ANAND PHARMACY COLLEGE, ANAND
(An Autonomous College under UGC Regulations 2023)
Managed by Shri Ramkrishna Seva Mandal
(Approved by PCI, NAAC Accredited – A+ Grade, 3.38 CGPA)
Awarding University: Gujarat Technological University, Ahmedabad

Name of Program: **Pharm D**
Year: **I**
Course Code: **P020101TP**
Course Name: **Human Anatomy & Physiology**
Course Type: **Core**
Year of Implementation: **2024 – 25**

Teaching and Examination Scheme:

Number of hours/ Week			Number of credits			Total credits	Evaluation Scheme (Marks)						Total Marks
							Sessional Exams				Term End Assessment		
							Theory	Practical					
L	Tu	P	L	Tu	P		T	CIE	E	T	T	P	
3	1	3	6	2	3	11	30	10	20	30	70	70	200

Scope:
This course is designed to impart a fundamental knowledge on the structure and functions of the human body. It also helps in understanding both homeostasis mechanisms and homeostatic imbalances of various body systems. Since a medicament, which is produced by pharmacist, is used to correct the deviations in human body, it enhances the understanding of how the drugs act on the various body systems in correcting the disease state of the organs.

Course Outcomes (CO):
Upon completion of the course student shall be able to

CO1	To describe and illustrate the detailed structure of various organs of the human body
CO2	To relate coordinated working pattern of different organs of each system in context of pharmaceutical care
CO3	To describe the various homeostatic mechanisms and their imbalances with respect to various organ systems
CO4	To explore the basic concepts of sports physiology
CO5	To explain, interpret and perform the haematological tests and also record blood pressure, heart rate, pulse rate and respiratory volumes
CO6	To apply knowledge of microscopy to identify tissues and organs and understanding their important functions and grasp the principles behind haematological tests

Detailed Syllabus:
Total Teaching hours: **90 hours**

1	a. Scope of anatomy and physiology b. Basic terminologies used in this subject (Description of the body as such planes and terminologies) c. Basic life process d. Systems of human body e. Homeostasis f. Positive and negative feedback system	**4 hours**
2	**Structure of cell**–its components and their functions. a. Structure of Human Cell	**5 hours**

	b. Plasma membrane c. Cytoplasm d. Endoplasmic reticulum e. Golgi complex f. Lysosomes g. Mitochondria h. Nucleus i. Protein synthesis j. Cell division – Mitosis & Meiosis	
3	**Elementary tissues of the human body** a. Epithelial tissue: sub-types and characteristics b. Connective tissue: sub-types and characteristics c. Muscular tissue: sub-types and characteristics d. Nervous tissues: sub-types and characteristics	**4 hours**
4	**Osseous system** a. Structure, composition and functions of the Skeleton. b. Classification of joints, Types of movements of joints and disorders of joints (Definitions only)	**4 hours**
5	**Haemopoetic System** a. Composition and functions of blood b. Haemopoesis and disorders of blood components (definition of disorder- Anemia, thrombocytopenia, agranulocytosis, thalassemia, Hemophilia, Leukemia) c. Blood groups d. Clotting factors and mechanism e. Platelets and disorders of coagulation	**6 hours**
6	**Lymph** a. Lymph and lymphatic system, composition, formation and circulation. b. Spleen: structure and functions, Disorders (Spleenomegaly) c. Disorders of lymphatic system (definition only- lymphadenitis, infectious mononucleosis, lymphangiogenesis, lymphadenopathy)	**3 hours**
7	**Cardiovascular system** a. Anatomy and functions of heart b. Blood vessels and circulation (Pulmonary, coronary and systemic circulation) c. Electrocardiogram (ECG) d. Cardiac cycle and heart sounds e. Blood pressure – its maintenance and regulation f. Definition of the following disorders Hypertension, Hypotension, Arteriosclerosis, Atherosclerosis, Angina, Myocardial infarction, Congestive heart failure, Cardiac arrhythmias	**7 hours**
8	**Respiratory system** a. Anatomy of respiratory organs and functions b. Mechanism / physiology of respiration and regulation of respiration c. Transport of respiratory gases d. Respiratory volumes and capacities, and Definition of: Hypoxia, Asphyxia, Dybarism, Oxygen therapy and resuscitation.	**6 hours**

9	**Digestive system** a. Anatomy and physiology of GIT b. Anatomy and functions of accessory glands of GIT (salivary lands, tongue, pancreas, liver, gallbladder) c. Phases of Digestion and absorption d. Disorders of GIT (definitions only- Peptic ulcer disease, Gastro Esophageal Reflux Disease, Inflammatory bowel disease, Alcoholic liver disease, Viral hepatitis, Jaundice)	**6 hours**
10	**Nervous system** a. Definition and classification of nervous system b. Anatomy, physiology and functional areas of cerebrum c. Anatomy and physiology of cerebellum d. Anatomy and physiology of mid brain e. Anatomy and physiology of Thalamus, hypothalamus and Basal Ganglia f. Spinal cord: Structure & reflexes – mono-poly-planter g. Cranial nerves – names and functions h. ANS – Anatomy & functions of sympathetic & parasympathetic N.S.	**9 hours**
11	**Urinary system** a. Anatomy and physiology of urinary system b. Formation of urine c. Renin Angiotensin system – Juxtaglomerular apparatus - acid base Balance d. Clearance tests and micturition e. Disorders of urinary system (definitions only): Urinary tract infection, Glomerulonephritis, Renal failure, Polycystic kidney disease	**6 hours**
12	**Endocrine system** a. Anatomy and physiology of Pituitary gland b. Anatomy and physiology of Adrenal gland c. Anatomy and physiology of Thyroid and Parathyroid glands d. Anatomy and physiology of Pancreas and gonads e. Disorders of endocrine system (definitions only): Diabetes mellitus, Diabetes insipidus, Hashimoto thyroiditis, grave's disease, hyperthyroidism, hypothyroidism, Addison disease, Cushing Syndrome	**7 hours**
13	**Reproductive system** a. Anatomy and physiology of Male and female reproductive system b. Role of hormones in physiology of menstruation c. Spermatogenesis & Oogenesis d. Sex determination (genetic basis) e. Pregnancy and maintenance and parturition f. Contraceptive devices (Surgical sterilization, non-incisional sterilization, hormonal method, IUD, Barrier method, Periodic Abstinence) g. Disorders of reproductive system (definitions only): Endometriosis, polycystic ovarian syndrome, infertility, sexually transmitted disease, erectile dysfunction	**8 hours**
14	**Sense organs** a. Eye- Anatomy of Eye, Physiology of Vision b. Ear- Anatomy of Ear, Physiology of Hearing c. Skin- Structure and functions of Skin d. Tongue & Nose- Anatomy and physiology e. Disorders of sense organs (definitions only): Myopia, Hyperopia, Presbyopia, Cataract, Diabetic retinopathy, Tinnitus, Vertigo, Rhinitis, psoriasis, eczema	**6 hours**

