CHAITANYA (DEEMED TO BE UNIVERSITY)-PHARMACY

HANAMKONDA

Course Structure and Syllabi for Pre Ph.D

PHARMACY (2021-22)

PART- I

Choose any **one** subject of the following

S.No	PAPER	PAPER CODE
1.	Research Methodology	21RM 100

PART II

Choose any **one** subject of the following

S.NO	PAPER	PAPER CODE
1.	Advanced Pharmaceutics	21AP101
2.	Advanced Pharmaceutical and Medicinal Chemistry	21APMC102
3.	Advanced Pharmacology and Toxicology	21APT103
4.	Advanced Pharmaceutical Analysis	21APA104
5.	Advanced Pharmacognosy	21APC105

Registrar
Chaitanya (Deemed to be University)
Kishanpura, Hanamkonda,
Warangal (U)-506 001 (T.S.)

Faculty of Pharmaceutical Sciences; PRE Ph.D. Course work - Paper - I:

Research Methodology (Common for all Specializations)

Unit-I

Introduction, meaning , objectives and types of research; Motivation in research, research approaches and significance of research; Research methods versus methodology, research and scientific method; Research process, criteria of good research; Ethics in research, Misconduct and consequences; Defining the research problem, selecting the problem, technique involved in defining a problem (Hypothesis).

Unit-II

Research Design, meaning of research design, need for research design, features of a good design; important concepts relating to research design; Different research designs; Basic principles of Experimental Designs; Developing a Research Plan, Safety & Operational rules for conduct of Research.

Unit-III

Processing and Analysis of Data, Processing Operations, Some Problems in Processing, Elements/Types of Analysis, Statistics in Research, Measures of Asymmetry (Skewness), Measures of Relationship. Simple Regression Analysis, Multiple Correlation and Regression, Partial Correlation, Association in Case of Attributes, Other Measures.

Unit-IV

Separation & Spectroscopic Methods

a. Solvent Extraction & Ion exchange chromatography, principle, instrumentation and applications of Gas-Chromatography (GC) & High Performance Liquid Chromatography (HPLC).
b. Principles, instrumentation and applications of UV, IR, NMR and Mass Spectroscopy in Pharmacy.

Unit-V

a. Interpretation and Report Writing: Meaning and technique of Interpretation, Precaution in interpretation; Significance of Report Writing , Different steps in Writing Report, Layout of the Research Report, Types of Reports; Basic elements of document title, authorship, contents, abstract, Introduction, literature review, materials and methods, results, discussion, summary and conclusions, acknowledgements and references. Writing process: stages of writings; designing illustrations, tables, figures, general guidelines for illustrations, documenting information sources, citation methods, documenting styles,

document print sources, documenting electronic sources. Appendix and its importance. Oral Presentation. Ethical issues in research, forms and consequences of plagiarism, copyright regulations.

b. **ICT in Research**

1. Using ICT for research purposes
2. Using internet and web-based resources; search engines; advanced search techniques
3. Using of web as a tool for scientific literature survey; achieve browsing
4. Using e-resources and e-data
5. Software for research purposes.

References:

1. Kothari C.K. (2004), 2/e, Research Methodology – Methods and Techniques (New Age International, New Delhi).
2. R. Ganeshan, Research Methodology for Engineers, MJP Publications, 2011.
3. Basic Computer Science and Communication Engineering –R. Rajaram (SCITECH).
4. Montgomery, Douglas C. & Runger, George C. (2007), 3/e, Applied Statistics &Probability for Engineers (Wiley India)

CHAITANYA (DEEMED TO BE UNIVERSITY)-PHARMACY

ADVANCED PHARMACEUTICS

Unit I

Preformulation Studies: Goals of preformulation, preformulation parameters, methodology, Solid state properties, solubility and partition coefficient, drug excipient compatability. Excipients used in pharmaceutical dosage forms: properties and selection criteria for various excipients like surfactant, viscosity promoters, diluents, coating materials, plasticizers, preservatives, flavours and colours.

