

R15
B.Pharm III-II Semester

S. No.	Course Code	Subject	L	T	P	C
1.	15R00601	Pharmacology-II	3	1	-	3
2.	15R00602	Pharmaceutical Analysis-II	3	1	-	3
3.	15R00603	Biopharmaceutics & Pharmacokinetics	3	1	-	3
4.	15R00604	Pharmaceutical Jurisprudence	3	1	-	3
5.	15R00605 15R00606 15R00607	CBCC-I 1. Pharmacy Administration 2. Clinical Trials 3. Cosmetic Technology	3	1	-	3
6.	15R00608	Pharmacology-II Laboratory	-	-	4	2
7.	15R00609	Pharmaceutical Analysis-II Laboratory	-	-	4	2
8.	15R00610	Biopharmaceutics & Pharmacokinetics Laboratory	-	-	4	2
9.	15A52602	Advanced English Language Communication Skills (AELCS) Laboratory (Audit Course)	-	-	2	-
10.	15R00611	Comprehensive Online Exam - II	-	-	-	1
Total:			15	5	16	22

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	PHARMACOLOGY – II	Code	15R00601
Course Year	B.Pharmacy III year	Sem	II
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30Marks
Credits	3		

Scope: This subject will provide an opportunity for the student to learn pharmacological information about the drugs. In this subject drugs acting on cardiovascular system, drugs acting on hematopoietic system, drugs acting on renal system, drugs acting on respiratory system and drugs acting on autacoids will be taught.

Objectives: Upon completion of the subject student shall be able to

- Understand various pharmacological aspects like mechanism of action, pharmacokinetics, side effects, drug interactions, contraindications and indications of drugs falling under below mentioned chapters.
- Correlate and apply the knowledge.
- Handle the animals and carry out the experiments on animals

Outcomes:

- Acquire the knowledge in basic mechanism of action of drugs.
- Therapeutic uses of drugs of the following chapters.

UNIT I
Drugs acting on cardiovascular System

- Pharmacology of drugs used in hypertension and CHF
- Pharmacology of drugs used in coronary artery diseases (Atherosclerosis, Angina and MI)
- Pharmacology of drugs used in arrhythmias
- Shock and treatment of different types of shock

UNIT II Drugs acting on hematopoietic system

- Coagulants, anticoagulants
- Fibrinolytics, antifibrinolytics, antiplatelet drugs
- Hematinics and plasma expanders

R15**UNIT III****a. Drugs acting on urinary system**

- i) Diuretics and antidiuretics

b. Drugs acting on respiratory system

- i) Antiasthmatics
- ii) Antitussives, expectorants and respiratory stimulants

UNIT IV**Autacoids**

- a. Amine autacoids- Histamine and 5-HT
- b. Lipid derived autacoids-Prostaglandins, thromboxanes and leukotrienes.
- c. Peptide autacoids- Angiotensin, bradykinin

UNIT V**Hormones and hormone antagonists**

- a. Insulin, Oral hypoglycaemic agents
- b. Thyroid and antithyroid drugs
- c. Adrenocortical steroids and their analogues
- d. Uterine stimulants and relaxants

Text Books:

1. H.P Rang, M. M. Dale & J.M. Ritter, Pharmacology, Churchill Livingstone, 4th Ed.
2. J.G. Hardman and Lee E. Limbird, Goodman & Gilman, The Pharmacological basis of therapeutics, McGraw-Hill, Health Professions Division.
3. Illustrated Pharmacology by Lippincott

References:

1. Tripathi, Essentials of Medical Pharmacology, Jaypee Brothers, Latest Edition
2. Sathoskar, Pharmacology and pharmacotherapeutics Vol. 1 & 2, Published by Popular Prakashan, Mumbai.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	PHARMACEUTICAL ANALYSIS- II	Code	15R00602
CourseYear	B.Pharmacy III year	Sem	II
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30Marks
Credits	3		

Scope: This subject will provide an opportunity for the student to learn about the spectroscopic and chromatographic techniques.