15	**Skeletal muscles** a. Histology b. Physiology of Muscle contraction c. Physiological properties of skeletal muscle and their disorders (definitions- Rheumatoid arthritis, Osteoarthritis, Gout, Spondylitis)	**5 hours**
16	**Sports physiology** a. Muscles in exercise, Effect of athletic training on muscles and muscle performance b. Respiration in exercise, CVS in exercise, Body heat in exercise, Body fluids and salts in exercise c. Drugs and athletics	**4 hours**

Tutorials **Tutorial hours: 30 Hours**

Tutorials will be based on the above syllabus

List of Practicals

1. Introduction to microscope
2. Study of tissues of Human body
   (a) Epithelial tissue. (b) Muscular tissue.
3. Study of tissues of Human body
   (a) Connective tissue. (b) Nervous tissue
4. Introduction to Hematological Data
5. Determination of Blood group
6. Determination of Bleeding Time
7. Determination of Clotting Time
8. Determination of Hemoglobin content of Blood
9. Study of appliances used in Hematological experiments
10. Determination of W.B.C. count of blood.
11. Determination of R.B.C. count of blood.
12. Determination of differential count of blood.
13. Determination of Erythrocyte Sedimentation Rate.
14. Study of Human Skeletal system Skeletal System part I- axial skeleton
    Skeleton System part II- appendicular skeleton
15. Study of Human Cardiovascular System
16. Study of Human Respiratory System
17. Study of Human Digestive System
18. Study of Human Urinary System
19. Study of Human Nervous System
20. Study of Special Senses in Human
21. Study of Human Reproductive System
22. Determination of Blood Pressure
23. Study of different family planning appliances
24. To perform pregnancy diagnostic test
25. Study of appliances used in experimental physiology.
26. To record simple muscle curve using gastrocnemius sciatic nerve

preparation

27. To record simple summation curve using gastrocnemius sciatic nerve preparation
28. To record simple effect of temperature using gastrocnemius sciatic nerve preparation.
29. To record simple effect of load & after load using gastrocnemius sciatic nerve preparation.
30. To record simple fatigue curve using gastrocnemius sciatic nerve preparation.

Note: All animal experiments are demonstrated by simulated experiments by softwares and videos

Scheme of Practical Examination

Item	Internal/ Sessional	External
Identification	04	10
Synopsis	04	10
Major Experiment	07	20
Minor Experiment	03	15
Viva	02	15
Max. marks	**20**	**70**
Duration	**3 hours**	**4 hours**

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for CIE)

Recommended Books^: (Latest Editions)

1. Goyal, R. K, Natvar M.P, and Shah S.A, Practical anatomy, physiology and biochemistry, latest edition, Publisher: B.S Shah Prakashan, Ahmedabad
2. Nageswari KS, Sharma R. Practical workbook of Human Physiology. Jaypee brother's medical publishers. New Delhi. India.
3. Varshney VP, Bedi M. Ghia's Textbook of Practical Physiology. Jaypee brother's medical publishers. New Delhi. India

L= Lecture, Tu= Tutorial, P= Practical, T = Theory

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Awarding University: Gujarat Technological University, Ahmedabad

Name of Program: **Pharm D**
Year: **II**
Course Code: **P020102TP**
Course Name: **Pharmaceutics**
Course Type: **Core**
Year of Implementation: **2024 – 25**

Teaching and Examination Scheme:

Number of hours/ Week			Number of credits			Total credits	Evaluation Scheme (Marks)						Total Marks
							Sessional Exams				Term End Assessment		
							Theory		Practical				
L	Tu	P	L	Tu	P		T	CIE	E	T	T	P	
2	1	3	4	2	3	9	30	10	20	30	70	70	200

Scope:
This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.