Unit II:

Novel drug delivery systems:

a) Sustained and controlled release of oral products
b) Bioadhesive drug delivery
c) Nasal drug delivery
d) Transdermal drug delivery, Iontophoresis,
e) Protein & peptide delivery f). Gastro retentive drug delivery

Unit III:

1. Colloidal drug delivery systems: Formulation development and evaluation of some colloidal drug delivery systems with an emphasis on recent advances.

a) Liposomes b). Nanoparticles c) Microspheres
d) Submicron emulsions e) Drug-immuno conjugates

2. Drug targeting: Principles, concept of targeting-general methods of targeting to tumors, brain and colon.

Unit- IV

Basic concepts of pharmacokinetics: compartment models: One, two and non- compartmental approaches to pharmacokinetics. Recent trends, merits and limitations of these approaches. Application of these models to determine the various pharmacokinetic parameters of ADME.

Unit -V

Bioavailability: Rate and extent of bioavailability, assessing bioavailability, multiple dosing bioavailabilities, in-vitro bioavailability studies, bioequivalence – general principles, criteria for establishment of bioequivalence requirements.

Multiple dosage regimens: Drug accumulation, i.v and oral regiment, loading dosing, scheduling. Diseasedose adjustment: hepatic disease, renal disease. Therapeutic drug monitoring.

References:

1. **Pharmacokinetics by** Gibaldi M., Marcel Decker Inc, New York.
2. Bioavailability **and** bioequivalence, Abtou, H.M., Dissolution, Mack publishing Co, Easton, PA.
3. Bioequivalence, **Marcel & Decker Inc**, Welling, P.G., Tse, FIS & Dighe, S.V. (eds), New York.
4. **Applied** Biopharmaceutics **&** Pharmacokinetics, Shargel, L & Yu, ABC, Appleton and Lange, Connecticut, USA.
5. **Pharmaceutical dosage forms**: Liberman, HA & Lachman L Tablets vol I, II & III.
6. **Pharmaceutical dosage forms**: Avis, Lachman I & liberman HA; Pareneteral medication Vol I & II.
7. **Turco S and King RF Sterile dosage forms**, Lea & Febiger, Philadelphia.
8. **Pharmaceutical Sciences** Remintons

CHAITANYA (DEEMED TO BE UNIVERSITY)-PHARMACY

ADVANCED PHARMACEUTICAL AND MEDICINAL CHEMISTRY

Unit I

Reactions mechanisms: Generation, stability, structure and reactivity of free radicals, carboanions, carbocations and carbenes. Mechanism of free radical, electophilic, nucleophilic (addition and substitution reactions, elimination reactions including stereochemistry concepts). Electocyclic, pericyclic and sigmatropic reactions.

Structural elucidation: Applications of UV, IR, H_1NMR, C_{13} NMR, mass spectroscopic data in structural elucidation of natural, synthetic and semi-synthetic drugs.Methods of analysis for analogue and structure class determination.

Unit II

Synthetic strategies: Introduction, target selection, disconnection approach, functional group inter conversions, synthons, reagents, retro synthesis, region selectivity, linear and convergent synthesis,synthesis of three,four,five ans six membed rings.

Drug Receptors: Receptor types and isolation, drug receptor Interaction, theories of drug action, mechanism of drug action.

Unit III

Enzyme Inhibitors: Enzyme kinetics and principles of Enzyme inhibitors in basic research and design of binding enzyme ihibitors. A detailed study of the following types of enzyme inhibitors, related drugs and their pharmaceutical significance:

a. PG Synthetase (Cycloxygenase)
b. Angiotensin converting enzyme (ACE) Inhibitors
c. Acetyl Cholinesterase (Ach E) Inhibitors.
d. Phosphodiesterase (PDE) inhibitors.

Unit IV

Rational Drug Design: QSAR; parameters involved in QSAR, lipophilicity (polarisability, electronic and stearic parameters). Quantitative models – Hansch analysis, free Wilson analysis and their relationships, linear relationships and applications of Hansch and free Wilson analysis.

Molecular modeling drug design. &CADD

Unit V

Chemistry and pharmacology of drugs used in CVS, CNS with emphasis on recent drugs.