Objective:

- The course is designed to explore the knowledge in modern analytical instrumental techniques i.e., both spectroscopy and chromatography.
- The course helps to assess the process for identification, determination, quantification and purification of a substance and separation of the components of a solution or mixture.

Outcome:

1. To gain knowledge on basic fundamentals of modern analytical instrumental techniques.
2. Analyze the drug structure, identification, purity determination, and quantification of the drug substance.

UNIT I

a) Study of separations, introduction to chromatography, classifications, types, various stationary and mobile phase in the following techniques and their applications in pharmacy (IP 2010 and 2014).

b) **Column chromatography:** Adsorption and partition theory, concept of theoretical plates, HETP, adsorbents used, preparation, procedure and methods of detection.

c) **Paper Chromatography:** Theory, different techniques employed, filter papers used, qualitative and quantitative detection.

e) **Thin layer chromatography:** Principle, 1D and 2D techniques, preparation of plates, R_f , R_x , R_m values and detection techniques. Concept of HPTLC.

f) **Ion Pair Chromatography,** Ion suppression and Ion Exchange Chromatography, Introduction to Theory and Principle, Instrumentation. Advantages and limitations. Pharmaceutical and other Applications.

g) **Size exclusion chromatography:** Introduction, principle, instrument. Column packing, Applications.

R15**UNIT-II**

Gas Chromatography: Principle, adsorption isotherm and its relation to tailing and fronting, Instrumentation - carrier gas, flow regulators, injectors columns, detectors. Various parameters used in GC analysis. Brief note on GC-MS.

UNIT III

a) Basic Principles (exothermic and endothermic reactions), Instrumentation and applications of the following: Differential Scanning Colorimetry (DSC), DTA, & TGA in analysis of Pharmaceuticals,

b) Quality Assurance

Concept of Quality control and Quality Assurance, ISO 9000, TQM, QC, Vs QA, Concepts of ICH, GMP and GLP, Calibration of UV and IR, Validation of analytical methods as per ICH guidelines.

UNIT IV

HPLC: Principle, Instrumentation- mobile phase, degassing, pumps, injectors, columns, detectors. Normal Phase Vs Reverse Phase HPLC, Isocratic and gradient elution in RP-HPLC. Various parameters in chromatogram of HPLC.

UNIT V

Optical Rotatory dispersion: Principle of optical activity, optical purity, concept of Optical Rotatory dispersion (ORD).

XRD: Production X-ray, types of X-rays, Braggs law, Octant rule, Cotton effect, XRD pattern in identification and comparison of polymorphs with examples.

Radio Immuno Assay & Enzyme Linked Immuno Sorbate Assay: Principle and procedure of RIA, Principle, Types, Procedures of ELISA and application of RIA and ELISA in various diagnosis.

R15**Text books:**

1. Willard HH, Merritt LL, Dean JA and Settle FA. (2001). *Instrumental Methods of Analysis*, 7th ed., CBS Publishers and Distributors, Delhi, ISBN: 9788123909431.
2. Douglas A. Skoog, F. James Holler and Stanley R. Crouch. (2006). *Principles of Instrumental Analysis*, Cengage Learning; 6th edition, ISBN-10: 0495012017

References:

1. Settle, *Handbook of Instrumental Techniques for Analytical Chemistry*. Prentice Hall.
2. Robert M Silverstein. *Spectrometric Identification of Organic compounds*. Sixth edition, John Wiley & Sons, 2004.
3. B.K. Sharma, *Instrumental Chemical Analysis*, Goel Publishers.

R15
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	BIOPHARMACEUTICS AND PHARMACOKINETICS	Code	15R00603
Course Year	B. Pharmacy III year	Sem	II
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30Marks
Credits	3		

Scope: This subject will provide an opportunity for the student to learn about the Biopharmaceutics and pharmacokinetic.

