



w.e.f. 2010-2011 academic year

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA-533003, Andhra Pradesh (India)

B.PHARMACY

COURSE STRUCTURE

I YEAR

I SEMESTER

S. No.	Subject	T	P	Credits
1	English-I	3	-	2
2	Mathematics-I/ Biology-I	3	-	2
3	Anatomy, Physiology & Health education-I	3	-	2
4	Pharm. Inorganic chemistry-I	3	-	2
5	Pharm. Organic Chemistry-I	3	-	2
6	Physical Pharmacy-I	3	-	2
7	Computer Programming	3	-	2
8	English Communications Skills Lab-1	-	3	2
9	Biology Lab	-	3	2
10	Pharm. Inorganic Chemistry-I Lab	-	3	2
11	Computer Lab	-	3	2
Total				2

I YEAR

II SEMESTER

S. No.	Subject	T	P	Credits
1	English-II	3	-	2
2	Mathematics-II/ Biology-II	3	-	2
3	Anatomy, Physiology & Health education-II	3	-	2
4	Pharm. Inorganic chemistry-II	3	-	2
5	Pharm. Organic chemistry-II	3	-	2
6	Physical Pharmacy-II	3	-	2
7	Environmental studies	3	-	2
8	English communication skills Lab-II	-	3	2
9	Anatomy, Physiology & Health education-II Lab	-	3	2
10	Pharm. Organic chemistry-II Lab	-	3	2
11	Physical Pharmacy-II Lab	-	3	2
Total				22



w.e.f. 2010-2011 academic year

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B.PHARMACY

COURSE STRUCTURE

II YEAR

I SEMESTER

S. No.	Subject	T	P	Credits
1	Pharmaceutical unit operation-I (Pharmaceutical Engg.,)	4	-	4
2	Pharmacognosy-1	4	-	4
3	Physical Pharmaceutics	4	-	4
4	Advanced Pharmaceutical Organic Chemistry	4	-	4
5	Health Education & Pathophysiology	4	-	4
6	Pharmacognosy-1 Lab	-	3	2
7	Physical Pharmaceutics Lab	-	3	2
8	Advanced Pharmaceutical Organic Chemistry Lab	-	3	2
9	Health education & Pathophysiology Lab	-	3	2
10	English Communication Practice	-	2	1
Total				29

II YEAR

II SEMESTER

S. No.	Subject	T	P	Credits
1	Pharmaceutical unit operation-II	4	-	4
2	Pharmaceutical Analysis-I	4	-	4
3	Pharmacognosy -I	4	-	4
4	Dispensing & Hospital Pharmacy	4	-	4
5	Biostatistics	4	-	4
6	Pharmaceutical unit operation-II Lab	-	3	2
7	Pharmaceutical Analysis-I	-	3	2
8	Pharmacognosy –I Lab	-	3	2
9	Dispensing & Hospital Pharmacy Lab	-	3	2
10	English Communication Practice	-	2	1
Total				2



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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
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B.PHARMACY

COURSE STRUCTURE

III YEAR

I SEMESTER

S. No.	Subject	T	P	Credits
1	Pharm. Biochemistry	4	-	4
2	Pharm. Microbiology	4	-	4
3	Chemistry of Natural Drugs	4	-	4
4	Pharm. Technology-I	4	-	4
5	Pharmacology-I	4	-	4
6	Pharm. Biochemistry Lab	-	3	2
7	Pharm. Microbiology Lab	-	3	2
8	Chemistry of Natural Drugs Lab	-	3	2
9	Pharma. Technology-I Lab	-	3	2
10	Pharmacology-1 Lab	-	3	2
Total				30

