Give the significance of zeta potential in formulations of suspensions.
04. What are colloids. Discuss the optical and kinetic properties of colloids.
05. What is thixotropy. Discuss the methods to measure it and give applications of thixotropy in pharmacy.
06. Differentiate between flocculated and deflocculated suspension. Taking an example, explain about controlled flocculation.

SECTION-A
Answer any TEN questions (10 X 4 = 40 marks)
07. State and explain Fick’s first law of diffusion.
08. Give the applications of complexation in pharmacy.
09. Differentiate between zero order and first order kinetics.
10. A tablet contains 500 mg of paracetamol. The tablet was manufactured on 10/07/1999. Paracetamol in the tablet decomposes according to zero order kinetics at the rate of 10 mg/year. What is the expiry date to be printed on the label.
12. Write notes on spreading and spreading coefficient.
13. What is total porosity, inter particle porosity and inter particle porosity. Give its significance in pharmacy.
14. Write notes on micellar solubilization.
15. How do you determine the viscosity of a pseudoplastic system using stamper viscometer.
16. Discuss the rheology of Bingham bodies.
17. How do you evaluate the physical stability of emulsions.
18. Write notes on sedimentation parameters of suspensions.
II/IV B.Pharmacy (4th Semester) 

404 APPLIED BIO CHEMISTRY & CLINICAL PATHOLOGY (Theory) (75 hrs.)

Unit : 01
Definition, classification, some properties and reactions of carbohy-drates, lipids and proteins. Diseases related to their metabolism.

Unit : 02
Carbohydrate metabolism : Glycolysis, glycogenolysis, gluconeogenesis, Krebs’ cycle, direct oxidative pathway (HMP). Metabolism of lipids. Essentials of fatty acids, Oxidation of fatty acids, ketogenesis, biosynthesis of fatty acids and cholesterol.

Unit : 03
Metabolism of Proteins and Amino acids : Essential and Non essential Amino acids, general metabolic reactions of amino acids like deamination, transamination, decarboxylation, urea cycle : metabolism of the following aminoacids, glycine, phenylalanine, tyrosine, cystein, cystine, methionine, tryptophan, valve and lysine.

Unit : 04
Enzymes: classification, structure, mechanism of enzyme action properties, factors influencing enzyme action, activators and deactivators of enzymes, competitive and noncompetitive inhibition with respect to drug action, co-enzymes.

Unit : 05
Bio-chemistry of important body fluids. The biochemical role of minerals, water vitamins and hormones. A brief outline of energy and phosphate metabolism and detoxication mechanisms.

Unit : 06
The Principles involved and the method used in qualitative and quantitative analysis of

a) Blood for the following constituents :
Glucose, urea, cholesterol, bile salts, bile pigments, creatinine, calcium, phosphates, SGPT and SGOT.

b) Urine for the following constituents :
Glucose, ketone bodies, bile salts, bile pigments, and albumin

c) Introduction to pathology of blood and urine
(1) Lymphocytes and Platelets, their role in health and disease
(2) Erythrocytes Abnormal cells, their significance
(3) Abnormal constituents of urine and their significance in disease.
III/IV B.Pharmacy (4th Semester)

405 APPLIED BIOCHEMISTRY & CLINICAL PATHOLOGY
(Practicals) (75 hrs.)

01. Qualitative analysis of carbohydrates
    (Glucose, Fructose, Maltose, Lactose, Sucrose, Starch).
02. Qualitative analysis of Amino acids (Glycine, Tyrosine, Cysteine
03. Qualitative analysis of Proteins (Albumin, Casein, Gelatin, Peptone)
04. Identification of normal and abnormal constituents in normal urine
    sample.
05. Identification of abnormal constituents in the given sample.
06*. Estimation of glucose in urine.
07*. Colorimetric estimation of tyrosine.
08*. Estimation of creatinine in urine.
09*. Estimation of glucose in blood.
10*. Estimation of creatinine in blood.
11*. Estimation of valine by formal titration.
12. Simple enzymatic reaction.