Objective:

- The course is designed to explore the knowledge in ADME.
- The course helps to learn significance of plasma drug concentration measurement.

Outcomes:

1. Graduate will acquire knowledge on the factors influencing absorption, distribution, protein binding and also on pharmacokinetic models.
2. Able to calculate the pharmacokinetic parameters based on plasma level-time data & urine data.
3. Understand the importance of clinical pharmacokinetics and the bioavailability and bio equivalence studies.

UNIT – I

Biopharmaceutics, Pharmacokinetics and Pharmacodynamics. Structure of GI membrane. Routes of drug administration and absorption from different routes.

Drug Absorption. Mechanisms of GI absorption, physico-chemical, biological and dosage form factors influencing absorption.

Drug distribution. Factors affecting drug distribution, physiological barriers of drug diffusion, apparent volume of distribution, drug binding to blood, tissues, protein binding – factors affecting, significance and kinetics of protein binding.

UNIT – II

Drug Metabolism: Pathways of drug metabolism. Phase-I (oxidative, reductive and hydrolytic reactions). Phase II reactions (conjugation) Enzyme induction and inhibition, hepatic clearance, pharmacological activity of metabolites, first pass effect.

Drug excretion. Glomerular filtration, tubular secretion and reabsorption, effect of pH and other drugs. Clearance concept, excretion through bile, feces, lungs and skin in brief.

R15**UNIT – III**

Bioavailability and bioequivalence: concept of equivalents, Definitions of various types of equivalents, types of Bioavailability studies, measurement of Bioavailability, plasma level and urinary excretion studies. Bioequivalence study design, IVIVC.

UNIT – IV

Pharmacokinetics. Basic considerations, compartment modeling, one compartment open model - i.v. bolus and extra vascular administration, urinary excretion studies. Apparent volume of distribution, elimination rate constant, biological half life, area under the curve and clearance. Calculation of pharmacokinetic parameters. Method of residuals, Wagner and Nelson method, excretion rate method, sigma minus method. Solving of simple problems

UNIT – V

Nonlinear kinetics. Non compartmental models, reasons for non linearity, concepts of linearity and non linearity, Michaelis- Menten equation and its significance.

Text Books:

1. L. Shargel and ABC Yu, textbook of applied biopharmaceutics & Pharmacokinetics, 4th edn, Appleton – century – crofts, Connecticut, 2004.
2. Milo Gibaldi, Biopharmaceutics and clinical pharmacokinetics 4/Edn. Pharma Book
3. Syndicate.Hyderabad.
4. DM Brahmarkar and SB Jaiswal, biopharmaceutics and pharmacokinetics- a treatise, vallabh prakasham, Delhi.

Reference Books:

1. Ronald & trouser. Clinical pharmacokinetics concepts & applications. 3rd ed, wolterskluwer Pvt Ltd., 2007.
2. Robert E notary, Biopharmaceutics and pharmacokinetics – an introduction, marcel dekker inc., NY
3. Basic pharmacokinetics by Hedaya, CRC press.

R15**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

Subject	PHARMACEUTICAL JURISPRUDENCE	Code	15R00604
Course Year	B.Pharmacy III year	Sem	II
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30Marks
Credits	3		

Scope: This subject will provide an opportunity for the student to review Pharmaceutical Legislations, Pharmaceutical ethics & policy.

Objectives:

- The course is designed to explore the knowledge Pharmaceutical Education.
- The course helps to learn various laws and acts in pharmacy.

Outcomes:

1. Graduate will acquire knowledge on Pharmaceutical Education.
2. Able to understand drugs & pharmaceutical industry.
3. Understand the importance of Pharmacy Acts.