Course Outcomes (CO):
Upon completion of the course student shall be able to

CO1	Understand the formulation principles for various pharmaceutical dosage forms
CO2	Solve pharmaceutical calculations necessary for the accurate dispensing of formulations
CO3	Apply the fundamentals to prepare various types of dosage forms
CO4	Understand, analyze and resolve pharmaceutical incompatibilities in formulations
CO5	Recall fundamental principles for preparing compatible dosage forms
CO6	Prepare dosage forms using relevant calculations, and ensure accurate labelling and packaging

Detailed Syllabus:
Total Teaching hours: **60 hours**

1	**Dosage forms:** Introduction to dosage form, classification and definitions **Prescription:** Definition, Parts of prescription, handling of prescription and errors in prescription. **Posology:** Definition, factors affecting posology. Pediatric dose calculations based on age, body weight and body surface area.	**06 hours**
2	**Historical background and development of profession of pharmacy:** History of profession of Pharmacy in India in relation to pharmacy education and industry, and organization, Pharmacy as a career	**02 hours**

3	**Pharmacopoeias:** Development of Indian Pharmacopoeia and introduction to other Pharmacopoeias such as BP, USP, European Pharmacopoeia, extra pharmacopoeia and Indian national formulary.	**02 hours**
4	**Pharmaceutical calculations:** Weights and measures – imperial & metric system, calculations involving percentage solutions, allegation medial and allegation alternate, proof spirit, proof strength and proof gallon, isotonic solutions based on freezing point and molecular weight.	**11 hours**
5	**Powders & Granules:** Definition, classification, advantages and disadvantages, (composition, preparation, packaging and labelling) simple & compound powders – official preparations, dusting powders, effervescent powders and granules, efflorescent and hygroscopic powders, explosive powder, tooth powder, eutectic mixtures. geometric dilutions	**08 hours**
6	**Liquid dosage forms:** Advantages and disadvantages of liquid dosage forms. Excipients/adjuvants used in formulation of liquid dosage forms like stabilizers, colorants, flavours with examples. **Monophasic liquids:** Definitions, Composition, preparations, packaging and labelling of gargles, mouthwashes, throat paint, eardrops, nasal drops, enemas, collodions, syrups, elixirs, liniments and lotions.	**07 hours**
7	**Biphasic liquids:** **Suspensions:** Definition, advantages and disadvantages, classifications, suspending agents, Preparation of suspensions, flocculated and deflocculated suspension & stability problems and methods to overcome. **Emulsions:** Definition, advantages and disadvantages, classification, emulsifying agent, preparation methods, test for the identification of type of emulsion, stability problems and methods to overcome.	**06 hours**
8	**Suppositories & Pessaries:** Definition, types, advantages and disadvantages, therapeutic uses, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories.	**04 hours**
9	**Galenicals:** Definition, equipment for different extraction processes like infusion, decoction, maceration and percolation, methods of preparation of spirits, tinctures and extracts.	**05 hours**
10	**Surgical aids:** Surgical dressings, absorbable gelatin sponge, sutures, ligatures and medicated bandages.	**03 hours**
11	**Pharmaceutical incompatibilities:** Definition, classification, physical, chemical and therapeutic incompatibilities with examples.	**06 hours**

Tutorials **Tutorial hours: 30 Hours**

Tutorials will be based on above syllabus

List of Practicals

1. **Syrups**

a. Simple Syrup I.P
b. Syrup of Ephedrine HCl NF
c. Syrup Vasaka IP
d. Syrup of ferrous Phosphate IP
e. Orange Syrup

2. Elixir

a. Piperizine citrate elixir BP

b. Cascara elixir BPC

c. Paracetamol elixir BPC

3. Linctus

a. Simple Linctus BPC

b. Pediatric simple Linctus BPC

4. Solutions

a. Solution of cresol with soap IP

b. Strong solution of ferric chloride BPC

c. Aqueous Iodine Solution IP d. Strong solution of Iodine IP

d. Strong solution of ammonium acetate IP

5. Liniments

a. Liniment of turpentine IP*

b. Liniment of camphor IP

6. Suspensions

a. Calamine lotion

b. Magnesium Hydroxide mixture BP

7. Emulsions

a. Cod liver oil emulsion

b. Liquid paraffin emulsion

8. Powders

a. Eutectic powder

b. Explosive powder

c. Dusting powder

d. Insufflations

9. Suppositories

a. Boric acid suppositories

b. Chloral suppositories

10. Incompatibilities

a. Mixtures with Physical

b. Chemical & Therapeutic incompatibilities

Scheme of Practical Examination

Item	Internal/ Sessional	External
Synopsis	05	15
Major Experiment	10	25
Minor Experiment	03	15
Viva	02	15
Max. marks	**20**	**70**
Duration	**3 hours**	**4 hours**

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for CIE)

Recommended Books^: (Latest Editions)

1. Ansel HC et al. Pharmaceutical Dosage Form and Drug Delivery System. Lippincott Williams and Walkins, New Delhi.
2. Carter SJ. Cooper and Gunn's-Dispensing for Pharmaceutical Students. CBS Publishers. New Delhi.

3. Aulton ME. Pharmaceutics: The Science & Dosage Form Design. Churchill Livingstone, Edinburgh.
4. Indian Pharmacopoeia.
5. British Pharmacopoeia.
6. Lachmann. Theory and Practice of Industrial Pharmacy. Lea & Febiger Publisher. The University of Michigan.
7. Alfonso R. Remington G. The Science and Practice of Pharmacy. Lippincott Williams New Delhi.
8. Carter SJ. Cooper and Gunn's Tutorial Pharmacy. CBS Publications. New Delhi.
9. Rawlins EA. Bentley's Text Book of Pharmaceutics. English Language Book Society. Elsevier Health Sciences. USA.
10. Isaac GS. Pharmaceutical Palletization Technology. Marcel Dekker. INC. New York.
11. Parikh DM. Handbook of Pharmaceutical Granulation Technology. Marcel Dekker. INC. New York.
12. Francoise N., Gilberte MM. Pharmaceutical Emulsions and Suspensions. Marcel Dekker. INC. New York.
13. Jani GK. Pharmaceutics II. BS Shah Prakashan. Ahmedabad.