III YEAR

II SEMESTER

S. No.	Subject	T	P	Credits
1	Medicinal Chemistry-I	4	-	4
2	Pharm. Technology-II	4	-	4
3	Biopharmaceutics & Pharmacokinetics	4	-	3
4	Clinical Pharmacy	4	-	3
5	Pharmaceutical Biotechnology	4	-	3
6	Medicinal Chemistry-I Lab	-	3	2
7	Pharm. Technology-II Lab	-	3	2
8	Biopharmaceutics & Pharmacokinetics Lab	-	3	2
9	Pharmaceutical Biotechnology Lab	-	3	2
9	Tutorials	-	3	-
Total				25



w.e.f. 2010-2011 academic year

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B.PHARMACY

COURSE STRUCTURE

IV YEAR

I SEMESTER

S. No.	Subject	T	P	Credits
1	Pharmaceutical Analysis-II	4	-	4
2	Pharmacognosy-III	4	-	3
3	Medicinal Chemistry-II	4	-	3
4	Pharmaceutical Jurisprudence	4	-	3
5	Pharmaceutical Management	4	-	3
6	Pharmaceutical Analysis-II Lab	-	3	2
7	Pharmacognosy-III Lab	-	3	2
8	Medicinal Chemistry-II Lab	-	3	2
9	Industrial Training & Seminar	-	-	-
Total				22

IV YEAR

II SEMESTER

S. No.	Subject	T	P	Credits
1	Medicinal Chemistry-III	4	-	3
2	Pharmacology -II	4	-	3
3	Controlled release & Novel Drug Delivery Systems	4	-	3
4	Regulatory Affairs, IPR & Patents	4	-	-
5	Medicinal Chemistry-III Lab	-	3	2
6	Pharmacology -II Lab	-	3	2
7	Project work*	-	-	6
8	Comprehensive viva	-	-	2
9	Tutorial	3	-	-
Total				21

* Suggested areas for project work

1. Pharmaceutical Technology & Industrial pharmacy;
2. Pharmacology & Clinical pharmacy;
3. Pharmacognosy & Phytochemistry
4. Pharmaceutical & Medicinal Chemistry
5. Pharmaceutical Analysis & Quality Assurance
6. Pharmaceutical biotechnology
7. Pharmaceutical Management & Marketing

1.Award of B.Pharm Degree

A student will be declared eligible for the award of the B.Pharm Degree if he fulfils the following academic regulations:

- 1.1 Pursued a course of study for not less than four academic years and not more than eight academic years.
- 1.2 Register for all the 200 credits and secure all the 200 credits.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B. Pharmacy – I Sem.

PHARMACEUTICAL BIOCHEMISTRY

UNIT - I

Bio chemical organization of the cell, molecular constituents of membrane, active & passive transport process, sodium and potassium pumps, osmoregulation and homeostasis.

UNIT – II

Bio-energetics & Redox Reactions: The concept of free energy, laws of thermodynamics. Determination of change in free energy from equilibrium constant & reduction potential. Production of ATP and its biological significance.

Redox reactions, redox potential, the respiratory chain & its role in energy capture & its control. Oxidative phosphorylation & its energetics & E.T.S mechanism of actions.

UNIT – III

Enzymes & Co-Enzymes: Classification, Structure, mechanism of action, properties, factors affecting enzymes action. Activators & de activators of enzymes, enzyme kinetics & enzyme inhibitions, repressions with reference to drug action.

UNIT - IV

Introduction to Bio-Molecules: Structure, classification, cell and biological functions of carbohydrates, proteins, lipids, nucleic acids (DNA & RNA) vitamins & minerals.

UNIT - V

Metabolism of Carbohydrates: Glycolysis, glycogenolysis, gluconeogenesis, Krebs' cycle, HMP & uronic acid pathways, anaerobic respiration in muscle.

UNIT – VI

Metabolism of Proteins: *Amino acid structure & classifications, de amination, Trans-amination, de-carboxylation, Urea cycle, Metabolism & examples:*

Valine, cystine, cysteine, tryptophan, tyrosine, methionine.

UNIT – VII

Metabolism of Lipids:

Oxidations : Alpha, Beta, Gamma & Omega oxidations of fatty acids, bio-synthesis of fatty acids, cholesterol, ketogenesis.

UNIT – VIII

Introduction to xenobiotic metabolism, detoxification, conjugation, prostaglandins & related products (Eicosanoids).