UNIT I**Introduction**

- a. Pharmaceutical Legislations - A brief review
- b. Drugs & Pharmaceutical Industry - A brief review
- c. Pharmaceutical Education - A brief review.
- d. Pharmaceutical ethics & policy
- e. Pharmacy Act 1948

UNIT II

Drugs and Cosmetics Act 1940 and Rules 1945

UNIT III

Narcotic Drugs & Psychotropic Substances Act 1985

UNIT IV

Drugs (Prices Control) Order 1995.
Medicinal & Toilet Preparations (Excise Duties) Act 1955
Drugs and Magic Remedies (Objectionable Advertisements) Act 1954 and Rules 1955.

R15**UNIT V**

Study of the salient features of the following.

- a. Prevention of Cruelty to animals Act 1960.
- b. Medical termination of pregnancy act 1970 and rules 1975
- c. Factories Act 1948.
- d. WTO, GATT and The Indian Patents Act 1970

Text Books:

1. B.M.Mithal, Text book of Forensic Pharmacy, publ by Vallabh Prakashan
2. Suresh.B, Text book of Forensic Pharmacy
3. C.K.Kokate&S.B.Gokhale, Textbook of Forensic Pharmacy, Pharmabook, Syndicate.
4. N.k.jain. Textbook of Forensic Pharmacy. 7thed, Vallabh prakashan, 2007.

Reference Books:

1. Bare Acts and Rules Publ by Govt of India/state Govt from time to time.
2. Pharmaceutical policy of India
3. Notification from NPPA
4. Vijay Malik, Drugs & Cosmetics act 1940 and Rules, Eastern Law House Co. Delhi, Kolkata.
5. K.Sampath, Pharmaceutical Jurisprudence (Forensic Pharmacy) Jai Publishers.

R15**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

Subject	PHARMACY ADMINISTRATION (CBCC-I)	Code	15R00605
Course Year	B.Pharmacy III year	Sem	II
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30Marks
Credits	3		

Scope: This subject will provide an opportunity for the student to learn about the Organization of Distribution and Marketing, Principles of drug store and community pharmacy administration.

Objectives:

- To learn Manufacturing Management, work study insurance in pharma industry.
- To gain knowledge on drug store planning and layout.

Outcome:

1. To gain knowledge on basic fundamentals of management and administration in pharma industry.
2. To acquire knowledge on organization of distribution and marketing.
(organization =correct spelling)

UNIT – I**Features of Business Organizations & New Economic Environment:**

Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-Liberalisation scenario.

Manufacturing Management: Goals of Production Management and Organization– Production, Planning and Control – Plant location - Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production).

UNIT – II

Work Study -Basic procedure involved in Method Study and Work Measurement-Statistical Quality Control: X chart, R chart, c chart, p chart, (simple Problems), Acceptance Sampling, Deming's contribution to quality.

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Organization of Distribution and Marketing: Functions of Marketing, Marketing Strategies based on Product Life Cycle., Channels of distribution – Factors influencing channels of distribution, sales organization and sales promotion.

UNIT - III

Pharma Industry: Growth of Pharma Industry in India – current status and its role in building national economy and national health – Structure of Pharma Industry in India – PSUs in Pharma Industry –Progress in the manufacture of basic drugs, synthetic and drugs of vegetable origin. Export and import of drugs and pharmaceuticals – Export and import Trade.

UNIT – IV

Insurance and Pharma: Various types of insurance including marine and health insurance.

UNIT – V

Principles of drug store and community pharmacy administration:

Drug store planning and layout, sales promotion and salesmanship in drug store. Accounting records in drug stores.

Text Books

1. Aryasri and Subbarao, Pharmaceutical Administration, TMH.
2. Smarta, Strategic Pharma Marketing
3. G.Vidya Sagar, Pharmaceutical Industrial Management. PBS/BS Publication 2005.