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Awarding University: Gujarat Technological University, Ahmedabad

Name of Program: **Pharm D**
Year: **I**
Course Code: **P020103TP**
Course Name: **Pharmaceutical Organic Chemistry**
Course Type: **Core**
Year of Implementation: **2024 – 25**

Teaching and Examination Scheme:

Number of hours/ Week			Number of credits			Total credits	Evaluation Scheme (Marks)						Total Marks
							Sessional Exams				Term End Assessment		
							Theory	Practical					
L	Tu	P	L	Tu	P		T	CIE	E	T	T	P	
3	1	3	6	2	3	11	30	10	20	30	70	70	200

Scope: This subject covers the classification, nomenclature, and structural isomerism of simple organic compounds. It explores intermediates formed during reactions, important physical properties, and methods of preparation. Additionally, the syllabus emphasizes reaction mechanisms and orientation. The course also includes the study of general methods for preparing and reacting with organic compounds, as well as an examination of their reactivity. Chemistry related to fats and oils is also part of the syllabus.

Course Outcomes (CO):
Upon completion of the course student shall be able to

CO1	Understand the IUPAC/Common system of nomenclature of simple organic compounds belonging to different classes of organic compounds
CO2	Understand the important physical properties of organic compounds
CO3	Know the basic principle of organic reactions with mechanism, orientation, order of reactivity, stability of compounds
CO4	Learn the mechanism of selective organic name reaction
CO5	Recall the methods for the synthesis of compounds and qualitative chemical test
CO6	Apply the basic principles involved in the systematic qualitative analysis of organic compounds and the use of stereo models

Detailed Syllabus:
Total Teaching hours: **90 hours**

1	**Structures and Physical properties:** a. Polarity of bonds, polarity of molecules, M.P, Inter molecular forces, B.P, Solubility, nonionic solutes and ionic solutes, protic and aprotic Solvents, ion pairs, b. Acids and bases, Lowry Bronsted and Lewis theories c. Isomerism	**03 hours** **03 hours** **03 hours**
2	**Nomenclature of organic compound belonging to the following classes:** Alkanes, Alkenes, Dienes, Alkynes, Alcohols, Aldehydes, Ketones, Amides.	**04 hours**

	Amines, Phenols, Alkyl Halides, Carboxylic Acid, Esters, Acid Chlorides and Cycloalkanes	**04 hours**
3	**Free radicals chain reactions of alkane:** Mechanism, relative reactivity, and stability	**06 hours**
4	**Alicyclic compounds**: Preparations of cyclo-alkanes, Bayer strain theory and orbital picture of angle strain.	**03 hours**
5	**Nucleophilic aliphatic substitution mechanism:** Nucleophiles and leaving groups, kinetics of second and first order reaction, mechanism, and kinetics of SN2 reactions. Stereochemistry and steric hindrance, role of solvents, phase transfer catalysis, mechanism and kinetics of SN1 reactions, stereochemistry, carbocation and their stability, rearrangement of carbocation, role of solvents in SN1 reaction, Ion dipole bonds, SN2 versus SN1 solvolysis, nucleophilic assistance by the solvents.	**03 hours** **04 hours**
6	**Dehydro-halogenation of alkyl halides:** 1,2 elimination, kinetics, E2 and E1 mechanism, elimination via carbocation, evidence for E2 mechanism, absence of rearrangement isotope effect, absence hydrogen exchange, the element effect, orientation, and reactivity, E2 versus E1, elimination versus substitution, dehydration of alcohol, ease of dehydration, acid catalysis, reversibility, orientation.	**05 hours**
7	**Electrophilic and free radicals addition:** Reactions at carbon-carbon, double bond, electrophile, hydrogenation, heat of hydrogenation and stability of alkenes, Markow-nikoff rule, addition of hydrogen halides, addition of hydrogen bromides, peroxide effect, electrophilic addition, mechanism, rearrangement, absence of hydrogen exchange, orientation and reactivity, addition of halogen, mechanism, halohydrin formation, mechanism of free radicals addition, mechanism of peroxide initiated addition of hydrogen bromide, orientation of free addition, additions of carbene to alkene, cyclo-addition reactions	**06 hours**
8	**Carbon-carbon double bond as substituents:** Free radical halogenations of alkenes, comparison of free radical substitution with free radical addition, free radical substitution in alkenes, orientation and reactivity, allylic rearrangements	**04 hours**
9	**Theory of resonance:** Allyl radical as a resonance hybrid, stability, orbital picture, resonance stabilization of allyl radicals, hyper conjugation, allyl cation as a resonance hybrid, nucleophilic substitution in allylic substrate, SN1 reactivity, allylic rearrangement, resonance stabilization of allyl cation, hyper conjugation, nucleophilic substitution in allylic substrate, SN2 nucleophilic substitution in vinylic substrate, vinylic cation, stability of conjugated dienes, resonance in alkenes, hyper conjugation, ease of formation of conjugated dienes, orientation of elimination, electrophilic addition to conjugated dienes, 1,4- addition, 1,2-versus 1,4- addition, rate versus equilibrium, orientation and reactivity of free radical addition to conjugated dienes.	**06 hours**