TEXT BOOKS

1. Harper, Biochemistry
2. A.L.Lehninger, Principles of Biochemistry.
3. J.L.Jain, Fundamentals of Biochemistry
4. Satyanarayana, Text Book of Biochemistry
5. Rama Rao, Text Book of Bio Chemistry.
6. Conn, Outlines of biochemistry

REFERENCES

1. L.Stryer, Text Book of Bio Chemistry.
2. E.E Conn & P.K. Stumpf, Outlines of Biochemistry by, Publ, John Wiley & sons, New York.
3. B.Harrow and A. Mazur, Text Book of Biochemistry, WB Saunders Co., Philadelphia.
4. Boyer Rodney, Modern experimental Bio Chemistry.
5. West, Edward Text Book of Biochemistry.
6. Conn, Outlines of Biochemistry.
7. Plummer, Practical Bio Chemistry.
8. Denniston, Topping & Caret; General, Organic, and Biochemistry, McGraw-Hill



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Pharmacy – I Sem.

PHARMACEUTICAL MICROBIOLOGY

UNIT - I

Introduction to Microbiology: Origin, scope and discovery of spontaneous generations theory, contributions of Antony Von Lewvonhock, Pasteur, Koch and Lister.

UNIT – II

Diversity of Microorganisms: Prokaryotes versus eukaryotes – eukaryotic and Prokaryotic cell structure, three domains of life (bacteria, archea and eukaryotes). Pharmaceutical significance of protozoa, algae, fungi, bacteria and viruses. Characterisation and identification of microorganisms.

UNIT – III

Nutrition and Growth of Microbes: Nutritional requirements, Types of Nutrient media and growth conditions and Nutritional types based on energy source. Isolation, cultivation (aerobic & anaerobic) and preservation of microorganisms, physiology of growth, bacterial growth curve, methods for determining bacterial numbers, mass and cell constituents. Exponential growth and generation time. Bacterial growth in batch and continuous culture (chemostat and turbidostat) synchronous growth.

UNIT – IV

Microorganisms and their Environment: *Effects and microbial adaptations to environmental conditions* – Temperature, oxygen desiccation, extreme cold ionic effect, electricity, osmotic pressure, radiant energy, hydrostatic pressure, mechanical impact, vibration.

UNIT – V

Control of Microorganisms: General Concepts, Inhibition of growth and killing, sterilization and disinfection, antiseptics and sanitation, mode of action application & limitation of physical agents (moist and dry heat, radiation and filtration), chemical agents. Various types of disinfectants, factors affecting sterilization and disinfection, evaluation of antimicrobial activity. Chemotherapeutic agents, mode of action and applications, drug resistance. Official methods of sterility testing of pharmaceuticals and biosafety measures.

UNIT – VI

Bacterial Genetics: Genetic recombination in bacteria, DNA replication, transcription and translation. Gene regulation (lac operon and tryptophan operon). Mutagenesis, chemical and physical mutagens.

UNIT – VII

Epidemiology of Diseases: Study of etiology, diagnosis, source of infection, mode of transmission, immunization methods, prevention and control of the following diseases. Bacillary dysentery, diphtheria, tuberculosis, leprosy, cholera, typhoid, syphilis, gonorrhoea, tetanus, food poisoning and infection hepatitis.

UNIT – VIII

Application of Microbes in Pharmaceutical Industry

- a. **Microbiological Assays:** Principles and Methods involved in Assay of Antibiotics, Vitamins, Amino acids & Bio-Sensors in Analysis.
- b. **Microbial Source & applications of various pharmaproducts** like Antibiotics, vitamins, amino acids, solvents, enzymes & genetic engineered products etc.

TEXT BOOKS

1. Pelczar and Reid, Text Book of Microbiology
2. Anantha Narayan and Jayram Panikar, Text Book of Microbiology, Orient Longman, Delhi, KAKINADA.
3. N.K. Jain, Pharmaceutical Microbiology
4. Alcamo, Microbiology.
5. R.C. Dubey, A textbook of Microbiology

REFERENCES

- 1 Heritage, J Introductory Microbiology.
- 2 Nester, Anderson, Roberts, Pearsall, Microbiology, McGraw-Hill.
- 3 Hugo, W B Pharmaceutical Microbiology.
- 4 Tortora, Gerard Text Book of Microbiology.
- 5 E.A Rawlins, Betley's Text Book of Pharmaceutics, 8th ed
- 6 Garg, F C Experimental Microbiology
- 7 Gaud, R.S Practical Microbiology



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Pharmacy – I Sem.