References

1. Subbarao Chaganti, Pharmaceutical Marketing in India – Concepts and Strategy Cases, Pharma Book Syndicate.
2. O.P.Khanna, Industrial Management, Dhanpatrai, New Delhi.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	CLINICAL TRIALS (CBCC-I)	Code	15R00606
Course year	B. Pharmacy III year	Semester	II
Theory	3 hrs/week	Tutorial	1 hr / week
End Exam	70 Marks	Internal marks	30 Marks
Credits	3		

Scope: This subject will provide an opportunity for the student to learn about the Introduction to clinical trials.

Objective:

- To learn Phase I, II and III levels of clinical trials.
- To gain knowledge on statistical approaches for various endpoints.

Outcome:

1. To gain knowledge on clinical trials.
2. To acquire knowledge on Phase I, II, III toxicity studies and dosage calculations.
3. To learn the selection of volunteers for clinical trials.

UNIT –I

Overview of clinical trials

Introduction to clinical trials, Issues in modern clinical trials, Study population.

UNIT –II

Phase I trials:

Up-and-down design, Single patient per cohort design, Titration design.

Phase II trials:

Randomized dose ranging design, Randomized titration design, Two-stage phase II designs, Multistage design, Bayesian design, Randomized phase II design, Multiple outcomes design.

R15**UNIT –III****Phase III trials:**

Randomized controlled clinical trials, Uncontrolled trials, Historical controls, Crossover designs, Withdrawal studies, Factorial designs, Group allocation designs, Studies of equivalency.

Randomization methods: Simple randomization, Replacement randomization, Random permuted blocks, Blinded studies.

UNIT –IV

Baseline assessment, subgroup analysis, recruitment, multicenter trials: Use of baseline data, Analysis of baseline comparability, Balance and imbalance, Difficulties of subgroup analysis, Recruitment of study subjects, Multicenter trials

UNIT –V

Statistical approaches for various endpoints: t-test, chisquare test, Fisher's exact test, analysis of variance, regression analysis, longitudinal analysis, nonparametric statistics

Text Books

1. Chow SC, Liu JP. Design and Analysis of Clinical Trials: Concepts and Methodologies. New York, NY: Wiley; 1998.
2. Geller N, Chow SC. Advances in Clinical Trial Biostatistics. New York, NY: Marcel Dekker; 2004.

Reference Books

1. *Interdisciplinary Statistics*. New York, NY: Chapman & Hall; 1997.
2. Jennison C, Turnbull BW. *Group Sequential Methods with Applications to Clinical Trials*. New York, NY: Chapman & Hall; 2000.
3. Machin D, Day S, Green S, Everitt B, George S. *Textbook of Clinical Trials*. New York, NY: Wiley; 2004.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	COSMETIC TECHNOLOGY (CBCC-I)	Code	15R00607
Course year	B. Pharmacy III year	Semester	II
Theory	3 hrs/week	Tutorial	1 hr / week
End Exam	70 Marks	Internal marks	30 Marks
Credits	3		

Scope: This subject will provide an opportunity for the student to learn about Cosmetics, scientific background technology and its future.

Objectives: Upon completion of the subject student shall be able to

- Understand various formulation aspects of cosmetic preparations.
- Provide knowledge on excipients & its applications in cosmetics.

Outcomes:

- Acquire skill in preparation of different types of cosmetics.
- Demonstrate the handling of equipment for evaluation of various cosmetics.
- Acquire the knowledge of processing of cosmetic, selection of materials for containers.

UNIT – I

Introduction of Cosmetics: Purposes of Cosmetics meaning of Cosmetics and cosmeceuticals. Classification of Cosmetics Quality characteristics and Quality Assurance Development Process of Cosmetics. Scientific background technology and its future.

UNIT – II

Excipients & its applications in cosmetics.

a. Oily Materials: Introduction, Oils and Fats, Wax, Hydrocarbons, Higher Fatty Acids, Higher Alcohols, Esters, Silicones.

b. Surface Active Agents: Introduction Anionic Surfactant, Cationic, Surfactants, Amphoteric Surfactant, Non-ionic, Surfactant. Other Surfactants.

c. Humectants: Introduction, Choice of Humectants Unusual Humectants, Special Uses of Humectants.