10	**Electrophilic aromatic substitution:** Effect of substituent groups, determination of orientation, determination of relative reactivity, classification of substituent group, mechanism of nitration, sulfonation, halogenation, Friedel craft alkylation, Friedel craft acylation, reactivity and orientation, activating and deactivating O,P,M directing groups, electron release via resonance, effect of halogen on electrophilic aromatic substitution in alkyl benzene, side chain halogenation of alkyl benzene, resonance stabilization of benzyl radical.	**06 hours**
11	**Nucleophilic addition reaction:** Mechanism, ionization of carboxylic acids, acidity constants, acidity of acids, structure of carboxylate ions, effect of substituent on acidity, nucleophilic acyl substitution reaction, conversion of acid- to-acid chloride, esters, amide and anhydride. Role of carboxyl group, comparison of alkyl nucleophilic substitution with acyl nucleophilic substitution.	**05 hours**
12	Mechanism of aldol condensation, Claisen condensation, Cannizzaro reaction, crossed aldol condensation, crossed Cannizzaro reaction, benzoin condensation, Perkin condensation. Knoevenagel, Reformatsky reaction, Wittig reaction, Michael addition	**05 hours**
13	**Hoffman rearrangement:** Migration to electron deficient nitrogen, Sandmeyer's reaction, basicity of amines, diazotization and coupling, acidity of phenols, Williamson synthesis, Fries rearrangement, Kolbe reaction, Reimer Tieman's reactions.	**05 hours**
14	**Nucleophilic aromatic substitution:** Bimolecular displacement mechanisms, orientation, comparison of aliphatic nucleophilic substitution with that of aromatic.	**04 hours**
15	Oxidation reduction reaction.	**05 hours**
16	Study of the following official compounds- preparation, test for purity, assay, and medicinal uses of Chlorbutol, Dimercaprol, Glyceryl trinitrate, Urea, Ethylene diamine dihyrate, Vanillin, Paraldehyde, Ethylene chloride, Lactic acid, Tartaric acid, citric acid, salicylic acid, aspirin, methyl salicylate, ethyl benzoate, benzyl benzoate, dimethyl phthalate, sodium lauryl sulphate, saccharin sodium, mephensin.	**06 hours**

Tutorials **Tutorial hours: 30 Hours**

Tutorials will be based on the above syllabus

List of Practicals

1) Introduction to the various laboratory techniques through demonstration involving synthesis of the following compounds:

1. Acetanilide / aspirin (Acetylation)
2. Benzanilide / Phenyl benzoate (Benzoylation)
3. P-bromo acetanilide / 2,4,6 – tribromo aniline (Bromination)
4. Di-benzylidene acetone (Condensation)
5. 1-Phenylazo-2-napthol (Diazotization and coupling)
6. Benzoic acid / salicylic acid (Hydrolysis of ester)
7. M-dinitro benzene (Nitration)
8. 9, 10 – Anthraquinone (Oxidation of anthracene) / preparation of benzoic acid from toluene or benzaldehyde
9. M-phenylene diamine (Reduction of M-dinitrobenzene) / Aniline from nitrobenzene Benzophenone oxime
10. Nitration of salicylic acid
11. Preparation of picric acid
12. Preparation of O-chlorobenzoic acid from O-chlorotoluene
13. Preparation of cyclohexanone from cyclohexanol.

2) Identification of organic compounds belonging to the following classes by:
Systematic qualitative organic analysis including preparation of derivatives Phenols, amides, carbohydrates, amines, carboxylic acids, aldehyde and ketones, Alcohols, esters, hydrocarbons, anilides, nitro compounds.

3) Introduction to the use of stereo models:
Methane, Ethane, Ethylene, Acetylene, Cis alkene, Trans alkene, inversion of configuration.

** indicate major experiments & * indicate minor experiments

Scheme of Practical Examination

	Internal/ Sessional	External
Synopsis	05	15
Major Experiment	10	25
Minor Experiment	03	15
Viva	02	15
Max. marks	**20**	**70**
Duration	**3 hours**	**4 hours**

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance)

Recommended Books (Practical)

1. Bansal RK. Laboratory Manual of Organic Chemistry. New age international. New Delhi.
2. Vogel. Vogel's Textbook of Practical Organic Chemistry. Pearson Education. India.
3. Ahluwalia UK. Green Chemistry. Springer Nature Switzerland AG. Europe.
4. Saunders Bernard Charles & George Mann Frederick. Mann's Practical Organic Chemistry. Longman. London & New York.
5. Mehta VK & Mehta R M. Principles of Organic Chemistry. PHI leaning Pvt. India.
6. Atherden LM. Bentley and Driver's Textbook of Pharmaceutical Chemistry. Oxford / BSP Books. UK.
7. Morrison TR & Boyd R. Organic Chemistry. Pearson Education. India.
8. Finar IL. Organic Chemistry. The Fundamentals of Chemistry. Pearson Education. India.
9. Foote Christopher S. & Brown William H. Organic Chemistry. Brooks Cole. CA.USA.
10. Smith MB & March Jerry. Advanced Organic Chemistry. Wiley. US.
11. The Indian Pharmacopoeia Commission (IPC). Indian Pharmacopoeia. The Ministry of Health & Family Welfare, Government of India.
12. Clayden & Jonathan. Organic Chemistry. Oxford University Press. UK.

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Awarding University: Gujarat Technological University, Ahmedabad

Name of Program: **Pharm D**
Year: **I**
Course Code: **P020104TP**
Course Name: **Medicinal Biochemistry**
Course Type: **Core**
Year of Implementation: **2024 – 25**

Teaching and Examination Scheme:

Number of hours/ Week			Number of credits			Total credits	Evaluation Scheme (Marks)						Total Marks
							Sessional Exams				Term End Assessment		
							Theory	Practical					
L	Tu	P	L	Tu	P		T	CIE	E	T	T	P	
2	1	3	4	2	3	9	30	10	20	30	70	70	200

Scope:
Applied biochemistry deals with complete understanding of the molecular level of the chemical process associated with living cells. Clinical chemistry deals with the study of chemical aspects of human life in health and illness and the application of chemical laboratory methods to diagnosis, control of treatment, and prevention of diseases.