TEXT BOOKS :

01. Text book of Biochemistry by Harper
02. Text book of Biochemistry by Lelinger
03. Biochemistry by A.V.S.Rama Rao
04. Biochemistry by West and Todd.
05. Biochemistry by U.Satyanarayana.
06. Text book of Biochemistry by D.M.Vasudevan, Sree Kumari S
07. Medical Biochemistry by N.Mallikarjuna Rao
08. Test book of Biochemistry with clinical correlatives by Devlin.
MODEL QUESTION PAPER
404 BIOCHEMISTRY (Theory)

Time : 3 hours       Max.Marks : 80

SECTION - A
Answer any four questions (4 X 10 = 40 marks)
1. Explain the color reactions of proteins.
2. Discuss the direct oxidative pathway for the metabolism of glucose.
3. Explain the general metabolic reactions of amino acids.
4. What are enzymes ? Give the classification of enzymes with suitable examples.
5. Write an assay on biochemistry of body fluids.
6. Write the principles of methods used in quantitative analysis of calcium and creatinine in blood ?

SECTION - B
Answer any TEN questions (10 x 4 - 40 marks)
7. What are essential and non-essential amino acids ?
8. Discuss the Haworth's cyclic structures of monosaccharides.
9. Write a short note on ketogenesis.
10. Write a short note on HMP pathway.
11. Explain the biosynthesis of urea.
12. Discuss briefly about the metabolism of glycine.
13. Write a note on mechanism of enzymic action.
14. Write short notes on coenzymes.
15. Give an account of phosphate metabolism.
16. Explain the biochemical role of vitamin-C.
17. Role of lymphocytes in health and disease.
18. How do you identify glucose and blood in urine ? Give the significance of above two abnormal constituents.

MODEL QUESTION PAPER (Practicals)
405 APPLIED BIO-CHEMISTRY AND CLINICAL PATHOLOGY

Time : 4 hours       Max.Marks : 80
1. Synopsis : 10 Marks
2* Major Experiment : 35 Marks
3. Minor Experiment : 20 Marks
4. Viva-Voce : 15 Marks
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Total: 80 Marks
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III/IV B.PHARMACY (4th SEMESTER)

406 FORENSIC PHARMACY (Theory) (75 hrs.)

Unit : 01
Evolution of pharmaceutical and drug legislation in India – Code of Pharmaceutical ethics.
Legislation to regulate the profession of pharmacy. The pharmacy Act, 1948.

Unit : 2 & 3
Legislation to regulate the import, manufacture, distribution and sales of drugs and cosmetics – The Drugs and cosmetics Act 1940 and Drugs and Cosmetics Rules 1945, as corrected upto –date.

Unit : 04
Legislation to control the advertisements, excise duties and price of drugs.
   a) The Drugs and Magic Remedies (Objectionable advertisement Act.)
   b) The Medicinal and Toilet preparations
       (Excise duties Act and Rules of 1956)
   c) Drugs (Price Control) Order, 1970 as corrected upto-date

Unit : 05
Legislations to control the operations regulating to dangerous drugs, poisons and opium.
   a) Poisons Act and Rules

Unit : 06
Other Legislation’s relating to Pharmaceutical Industry and profession.
   a) The Indian Patents and Designs Act, 1970 with reference to the Drugs and Pharmaceuticals only.
   b) Medical Termination of Pregnancy Act.
   c) Shops and Establishments Act

TEXT BOOKS :
01. Forensic Pharmacy by B.M.Mithal
02. Forensic Pharmacy by N.K.Jain
03. Text book of Forensic Pharmacy, C.K.Kokate, S.B.Gokhale
05. Pharmaceutical jurisprudence and ethics by S.P.Agarwal, Rajesh Kanna
MODEL QUESTION PAPER
FORENSIC PHARMACY

SECTION-A
Answer any FOUR questions (4 X 10 = 40 marks)
1. What are the objectives of pharmacy act. Discuss the constitution and functions of pharmacy council of India.
2. Classify the licenses issued for the sale of drugs. Explain the licensing requirements and procedure involved in retail sale of drugs.
3. What are the administrative bodies constituted under drugs and cosmetics act. Write the constitution and functions of DTAB.
4. Define (A) Bonded manufactory (B) Proof spirit. Explain the steps involved in the manufacture of medicinal preparations in a bonded manufactory.
5. What are narcotic drugs and psychotropic substances. Explain the various controlled operations and measures taken by central government to prevent illicit traffic in narcotics and psychotropic substances.
6. What is (A) Patent (B) Invention. Mention the inventions patentable under the patents act. Write the procedure involved in patenting.