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d. Antioxidants: Introduction, General Oxidative theory, Measurement of Oxidation and Assessment of Oxidant efficiency, Choice of Antioxidant.

UNIT – III

Safety of Cosmetics: Basic Concept of Cosmetic Safety, Safety test items & Evaluation method: Skin irritation, sensitization, Testing on Human (Patch test, Usage test)

UNIT – IV

Cosmetics Containers: Introduction, Characteristics required by Cosmetic Containers- Quality Maintenance functional Design, Optimum Packaging.

Types of Cosmetic Containers:- Narrow Mouth bottles, Wide Mouth Bottles (Containers), Tubes, tubular Containers, Powders Containers, Compact containers, Stick containers, pencil containers Applicator containers.

UNIT – V

Material of construction for containers: Types of Material Forming and processing methods. Container design procedure. Material test methods & Specifications. Trends in Container materials

Text Books

- 1) New Cosmetic Science by Takeo Mitsui
- 2) Harry's Cosmetology.

Reference Books

- 1) Cosmetic Science & Technology by Sagarin C.B.
- 2) Hand book of Cosmetic science & Technology by Marc paye, Andre O. Barel.
- 3) Cooper & Gunn Dispensing for Pharmaceutical Students.

R15**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

Subject	PHARMACOLOGY – II LABORATORY	Code	15R00608
CourseYear	B. Pharmacy III year	Sem	II
Lab	4hrs/week	Tutorial	Nil
End exam	70 Marks	Internal exam	30Marks
Credits	2		

Scope:

- To find out the drugs that is beneficial in clinics.
- Study the mechanism of Action and Site of action and their toxicities.
- Study the actions of drugs existing in Preclinical

Objectives:

To know and understand pharmacological investigation techniques applied in the research

Outcomes:

- Acquires ability to apply experimental approaches in characterization of drugs.
- Able to use the knowledge to screen novel drugs in different animal models.

A. EXPERIMENTAL PART

- Experiments on Isolated Preparations:
 - Calculate the PA_2 value of atropine using acetylcholine as an agonist on rat ileum preparation.
 - Calculate the PA_2 value of chlorpheniramine using histamine as an agonist on guinea pig ileum preparation.
 - Find out the strength of the given sample (e.g. Acetylcholine, Histamine, 5-HT, Oxytocin etc.) using a suitable isolated muscle preparation by
 - Interpolation bioassay
 - Matching or bracketing bioassay
 - Three point bioassay
 - Four point bioassay

R15**2. Experiments on intact animals like**

- a. Study of drug induced catatonia in rats
- b. Study of muscle relaxant activity (rotarod apparatus)
- c. Study of antipsychotic activity (pole climb response apparatus)
- d. Study of antianxiety activity (elevated plus maze)
- e. Study of analgesic activity (analgesimeter)
- f. Study of anti-inflammatory activity (plethysmometer)
- g. Study of antidepressant activity (swim test & tail suspension test)
- h. Study of anticonvulsant activity (electroconvulso meter)

i. Study of spontaneous motor activity and locomotor activity (actophotometer)**B. DEMO/ WORK SHOP**

- a. Screening of antiulcer activity
- b. Invitro antioxidant activity
- c. Screening of antihistaminic activity (histamine chamber)

C. SEMINAR/ ASSIGNMENT/ GROUP DISCUSSION

- a. BABE studies
- b. Invitro-invivo correlation studies
- c. Pharmacovigilance
- d. Biostatistics and its application

REFERENCES

1. Practicals in pharmacology By Dr.R.K.Goyal
2. Handbook of experimental pharmacology By S.K.Kulakarni
3. Experimental pharmacology By M.N.Ghosh
4. Experimental Pharmacology and Toxicology By Dr.B.M.VrushabendraSwamy and Prof.K.N.Jayaveera, S.Chand & Co.,

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Subject	PHARMACEUTICAL ANALYSIS-II LABORATORY	Course Code	15R00609
Course Year	B. Pharmacy III Year	Semester	II
Lab	4 Hrs/ Week	Tutorial	NIL
End Exam	70 Marks	Internal Exam	30 marks
Credits	2		

Scope:

This subject will provide an opportunity for the student on handling of modern analytical instruments or equipment.