Course Outcomes (CO):
Upon completion of the course student shall be able to

CO1	To Understand the knowledge of cellular biological oxidation and metabolism of carbohydrates, lipids, amino acids, proteins, and nucleic acids in various physiological and pathological conditions
CO2	Use concepts of enzyme catalysis and inhibition for therapeutic and diagnostic purposes
CO3	Evaluate and interpret results of selected clinical chemistry tests to identify malfunction of human body
CO4	Explore the genetic organization, and apply this knowledge for DNA replication and RNA transcription processes
CO5	Explain principles of various biochemical methods and able to interpret variation in normal levels of constituents present in biological fluids
CO6	Estimate and interpret various constituents in blood and urine using various biochemical techniques

Detailed Syllabus:
Total Teaching hours: **45 hours**

1	**Introduction to biochemistry:** Cell and its biochemical organization, transport process across the cell membranes. Energy rich compounds; ATP, Cyclic AMP and their biological significance.	**05 hours**
2	**Enzymes**: Definition; Nomenclature; IUB classification; Factor affecting enzyme activity; Enzyme action; enzyme inhibition. Isoenzymes and their therapeutic and diagnostic applications; Coenzymes and their biochemical role and deficiency diseases.	**02 hours** **05 hours**

3	**Carbohydrate metabolism**: Glycolysis, Citric acid cycle (TCA cycle), HMP shunt, Glycogenolysis, gluconeogenesis, glycogenesis. Metabolic disorders of carbohydrate metabolism (diabetes mellitus and glycogen storage diseases) Glucose, Galactose tolerance test and their significance; hormonal regulation of carbohydrate metabolism.	**04 hours** **04 hours** **04 hours** **04 hours**
4	**Lipid metabolism:** Oxidation of saturated (β-oxidation); Ketogenesis and ketolysis; biosynthesis of fatty acids, lipids Metabolism of cholesterol; Hormonal regulation of lipid metabolism. Defective metabolism of lipids (Atheroslerosis, fatty liver, hypercholesterolemia).	**04 hours** **04 hours** **04 hours**
5	**Biological oxidation:** Coenzyme system involved in Biological oxidation. Electron transport chain (its mechanism in energy capture; regulation and inhibition); Uncouplers of ETC; Oxidative phosphorylation;	**07 hours**
6	**Protein and amino acid metabolism:** Protein turn over; nitrogen balance; Catabolism of Amino acids (Transamination, deamination & decarboxylation). Urea cycle and its metabolic disorders; production of bile pigments; hyperbilirubinemia, porphoria, jaundice. Metabolic disorder of Amino acids.	**05 hours** **07 hours**
7	**Nucleic acid metabolism:** Metabolism of purine and pyrimidine nucleotides; Protein synthesis; inhibition of protein synthesis; Genetic code; mutation and repair mechanism; DNA replication (semiconservative /onion peel models) and DNA repair mechanism	**04 hours** **03 hours** **03 hours**
8	**Introduction to clinicalchemistry: Cell**; composition; malfunction; Roll of the clinical chemistry laboratory.	**02 hours**
9	**The kidney function tests:** Role of kidney; Laboratory tests for normal function includes- a.Urine analysis (macroscopic and physical examination, quantitative and semiquantitative tests.) b.Test for NPN constituents. (Creatinine /urea clearance, determination of blood and urine creatinine, urea and uric acid) c.Urine concentration test d.Urinary tract calculi. (stones)	**05 hours**
10	**Liver function tests:** Physiological role of liver, metabolic, storage, excretory, protective, circulatory functions and function in blood coagulation. a. Test for hepatic dysfunction-Bile pigments metabolism. b. Test for hepatic function test- Serum bilirubin, urine bilirubin, and urine	**05 hours**

	urobilinogen. c. Dye tests of excretory function. d. Tests based upon abnormalities of serum proteins. Selected enzyme tests.	
11	**Lipid profile tests:** Lipoproteins, composition, functions. Determination of serum lipids, total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides.	**03 hours**
12	**Immunochemical techniques** for determination of hormone levels and protein levels in serum for endocrine diseases and infectious diseases. Radio Immuno Assay (RIA) and Enzyme Linked Immunosorbent Assay (ELISA)	**03 hours**
13	**Electrolytes:** Body water, compartments, water balance, and electrolyte distribution. Determination of sodium, calcium potassium, chlorides, bicarbonates in the body fluids.	**03 hours**

Tutorials **Tutorial hours: 30 Hours**

Tutorials will be based on above syllabus

List of Practicals

1. Qualitative analysis of normal constituents of urine.*
2. Qualitative analysis of abnormal constituents of urine.*
3. Quantitative estimation of urine sugar by Benedict's reagent method.**
4. Quantitative estimation of urine chlorides by Volhard's method.**
5. Quantitative estimation of urine creatinine by Jaffe's method.**
6. Quantitative estimation of urine calcium by precipitation method.**
7. Quantitative estimation of serum cholesterol by Liebermann Burchard's method.**
8. Preparation of Folin Wu filtrate from blood.*
9. Quantitative estimation of blood creatinine.**
10. Quantitative estimation of blood sugar Folin-Wu tube method.**
11. Estimation of SGOT in serum.**
12. Estimation of SGPT in serum.**
13. Estimation of Urea in Serum.**
14. Estimation of Proteins in Serum.**
15. Determination of serum bilirubin**
16. Determination of Glucose by means of Glucose oxidase.**
17. Enzymatic hydrolysis of Glycogen/Starch by Amylases.**
18. Study of factors affecting Enzyme activity. (pH& Temp.)**
19. Preparation of standard buffer solutions and its pH measurements (any two)*
20. Experiment on lipid profile tests**
21. Determination of sodium, calcium and potassium in serum.**
22. Identification of given unknown carbohydrate/protein sample.
23. To determine cholesterol in serum by CHOD- POD method by Auto analyzer.