CHEMISTRY OF NATURAL DRUGS

UNIT – I

Alkaloids: Definition of alkaloids, pseudoalkaloids and protoalkaloids. General methods of extraction and isolation. Properties of alkaloids. Tests for alkaloids.

Opium alkaloids: Structural features of Morphine molecule – Peripheral groups. Modification of structure and effect on analgesic activity – SAR of morphine and morphine-like analgesics.

Narcotic antagonists: Nalorphine, Levallorphan. Anti-tussive agents: Noscapine, Dextromethorphan. Smooth muscle relaxants: Papaverine and related compounds like ethaverine, Dioxyline. Structures and uses of these compounds.

Tropane alkaloids: Structures of Atropine/hyoscyamine, Hyoscine, Hydrolytic products of these – Tropine and Scopolin. Relationship between tropine & pseudotropine. Biological actions and uses of tropane alkaloids. Homatropine.

UNIT – II

Rauwolfia alkaloids: Structures and uses of Reserpine, Rescinnamine, Deserpidine, ajmaline, syrosingapine. Hydrolysis of reserpine and rescinnamine. Mechanism of action of reserpine.

Ergot alkaloids: Classification, structures, hydrolytic products, pharmacological actions, therapeutic uses and toxicity. Synthetic derivatives: Methylergonovine (Methylergometrine), LSD, ethysergide.

UNIT – III

Terpenoids: Volatile oils: Definition of terpenoids, Classification, isoprene, special isoprene and gem-dialkyl rules.

Citral: Sources and structures, isomerism in citral, citral-a (Geranial), citral-b (Neral). Reduction of citral to citronellal, citronellol, geraniol and nerol. Oxidation of citral to geranic acid. Cyclodehydration of citral to p-cymene. Conversion of citrals – a and b into alpha-terpeneol and ionones.

Alfa – Terpeniol: Sources and structure. Conversion into p-cymene, 1,8 – terpin, terpinolene, dipentene, dipentene dihydrochloride. Preparation of alfa-terpeneol from limonene/dipentene, 1,8-Terpin and pinene.

UNIT – IV

Carvone: Sources and structure. Conversion into Carvacrol. Reduction of Carvone with different reagents. Synthesis from Limonene/Dipentene and alfa – Terpeneol.

Menthol and menthone: Sources, structures and uses. Oxidation of menthol to menthone. Conversion of menthol into thymol.

1,8-cineole: Sources and structure. Preparation from Cis-terpin. Mention of 1,4-cineole.

Camphor: Source, properties, commercial method of preparation from α -pinene and uses. Oxidation to camphoric acid and camphoronic acids, conversion into p-cymene. Reduction of camphor to Borneol & isoborneol. Source, structures, uses of isoborneol. Oxidation of borneols to camphor.

UNIT – V

Steroids: Introduction: Brief history of development of steroid industry. Sources of steroidal drugs – diosgenin, cholesterol, stigmasterol and ergosterol – their structures. Marker's synthesis of progesterone. Nomenclature of steroids, stereochemistry and numbering the ring system. Colour reactions of steroids. Selenium distillation of steroids.

UNIT – VI

Steroidal Anti-Inflammatory drugs: Classification, structures, SAR, uses & toxicity.

Cardiac glycosides: structures of glycosides from Digitalis, Strophanthus, Squill and Bufo. Enzymatic and acid hydrolytic reactions of the glycosides. Mechanism of action, SAR, therapeutic uses and toxicity.

Bile acids: Names, structures and functions.

UNIT – VII

Hormones: Sex Hormones: Male and female sex hormones. Estrogens – estradiol, estrone, estriol. Structures and their interconversion.

Structures of synthetic estrogens. Therapeutic uses and side effects.

Progesterone and selected progestins – structures, uses and side-effects.

Preparation of progesterone from diosgenin. A note on Steroid contraceptive agents and regimens.

Androgens – Testosterone and derivatives. Structure and biological activities & uses.