Objective:

- The course is designed to explore the knowledge in handling of modern analytical instruments or equipment.
- The course helps to understand the instrumental or equipment operational procedures

Outcomes:

- Analyze the drug compound independently by using the instrument.
- Design and deepen their practical skills so as to be capable of performing the analysis in a good manner.
- Compare the results in determination of percent purity of drug performed by self with monographs.

I. Experiments

1. Determination of λ - max of KMnO_4
2. Determination of λ - max of any one drug
3. Determination of isobestic point of any 2 drugs.
4. Estimate the unknown concentration of Paracetamol by UV Spectrophotometric method.
5. Estimate the unknown concentration of ciprofloxacin in the ciprofloxacin injection by colorimetric method.
6. Estimate the unknown concentration of Riboflavin by fluorimetric method.
7. Assay of Ibuprofen (any one drug) by UV-spectrophotometric method using calibrative curve method.
8. Assay of Paracetamol (any one drug) by UV-spectrophotometry-A (1%, 1 cm) method.

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9. Assay of Pheniramine Maleate by UV-spectrophotometry-A (1%, 1 cm) method.
10. Study of quenching effect of quinine by Fluorimetry.
11. Determination of Na/K ions by Flame photometry.
12. Interpretation of UV Spectra.
13. Interpretation of IR Spectra
14. Interpretation of Mass Spectra
15. Interpretation of NMR Spectra

II. Demo/ Work Shop

1. Demonstration of UV instrumentation of single and double beam spectrophotometer.
2. Demonstration of IR instrumentation including KBr pressed pellet technique, ATR, liquid film technique.

III. Seminar/Assignment/Group Discussion

1. Determination of two drugs simultaneously by using UV spectrophotometer.
2. Reagent mechanisms: Ninhydrin, FC, MBTH, PDAC, PDAB (at least two)

LIST OF MINIMUM INSTRUMENTS/EQUIPMENTS REQUIRED

1. Fluorimeter
2. UV-Spectrophotometer
3. Digital balance
4. IR Spectrometer
5. Digital Colorimeter
6. Flame photometry
7. Hot air oven
8. Adequate glassware

REFERENCES:

1. Monographs: Indian Pharmacopoeia, British Pharmacopoeia, United States of Pharmacopoeia, European Pharmacopoeia, Japanese Pharmacopoeia.
2. AH Beckett & Stenlake, Text book of Practical Pharmaceutical chemistry, Vol. II Continuum International Publishing Group, Althone.
3. Martindale: The Complete Drug Reference. 34th and 35th editions.

R15**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

Subject	BIOPHARMACEUTICS AND PHARMACOKINETICS LABORAOTORY	Code	15R00610
Course Year	B. Pharmacy III year	Sem	II
Lab	4hrs/week	Tutorial	Nil
End exam	70 Marks	Internal exam	30Marks
Credits	2		

Scope: This subject will provide an opportunity for the student to learn about the Biopharmaceutics and pharmacokinetic.

Objective:

- The course is designed to analysis of biological samples for drug content.
- The course helps to estimation of the pharmacokinetic parameters.

Outcomes:

1. Graduate will acquire knowledge on analysis of biological samples for drug content.
2. Able to calculate the pharmacokinetic parameters based on plasma level-time data & urine data.
3. Understand the statistical treatment of pharmaceutical data.