** indicate major experiments & * indicate minor experiments

Scheme of Practical Examination

	Internal/ Sessional	External
Synopsis	05	15
Major Experiment	10	25
Minor Experiment	03	15
Viva	02	15
Max. marks	**20**	**70**
Duration	**3 hours**	**4 hours**

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance)

Recommended Books^: (Latest Editions)

1. Goyal R K, Shah S A, Mehta A A. Practicals in Biochemistry and Clinical Pathology. B S Shah Prakashan. Ahmedabad. India.
2. Plummer David T. An introduction to practical biochemistry. McGaw Hill Education (India) Pvt. Ltd. Chennai. India.
3. Rao G D. A manual of Practical Biochemistry. Birla Publication Pvt. Ltd Delhi.India.
4. Murry R K,Granner D K & Rodwell V W. Harper's Illustrated Biochemistry. Mc Graw Hill Education. Asia.
5. Rao R. Textbook of Biochemistry. UBS Publisher. New Delhi. India.
6. Deb A C. Fundamental of Biochemistry. New Central Book Agency. Kolkata. India.
7. Satyanarayan D & Chakrapani U. Biochemistry. Book & Allied Pvt, Ltd. Kolkata. India.
8. Nelson DL. CoxMM. Lehninger Principles of Biochemistry. W.H Freeman and Company. Newyork.USA.
9. Berg J M,Tymoczko J L & Stryer L. Biochemistry. W. H Freeman and Company. Newyork. USA.
10. Harvey R A. Ferrier D R. Lippincott Illustrated Reviews: Biochemistry. Wolters Kulver. Baltimore. USA.

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^ This is not an exhaustive list

ANAND PHARMACY COLLEGE, ANAND
(An Autonomous College under UGC Regulations 2023)
Managed by Shri Ramkrishna Seva Mandal
(Approved by PCI, NAAC Accredited – A+ Grade, 3.38 CGPA)
Awarding University: Gujarat Technological University, Ahmedabad

Name of Program: **Pharm D**
Year: **I**
Course Code: **P020105TP**
Course Name: **Pharmaceutical Inorganic Chemistry**
Course Type: **Core**
Year of Implementation: **2024 – 25**

Teaching and Examination Scheme:

Number of hours/ Week			Number of credits			Total credits	Evaluation Scheme (Marks)						Total Marks
							Sessional Exams				Term End Assessment		
							Theory	Practical					
L	Tu	P	L	Tu	P		T	CIE	E	T	T	P	
2	1	3	4	2	3	9	30	10	20	30	70	70	200

Scope:
This course mainly deals with fundamentals of Analytical chemistry and also the study of inorganic pharmaceuticals regarding their monographs and also the course deals with basic knowledge of analysis of various pharmaceuticals.

Course Outcomes (CO):
Upon completion of the course student shall be able to

CO1	Understand the principles and procedures of analysis of drugs in volumetric analysis and carryout various volumetric titrations
CO2	Acquire knowledge about the sources of impurities and methods to determine the impurities in pharmaceuticals
CO3	Apply knowledge of assay for determination of the purity of inorganic pharmaceutical compounds
CO4	Demonstrate the preparations of inorganic compounds following standard procedures
CO5	Illustrate basic principles involved in systematic analysis and preparation of inorganic compounds
CO6	Apply analytical skills for interpretation of limit tests, identification tests, purity tests, and preparation of inorganic pharmaceutical compounds

Detailed Syllabus:
Total Teaching hours: 60 hours

General methods of preparation, assay for the compounds superscripted with asterisk (*), properties and medicinal uses of inorganic compounds belonging to the following classes

1	**Errors:** Errors in Analysis: Error, Types of errors, minimization of errors, Accuracy and Precision, Methods of expressing precision, Test for rejection of data, Significant figures, Rounding of figures, Confidence limits	**02 hours**
2	**Volumetric analysis (Titrimetric analysis)** **Acid-base titrations:** Acid-base theory, Relative strength and its effect on titration, common ion effect, pH, Henderson-Hesselbach equation, buffers, neutralization curve, acid base indicators, theory of indicators, back titrations, biphasic titrations, pharmacopoeial applications, hydrolysis of salts, ionic products of water and law of mass action.	**07 hours**