Hormones of Thyroid: Thyroxine and triiodothyronine – structure and functions.

UNIT – VIII

Adrenal Cortex Hormones:

Mineralocorticoids: Aldosterone, Deoxycorticosterone,

Fludrocortisone – structures, biological activity and uses. Aldosterone antagonist Spiranolactone.

Glucocorticoids: Cortisone & Hydrocortisone – Structure, biological actions, uses.

Hormones of Pancreas:

Insulin – introduction, structural features – some sequence differences in insulins of some species like humans, pork, beef. Metabolic effects of insulin. A note on insulin preparations.
Glucagon – Structure and Physiological role.

NOTE:

1. **Structure elucidation of compounds is not included in the syllabus.**
2. **Structural features like the basic nucleus; presence of substituent groups will be discussed.**
3. **Simple reactions like hydrolysis, selenium dehydrogenation, oxidation, reduction etc., will be taught wherever applicable.**

TEXT BOOKS

1. O.P. Agarwal, Natural products by. Vol.1 & 2, Goel publications – Meerut.
2. JB Harborne, Phyto Chemical methods.
3. I L Finar, Organic chemistry, Vol. 1 & 2, the English language book society, London, New Delhi.

REFERENCES

1. RT Morrison and R.N BOYD, Organic chemistry, Allyn and Bacon, inc., boston
2. Me – Wolf, ed., Burger's medicinal chemistry, J. Wiley & sons, NY.
3. F.G. Mann & B. Saunders, Practical Organic chemistry Longmans green & Co. Ltd., UK.
4. RM. Acheson, an introduction to the chemistry of heterocyclic compounds, Interscience NY.
5. Duquesn & others, Practical pharmacognocny, CBS Publ.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Pharmacy – I Sem.

PHARMACEUTICAL TECHNOLOGY – I

UNIT-I

Preformulation: Physicochemical properties like physical form, particle size, shape, density, wetting, dielectric constant, solubility, dissolution, organoleptic additives, hydrolysis, oxidation-reduction, recombination, polymerization etc and their effect on formulation, stability and bioavailability study of prodrugs in solving problems related to stability bio availability in formulations. Stability testing of finished products as per ICH guidelines.

UNIT-II

Liquid dosage forms: Introduction, types of additives used in formulations, vehicles, stabilizers, preservatives, suspending agents, emulsifying agents, solubilizers, colors, flavours and others, manufacturing packaging and evaluation of clear liquids, suspensions and emulsions official in pharmacopoeia.

UNIT-III

Semisolid dosage forms: Definitions, types, mechanisms of drug penetration, factors influencing penetration, semisolid bases and their selection. General formulation of semi solids, clear gels manufacturing procedure, evaluation and packaging.

UNIT-IV

Pharmaceutical aerosols: Definition, propellants general formulation, manufacturing and packaging methods, pharmaceutical applications.

UNIT-V

Ophthalmic Preparations: Requirements, formulation, methods of preparation, containers, evaluation.

UNIT-VI

Cosmeticology and Cosmetic Preparations –I: Fundamentals of cosmetic science, structures and functions of skin and hair. Formulation, preparation and packaging of cosmetics for skin, hair.

UNIT-VII

Cosmeticology and Cosmetic Preparations –II: Formulation, preparation & packaging of dentrifices like tooth powders, pastes, gels etc., and manicure preparations like nail polish, lipsticks, eye lashes, baby care products etc.

UNIT-VIII

Suppositories: Ideal requirements of bases, Different types of bases, manufacturing procedure packing and evaluation.

TEXT BOOKS

1. L. Lachman, H.A, Lieberman and J.L. Kanig, Theory & Practice of industrial pharmacy, Lea & Febieger, Philadelphia Latest Edn.
2. CVS. Subramanyam, Pharmaceutical production and management, Vallabh Prakashan, New Delhi 2005.