I. EXPERIMENTS

1. Analysis of biological samples for drug content and estimation of the pharmacokinetic parameters.
2. *In vitro* evaluation of tablet/capsule for drug release
3. Drug-protein binding studies.
4. Statistical treatment of pharmaceutical data.
5. Problems related to pharmacokinetics – determination of PK Parameters
6. Problems related to bioavailability and bioequivalence.

II. DEMO/ WORKSHOP

1. Absorption studies – *in vitro*.
2. Experiments designed for the estimation of various pharmacokinetic parameters.

III. SEMINAR/ASSIGNMENT/GROUP DISCUSSION

Chronopharmacokinetics.

R15**Text Books:**

1. L. Shargel and ABC Yu, textbook of applied biopharmaceutics & Pharmacokinetics, 4th edn, Appleton – century – crofts, Connecticut, 2004.
2. Milo Gibaldi, Biopharmaceutics and clinical pharmacokinetics 4/Edn. Pharma BookSyndicate.Hyderabad.
3. DM Brahmankar and SB Jaiswal, biopharmaceutics and pharmacokinetics- a treatise, vallabh prakasham, Delhi.

Reference Books:

1. Ronald & trouser. Clinical pharmacokinetics concepts & applications. 3rd ed, wolterskluwer Pvt Ltd., 2007.
2. Robert E notary, Biopharmaceutics and pharmacokinetics – an introduction, marcel dekker inc., NY
3. Basic pharmacokinetics by Hedaya, CRC press.

R15**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR****B. Pharmacy III-II Sem.**

L	T	P	C
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**15A52602 ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS
(AELCS) LAB (Audit Course)**

1. INTRODUCTION

With increased globalization and rapidly changing industry expectations, employers are looking for the wide cluster of skills to cater to the changing demand. The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information and to organise ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Taking part in social and professional communication.

2. OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

R15**3. SYLLABUS:**

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

UNIT-I: COMMUNICATION SKILLS

1. Reading Comprehension
2. Listening comprehension
3. Vocabulary Development
4. Common Errors

UNIT-II: WRITING SKILLS

1. Report writing
2. Resume Preparation
3. E-mail Writing

UNIT-III: PRESENTATION SKILLS

1. Oral presentation
2. Power point presentation
3. Poster presentation

UNIT-IV: GETTING READY FOR JOB

1. Debates
2. Group discussions
3. Job Interviews

UNIT-V: INTERPERSONAL SKILLS

1. Time Management
2. Problem Solving & Decision Making
3. Etiquettes

4. LEARNING OUTCOMES:

- Accomplishment of sound vocabulary and its proper use contextually
- Flair in Writing and felicity in written expression.
- Enhanced job prospects.
- Effective Speaking Abilities
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5. MINIMUM REQUIREMENT:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infra-structural facilities to accommodate at least 60 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system

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- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

6. SUGGESTED SOFTWARE:

The software consisting of the prescribed topics elaborated above should be procured and G

1. **Walden Infotech: Advanced English Communication Skills Lab**
2. **K-VAN SOLUTIONS-Advanced English Language Communication Skills lab**
3. **DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.**
4. **TOEFL & GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)**
5. **Train2success.com**

7. BOOKS RECOMMENDED:

1. **Objective English for Competitive Exams**, Hari Mohana Prasad, 4th edition, Tata Mc Graw Hill.
2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, O U Press 3rd Edn. 2015.
3. **Essay Writing for Exams**, Audrone Raskauskiene, Irena Ragaisiene & Ramute Zemaitiene, OUP, 2016
4. **Soft Skills for Everyone**, Butterfield Jeff, Cengage Publications, 2011.
5. **Management Shapers Series** by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
6. **Campus to Corporate**, Gangadhar Joshi, Sage Publications, 2015
7. **Communicative English**, E Suresh Kumar & P.Sreehari, Orient Blackswan, 2009.
8. **English for Success in Competitive Exams**, Philip Sunil Solomon OUP, 2015