References:

1. **Org. Chemistry of Drug Design and drug Action**. Richard B. Silvermann

2. **Berger's Medicinal Chemistry and Drug Design**. 6th Edition.
3. **Identification of organic compounds** by Silverstain.
4. **Comprehensive Medicinal Chemistry** Corwin Hansch
5. **Medicinal Chemistry by** William O Foye.
6. **Introduction to Medicinal Chemistry** by G. Patrick.
7. **Advanced organic chemistry by** Jerry March.
8. **Introduction to principles of drug design by** Smith and Williams, Harwood Academy press.
9. **Organic Medicinal and Pharmaceutical Chemistry** by Wilson and Gisvold.
10. **Advanced organic chemistry**. Part A and B. Francis A, Carey and Richard J. Sunberg
11. **Some modern methods of organic synthesis**. W. Carruthers Cambridge University Press. Cambridge.
12. **Organic Reaction Mechanisms** IV th Edth,VK Ahluwalia and RK Parashar,Narosa publishers.
13. **Pepdidomimetics in Organic and Medicinal Chemistry** by AntonioGuarnaana andreaTrabocchi,First edition,wiley publishers.

CHAITANYA (DEEMED TO BE UNIVERSITY)-PHARMACY

ADVANCED PHARMACOLOGY AND TOXICOLOGY

Unit I

Receptor Pharmacology: - Drug receptor interaction theory, occupation theory and rate theory. Receptor occupation and response relationship, spare receptors, silent receptors, orphan receptors, presynaptic and postsynaptic receptors. Receptor characterization method: Pharmacological characterization methods, radio ligand methods, monoclonal antibodies, receptor subtypes. Endogenous substances as targets for drug discovery

Unit II

Drug development process, clinical trials, safety evaluation, bioequivalence studies, statistical design in clinical trials, data analysis technique.

Biotransformation of drugs: Phase I and II. Excretion of drugs: Renal and non-renal (mechanisms and factors affecting). Clearance: Renal and hepatic clearance. Kinetic of drug absorption: compartment models evaluation of pharmacokinetic parameters.

Unit III

Preclinical models employed in the screening of new drugs belonging to following categories: Antipsychotic, analgesic and anti-inflammatory, anti-hypertensive, anti-diabetic, anti-ulcer agents.

Unit IV

Recent development in chemotherapeutic agents, multi-drug resistance, antiviral, antibacterial, anti-protozoal and cancer chemotherapy. Drug therapy in pediatrics and geriatrics

Unit V

Drugs acting on central nervous system: General Anaesthetics, sedative and hypnotics, anti-psychotics, anti-depressants, anti-epileptics, analgesics, anti-migraine agents and anti-parkinsonism agents.
Drugs acting on autonomic nervous system: Sympathomimetics, sympatholytics, parasympathomimetics, parasympatholytics and neuromuscular junction and ganglionic blockers.

References:

1. **Basic and Clinical pharmacology** by Bertram G. Katzung (International edition) lange medical book / Mc Graw Hill, USA 2001 8th edition
2. **Pharmacology** by Rang H.P, Dale MM and Ritter JM., Churchill Livingston, London, 4/e
3. **Goodman and Gilman's The pharmacological basis of therapeutics** (International edition) Mc Graw Hill, USA 2001 10th edition.
4. **Harrison's principles of internal medicine two Vols, 2001** by Braunwald, Fauci, Kasper, Hauser, Longo Jameson, Mc Graw Hill, Newyork 15th edition
5. **Pharmacology** by K.D.Tripati.
6. **Drug Discovery and evaluation – Pharmacological assays** by H.Gerhard.Vogel, 2nd edition, Springer verlag, Berlin, Heidelberg.

CHAITANYA (DEEMED TO BE UNIVERSITY)-PHARMACY

ADVANCED PHARMACEUTICAL ANALYSIS

Unit I

Validation and calibration of various instruments used for drug analysis such as UV-visible spectrophotometer, IR spectrophotometer, HPLC, GC and HPTLC.
Advances in pharmaceutical analytical methods for the development and Quality control and in process quality control of tablets, capsules, liquid dosage forms, parentral and sterile preparations.