SECTION - B
Answer any TEN questions (10 X 4 = 40 marks)
7. Enumerate the events before 1940 that led to the enactment by pharmacy act.
8. Explain the code of ethics of pharmacist in relation to trade.
9. Mention the classes of drugs prohibited for import into India. Write the procedure for importing drugs.
10. What are the qualifications and duties of government analyst.
11. Write a note on schedules to the drugs and cosmetics act 1945.
12. Define (A) drug (B) cosmetic (C) Misbranded drug (D) Spurious drug.
14. List out the advertisements prohibited under objectionable advertisement act.
15. What is opium poppy. Explain the cultivation of opium.
16. Write short notes on poisons act and rules.
17. What are the conditions of working laid down under the shops and establishment act.
18. Write the constitution and functions of Institutional animal ethics committee.
A.N.U. B.PHARMACY SYLLABUS (WITH EFFECT FROM 2008 - 09 ACADEMIC YEAR)

407 ENGLISH & COMMUNICATION SKILLS
(LANGUAGE LABORATORY) (Practicals) (50 hrs.)

01. Functional and advanced grammar
   i. Basics of english language
   ii. Tips to learn english language
   iii. Articles
   iv. Complete version of parts of speech
   v. Complete version of tenses
   vi. Direct and indirect speech
   vii. Active and passive voice
   viii. Analysis of sentences
   ix. Degrees of comparison
   x. Question tags

02. Verbal and Non-Verbal Skills
   i. Verbal - concerned with words only; corresponding word for word.
   ii. Non-verbal - posture and gesture; facial expressions; sign or code language.

03. Accent – Modulation / Pronunciation
   i. Word accent
   ii. Stress and rhythm in corrected speech
   iii. Intonation - falling pitch, rising pitch, rising – falling tone
   iv. Some common errors in pronunciation

04. Vocabulary Enhancement
   i. Level - I words
   ii. Level - II words
   iii. Level – III words
   iv. Synonyms and antonyms and their basic word

05. Speaking / Writing Tasks
   i. Topics to be practiced orally and in written form to enhance speaking skills and writing skills.

06. Presentation Skills
   i. Model presentation
   ii. Resume preparation
   iii. Conversation and telephone etiquette skills
07. Extempore / Elocution
   i. Students are advised to involve in this activity as it develops one’s potentiality and to a creative way of thinking and their involvement in general awareness.

08. Personality Development
   i. The art of being dynamic – four dimensions
   ii. Self-analyzing questions
   iii. Human refinement and soft Skills

09. Communication Skills
   i. Value of English
   ii. Status of English in India
   iii. Language and communication skills
   iv. Communication skills in corporate requirements

10. Group Discussions
   i. Group dynamics
   ii. Some selected GD topics for practice purpose

11. Interview Skills
   i. Basics of interview skills
   ii. Preparing yourself for the interview
   iii. How to face interview board
   iv. Ten worst interview blunders
   v. Sample questionnaire and answers

12. Practice tests for IELTS and TOEFL
   i. A blueprint of IELTS and TOEFL
   ii. Most often asked questions in IELTS / TOEFL

13. Reflection of Perfection
   i. Value of being perfect
   ii. A short inspiring story on the importance of perfection

14. Key to Success
   i. Formula for Success
   ii. Ten steps for Transformation
   iii. Tips to learn English Grammar and Spoken English

TEXT BOOKS:
1. English Lab for B.Pharmacy Students by Anthony
2. Interview and Group discussion skills with mind blowing questions and top class logical answers by Anthony
3. English grammar and composition by Wren & Martin
III/IV B.PHARMACY (4th SEMESTER)
MODEL QUESTION PAPER
English & Communication Skills (Language Lab)

Time : 3 hours  Max.Marks : 80

01. Write all the rules and regulations of Direct speech and indirect speech. (5M)

02. Write About Pronoun (5M)

03. Choose the correct word from the pair (5M)
   a. The movie was (so/such) boring she fell a sleep
   b. She (lie/lay) down for a short nap
   c. She should be arriving (shortly/briefly)
   d. She (laid/lay) the book on the table.
   e. You can choose from (among/between) five prizes.

04. Choose the correct from of the verb. (5M)
   a. I would like __________ the President of our country
      To meet/meet/meeting
   b. Shall I _____________off the TV ?
      Turn / Turning / to turn
   c. You didn't need ________any more eggs.
      Buy / to buy / buying
   d. Could I _____________ your dictionary, please ?
      To borrow / Borrow / Borrowing
   e. Do we have _____________now ?
      To leave / Leaving / Leave

05. Essay writing - “Global warming” ? (10M)

06. Extempore (10M)

07. Language laboratory online exercises in Language laboratory (40M)