REFERENCES

1. Shobha Rani, Text of Industrial Pharmacy, Hiremath Orient Longman
2. Sagarian & MS Balsam, Cosmetics Sciences & Technology Vol.1, 2 & 3
3. Lippincott Williams and Wilkins, Remington Pharmaceutical Sciences.
4. E.A.Rawlkins, Bentley's Text Book of Pharmaceutics, Elbs publ
5. HC Ansel Introduction to Pharmaceutical Dosage forms
6. S.H. Willing, M.M Tucherman and W.S. Hitchings IV, Good Manufacturing Practices for Pharmaceuticals: A Plan for Total Quality Control, Marcel Dekker, Inc., New York 1998.
7. Gilbert S. Banker and Christopher T Rhodes, Modern Pharmaceutics, IVth ed, Marcel Dekker, USA, 2005.
8. Yiew Chien, novel drug delivery systems, Marcel Dekker 2003.
9. Robert. A. Nash, Pharmaceutical Process Validation, 3rd Ed Marcel Dekker, 2003.
10. Good Manufacturing Practices – Schedule M Read With The Drugs And Cosmetic Rules 1945



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Pharmacy – I Sem.

PHARMACOLOGY – I

UNIT I

General Pharmacology: Introduction to pharmacology, sources of drugs, dosage forms and routes of administration, mechanism of action, Structural activity and relationship(SAR), factors modifying drug action, tolerance and dependence, Pharmacogenetics Enzyme induction & Inhibition, Absorption, distribution metabolism and excretion of drugs, Principles of drug discovery and development of new drugs.

UNIT II

Pharmacology of Autonomic Nervous System:

Neurohumoral transmission in peripheral nervous system (autonomic and Somatic)
Parasympathomimetics & parasympatholytics, sympathomimetics & sympatholytics
Ganglionic-stimulants and blocking agents, Neuromuscular blocking agents.

UNIT III

Drugs acting on Central Nervous System:

Neurohumoral transmission in the C.N.S, General anesthetics, Alcohols and Disulfiram, Sedatives, hypnotics, & anti-anxiety agents.

UNIT IV

Analgesics, Antipyretics, Anti-inflammatory and Anti-gout drugs, Narcotic analgesics & antagonists, C.N.S. stimulants, Drug Addiction & Drug Abuse.

UNIT V

Pharmacology of Local Anaesthetics & Skeletal muscle relaxants
Antipsychotics & Lithium, Antidepressants, Pharmacology of Anti-epileptic drugs,
Pharmacological management of Parkinsonism & other movement disorders

UNIT VI

Drugs Acting on the Gastrointestinal Tract

Antacids, Antisecretory & Anti-ulcer Drugs, Laxatives & antidiarrhoeal drugs, Appetite Stimulants & Suppressants, Emetics & anti-emetics, Carminatives, Demulcents, Protectives, Adsorbents, Astringents, digestants, enzymes & mucolytics.

UNIT VII

Principles of Toxicology: Definition of poison, general principles of treatment of poisoning with particular reference to barbiturates, opioids, organophosphorous and atropine, heavy metals and heavy metal antagonists.

TEXT BOOKS

1. Sathoskar, Pharmacology and pharmaco therapeutics Vol. 1 & 2, Publ by Popular Prakashan, Mumbai.
2. Bertram. G. Katzung, Basic and clinical pharmacology, 9th Edn
3. Tripathi, Text book of Pharmacology
4. Rang & Dale, Text book of Pharmacology.

REFERENCE BOOKS

1. J.G. Hardman and Lee E. Limbard, Good Mann & Gilman, The Pharmacological basis of therapeutics, Mc Graw hill, Health Professions Dvn.
2. H.P Rang, M. M. dale & J.M. Ritter, Pharmacology, Churchill living stone, 4th Ed.
3. J. Crossland, Lewis's Pharmacology, Church living stone.
4. Ruth Woodrow, Essentials of Pharmacology for Health Occupations.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Pharmacy – I Sem.

PHARMACEUTICAL BIOCHEMISTRY LAB

Experiments:

1. To prepare standard buffers (citrate, phosphate & carbonate) and measure the pH.
2. Titration curve for amino acids.
3. Separation of amino acids by two dimensional paper chromatography & gel electrophoresis.
4. The separation of lipids by T.L.C.
5. Identification of carbohydrates
6. Identification of amino acid.
7. Identification of lipids.
8. Estimation of glucose in urine.
9. Estimation of creatinine in urine.
10. Estimation of urea in blood.
11. Estimation of creatinine in blood.
12. Estimation of Serum protein.
13. Estimation of bile pigments in serum.
14. Estimation of alkaline phosphatase in serum
15. Effect of temperature on the activity of alpha-amylase.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Pharmacy – I Sem.