Unit II

Interpretation spectral data of IR, HNMR, ^{13}CNMR, mass spectroscopy in the characterization of organic medicinal compounds. a note on signal multiplicity and signal spirit in NMR.
New drug development and approval process: Investigational new drug (IND), new drug applications (NDA), supplemental new drug application (SNDA)

Unit III

Analysis of drugs and excipients in solid state- particle size analysis, DTA,TMA, SCS, DGA, X-ray diffraction – principle, instrumentation and applications.
Radiometric analysis: Radio activity, radioisotopes and pharmaceutical applications of radiopharmaceuticals. Radio immune assay: Principle, procedures and applications. ELISA test.

Unit IV

A detailed study of principles and procedures involved in various physico- chemical methods of analysis including instrumental methods of analysis of pharmaceutical dosage forms containing the following classes of drugs. (Official in IP).
a. Sulphonamides, b. Barbiturates.
c. Adrenergic drugs. d. Anti tubercular drugs.
e. Diuretics.
Microbiological and biological evaluation of Antibiotics and Vaccines.

Unit V

Principles and procedures involved in the use of the following reagents in pharmaceutical analysis.
a. MBTH (3-methyl-2-benzothiazolone hydrazone) reagent.
b. FC reagent
c. 2, 6 - dichloroquinine monoamine reagent.
d. 2, 3, 5-tri phenyl tetrazonium salt.
e. PDAB (paramethyle aminobenzaldehyde) reagent
f. PDACA (paradimethyleamino cinnamaldehyde) reagent.
g. 2,4 dinitrophenyl hydrazine
i. DPPH

References:

1. **A.I. Vogel text book of inorganic chemistry** , 4th edition, ELBS publication, London
2. **Pharmaceutical drug analysis** by P.D.Seth
3. **K.A.Connors text book of pharmaceutical analysis**, 3rd edition, Willey Interscience publication New York.

4. **Instrumental methods of analysis** by Willard, Merit, Dean, Settle.
5. **Instrumental methods of analysis** by Skoog.
6. IP, BP, USP, RPS.
7. **Analysis** by BK Sharma.
8. **Spectrometric identification of organic compounds** by Silverstein, Webster.
9. **Quality Assurance of Pharmaceuticals** (A compendium of guidelines and selected materials) Vol I and II (Pharma Book Syndicate).
10. **Pharmaceutical analysis of modern methods**. Part A and B. Dekker Series.
11. **Pharmaceutical Process Validation** by Ira R. Berry and Robert A, Nash.

CHAITANYA (DEEMED TO BE UNIVERSITY)-PHARMACY

ADVANCED PHARMACOGNOSY

Unit I

a. Plant drug cultivation: General aspects involved in the cultivation of medicinal plants. Conservation of medicinal plants: *ex-situ* and *in-situ* cultivation; Biodiversity loss; WTO and TRIPS agreement. Effect of pesticides and fertilizers on medicinal plants.
b. Recent advances in drugs of marine origin.

Unit II

Current trends in plant tissue culture and its applications in pharmaceutical and allied fields. Immobilized cell systems and techniques of immobilization, biotransformation resulting into pharmaceutically important secondary metabolites, using tissue cultures. Micro-propagation, hairy root cultures and their applications in pharmacy. Commercial production of pharmaceuticals in plant tissue culture.

Unit III

Quality control methods for medicinal plant materials: Development of standardization parameters according to WHO guidelines for assessment of bio drugs. Schedule - M and Schedule - T of D & C act.

Unit IV

Detailed Phytochemical study of following classes of phytoconstituents including important drugs .
a) alkaloids
b) glycosides
c) steroids
d) flavanoids
Applications of UV, IR, NMR and Mass spectrometry in the structural elucidation of phytoconstituents.