PHARMACEUTICAL MICROBIOLOGY LAB

1. Introduction to equipment and glassware used in microbiology laboratory.
2. Preparation of various culture media.
3. Sterilization techniques and their validations.
4. Aseptic transfer of culture into different types of medias.
5. Characterisation of microbes by staining methods (simple gram's, acid fast and negative staining) and motility testing by hanging drop method.
6. Enumeration of bacteria by pour plate/spread plate technique.
7. Enumeration of bacteria by direct microscopic count.
8. Isolation of pure cultures by streak plate, spread plate, pour plate.
9. Evaluation of antiseptics and disinfectants, sterility of pharmaceutical products as per ip requirements.
10. Observation of colony characteristics.
11. bio chemical reactions:
 - i) Indole test.
 - ii) Methyl red test.
 - iii) Voges proskauer test.
 - iv) Starch hydrolysis test.
 - v) Fermentation of carbohydrates.
12. Morphology of molds, yeasts.
13. Preservation of microorganisms (slant and stab cultures)



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Pharmacy – I Sem.

CHEMISTRY OF NATURAL DRUGS LAB

1. Preparation of different alkaloid testing reagents like Dragendroff, Mayer' Wagner's, etc. and testing some alkaloids and plant extracts using these reagents.
2. Identification of alkaloids by specific colour tests.
3. Tests for steroids, steroidal glycosides and cardiac glycosides. Liberman- Burchard test, Salkowski reaction, Kedde reaction, etc.
4. Tests for flavanoids and their glycosides. Shinoda Test (Mg /Hcl test), FeCl₃ test.
5. TLC end examination of alkaloids, steroids, steroidal glycosides and cardiac glycosides.
6. Identification of natural products.
7. Extraction of caffeine from tea leaves.
8. Extraction of lactose from milk.
9. Extraction of nicotine from tobacco.
10. Extraction of piperine from black pepper.
11. Extraction of lycopene from tomatoes.
12. Extraction of beta - carotene from carrots.
13. Volatile oil production by steam distillation (**Demonstration only**)

TEXT BOOKS

1. Indian Pharmacopoeia – 1996.
2. Weagners, Phyto Chemical Methods of Drug Analysis.
3. C.K. Kokate, Practical Pharmacognosy



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

III Year B.Pharmacy – I Sem.

PHARMACEUTICAL TECHNOLOGY - I LAB

1. Preparation, evaluation and packaging of solutions, suspensions and emulsions, ointments. Suppositories, aerosols, eye drops, eye ointments etc.
2. Formulation of various types of cosmetics for skin, hair, dentrifices and manicure preparations.



III Year B.Pharmacy – I Sem.

Pharmacology-1 Lab

Introduction to Experimental Pharmacology

1. Preparation of different solutions for experiments.
2. Drug dilutions, use of molar and w/v solutions in experimental Pharmacology.
3. Common laboratory animals and anesthetics used in animal studies.
4. Commonly used instruments in experimental pharmacology.
5. Some common and standard techniques. Bleeding and intravenous injection, intragastric administration.
6. Experiments in Central Nervous system:
Recording of spontaneous motor activity, stereotype, analgesia, anticonvulsant activity, anti-inflammatory activity.
7. To study the effect of autonomic drugs on rabbit's eye.
8. To record the concentration response curve (CRC) of acetylcholine using rectus abdominus muscle preparation of frog.
9. To study the effects of physostigmine and d-tubocurarine on the CRC of acetylcholine using frog rectus abdominus muscle preparation.
10. To study the drugs potentiating the activity of acetylcholine.
11. To study the drugs antagonizing action of acetylcholine.
12. To study the effect of drugs on rabbit ileum.
13. To study the effects of various agonists and antagonists and their characterisation using isolated preparations like frog's rectus abdominus muscle and isolated ileum preparation of rat & guinea pig.