Unit V

Standardization of ISM formulations, problems faced and their solutions. Standardization of herbal formulations, storage and safety modifying of drugs of natural origin.
Screening of plant extract/fractions on anti-diabetic, hepatoprotective, antiepileptic, diuretic and CVS. pharmacological toxicological studies of drugs of natural origin.
Herbal Cosmetic and herbal neutraceuticals formulation, Standardization and regulations

References:

1. **Text book of Pharmacognosy** by Trease and Evans.
2. **Phytochemical methods** by JB Heraborne.
3. **Instrumental methods of analysis** by BK Sharma.
4. **Pharmacognsoy and Phytochemistry** by Vinod Rangari.
5. **Plant Tissue culture** by Razdawn.
6. **Text book of Pharmacognosy** by Brady and Tyler.
7. **Quality control of herbal drugs and approach to evaluation of botanicals** by Dr. Puloak Mukherjee.
8. **A text book of Herbal cosmetics** by Vimala Devi.M, CBS Publishers,
9. British Herbal Pharmacopiea (Latest Edition)

SPECIALIZATION: PHARMACY PRACTICE

I. CLINICAL PHARMACY, PHARMACOKINETICS AND TOXICOLOGY

1. **Introduction:** Definition, development and scope of clinical pharmacy
2. **Clinical Pharmacy:** Medication chart view, clinical review, therapeutic drug monitoring, pharmacist interventions, ward round participation, adverse drug reaction management, medication history and patient counseling, drug utilization evaluation and review, quality assurances of clinical pharmacy services, patient data analysis, drug and poison information services.
3. **Clinical pharmacokinetics and pharmacodynamics:** Volume of distribution, clearance, plasma protein binding, concentration dependent clearance, flow dependent clearance, multicompartment models, physiologic model, pharmacodynamic models
4. **Clinical evaluation of new drugs:** Clinical trials, various phases of clinical trials, design and execution of trials in different clinical settings
5. **Toxicology:** Occupational and environmental toxicology, chelators and heavy metal intoxication, insecticide poisoning, Antidotes and its applications, Toxicokinetics, Management and functioning of poisons information Centre (day and night)

II. APPLIED PHARMACOTHERAPEUTICS INCLUDING PATHOPHYSIOLOGY

1. **Cardiovascular disorders**– Hypertension, congestive cardiac failure, ischaemic heart disease, arrhythmias, hyperlipidaemias
2. **Respiratory disorders**– Asthma, chronic obstructive airways disease, drug induced pulmonary diseases
3. **Renal disorders**– Acute renal failure, chronic renal failure, renal dialysis and transplantation, drug dosing in renal impairment, drug induced renal disease, electrolytes and fluid balance
4. **Endocrine disorders**– Diabetes, thyroid diseases, oral contraceptives, hormone replacement therapy, osteoporosis
5. **Nervous disorders**– Epilepsy, Parkinson's disease, stroke and transient ischaemic attacks, headache, Alzheimer's disease.
6. **Psychiatric disorders** – Schizophrenia, depression, anxiety disorders, sleep disorder
7. **Gastrointestinal disorders**– Ulcer disease, inflammatory bowel diseases, hepatitis, jaundice, diarrhoea and constipation
8. **Inflammation:** Pathophysiology and repair of inflammation, immunology basic principles

9. **Infectious diseases** – Meningitis, respiratory tract infections, gastroenteritis, pneumonia, bacterial endocarditis, septicaemia, otitis media, urinary tract infections, tuberculosis, leprosy, protozoal infections, helminthiasis, HIV, fungal infections
10. **Skin and sexually transmitted diseases** – Psoriasis, acne, eczema, scabies, syphilis and gonorrhoea
11. **General principles of cancer chemotherapy** – Oncology cell cycle, commonly used cytotoxic drugs, chemotherapy of lung cancer, breast cancer, haematological malignancies, chemotherapy induced nausea and vomiting, Palliative care
12. **Pain management** – Pain pathways, analgesics and NSAIDs, opiates, local anaesthetics, neuralgia including trigeminal.

III. PHARMACOEPIDERMIOLOGY AND PHARMACOECONOMICS

1. **Pharmacoepidemiology:** Definition and scope, concept of risk in pharmacoepidemiology, measurement of outcomes in pharmacoepidemiology, pharmacoepidemiological methods
2. **Pharmaeconomics:** Definition and need of pharmacoeconomics, evaluation methods of pharmacoeconomics.