	Redox titrations: Theory and principle of redox titrations, redox indicators, types of redox titrations: principle and applications of iodometry, iodimetry, cerimetry, mercurimetry, diazotization nitrite titrations, 2,6 - dichlorophenolindophenol titrations. Titration curve and calculations of potentials during course of titrations	**06 hours**
	Nonaqueous titrations: Principle, General criteria for solvent, Type of nonaqueous solvents, titrants and indicators, Differentiating and levelling solvents. pharmacopoeial applications. Assay of Sodium benzoate	**03 hours**
	Argentometric or precipitation titrations: Principle, Mohr's method, Fajan's method and Volhard methods and modified Volhard methods, pharmacopoeial applications. Assay of Sodium chloride.	**03 hours**
	Complexometric titrations: Principle, Theory of the titrations- Stability of complex, Type of ligand/titrant, Theory of indicators and pharmacopoeial applications. Assay of Calcium gluconate and Magnesium sulphate.	**04 hours**
3	**Gravimetric analysis**: Stability- Von Weimarn ratio, solubility products, types of precipitations, precipitation techniques, Steps involved in Gravimetric analysis, pharmacopoeial applications	**03 hours**
4	**Impurities in Pharmaceuticals:** Sources of impurities, tests for purity and identity, limit tests for iron, arsenic, lead, heavy metals, chloride, sulphate. Modified limit test for chloride, sulphate	**04 hours**
5	**Gases and Vapours**: Oxygen, Anaesthetics and Respiratory Stimulants	**02 hours**
6	**Acidifying agents**: definition, mechanism of action, Dilute HCl	**01 hours**
7	**Antacids**: Types, Ideal characteristics of an antacid, Aluminium compounds, Calcium compounds, Magnesium compounds, Sodium compounds, Combination of Antacids	**02 hours**
8	**Cathartics**: Classification, Magnesium hydroxide, Magnesium sulphate, Sodium Phosphate, Dried Sodium Phosphate, Sodium potassium tartarate, Potassium bi-tartarate, Mercurous chloride	**02 hours**
9	**Major intra and extra-cellular electrolytes**: Physiological ions, electrolytes used replacement therapy, acids-base balance and combination therapy.	**04 hours**
10	**Essential and trace elements:** Transition elements and their compounds of pharmaceutical importance: Iron and haematinics, mineral supplements.	**03 hours**
11	**Antimicrobials**: Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide, Chlorinated lime, Iodine and its preparations	**02 hours**
12	**Pharmaceutical Aids used in pharmaceutical industry**: Anti-oxidants, preservatives, Filter aids, Adsorbents, Diluents	**03 hours**
13	**Dental products**: Dentifrices, Anti-caries agents, role of fluoride in the treatment of dental caries, Desensitizing agents.	**02 hours**
14	**Miscellaneous agents**: Sclerosing agents, Expectorants- Potassium iodide, Ammonium chloride., Emetics, poisons and Anti-dotes- Sodium thiosulphate, Activated charcoal, Sodium nitrite, Sedatives	**04 hours**
15	**Inorganic Radiopharmaceuticals**: Nuclear radiopharmaceuticals, reactions, Nomenclature, Methods of obtaining their standards and units of activity, measurements of activity, clinical applications and dosage, hazards and precautions.	**03 hours**

Tutorials **Tutorial hours: 30 Hours**

Tutorials will be based on the above syllabus

List of Practicals

Limit tests for following ions:

1. Limit test for Chlorides and Sulphates
2. Modified limit test for Chlorides and Sulphates
3. Limit test for Iron
4. Limit test for Heavy metals
5. Limit test for Lead
6. Limit test for Arsenic

Assays of following compound

1. Ammonium chloride- Acid-base titration
2. Ferrous Sulphates- Cerimetry
3. Copper Sulphates - Iodometry
4. Calcium gluconate- Complexometry
5. Hydrogen peroxide – Permanganometry
6. Sodium benzoate – Nonaqueous titration
7. Sodium chloride – Modified volhard's method
8. Assay of KI – KIO_3 titration
9. Gravimetric estimation of barium as Barium Sulphates
10. Sodium antimony gluconate or antimony potassium tartarate

Estimation of mixture

1. Sodium hydroxide and sodium carbonate
2. Boric acid and Borax
3. Oxalic acid and sodium oxalate

Test for identity

1. Sodium bicarbonate
2. Barium sulphate
3. Ferrous sulphate
4. Potassium chloride

Test for purity

1. Swelling power in Bentonite
2. Acid neutralizing capacity in aluminium hydroxide gel
3. Ammonium salts in potash alum
4. Adsorption power heavy Kaolin
5. Presence of Iodates in KI

Preparations (Any two exercises)

1. Boric acids
2. Potash alum
3. Calcium lactate
4. Magnesium sulphate

To perform Identification test for Cation and anion

Scheme of Practical Examination

	Internal/ Sessional	External
Synopsis	05	15
Major Experiment	10	25
Minor Experiment	03	15
Viva	02	15
Max. marks	**20**	**70**
Duration	**3 hours**	**4 hours**

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva- voce and record maintenance)

Recommended Books^: (Latest Editions)

1. Block JH, Roche B, Soine TO and Wilson CO. Inorganic Medicinal and Pharmaceutical Chemistry. Lea and Febiger. US.
2. Ministry of Welfare. Government of India. Indian Pharmacopoeia
3. Subba Rao B and Alagarsamy V. Practical Pharmaceutical Inorganic Chemistry, Pharma Med Press / BSP Books. Hyderabad-Telangana, India.
4. Belsare DP and Dhake AS. Inorganic Pharmaceutical Chemistry (Practical). Career publication, Maharashtra. India
5. Devala Rao G. Practical Pharmaceutical Inorganic Chemistry. Birla Publication Pvt. Ltd. Delhi. India.
6. Bentley and Driver's Textbook of Pharmaceutical Chemistry. Oxford / BSP Books. UK.
7. Gupta J, Sanduja M & Grover M. A Practical Book of Pharmaceutical Inorganic Chemistry. Nirali Prakashan. India.
8. Beckett AH, Stenlake JB. Practical Pharmaceutical Chemistry. CBS Publishers and Distributors. New Delhi. India
9. Vogel AI. Text Book of Quantitative Inorganic analysis. Longman.New York. London.
10. Rao PG. Inorganic Pharmaceutical Chemistry. Vallabh Prakashan. New Delhi. India.
11. Kennedy John H. Analytical Chemistry Principles. Harcourt Brace Jovanovich. San Diego, California. USA.
12. United States Pharmacopoeial Convention. USP.
13. The British Pharmacopoeia Commission. British Pharmacopoeia.
14. Skoog, Douglas A; West, Donald M; Holler, F. James. Fundamentals of Analytical Chemistry. Sounders College Publishing, London.
15. Ayers GH. Quantitative Chemical Analysis. Harper and Row. New York. US.
16. Connors KA. A Textbook of Pharmaceutical Analysis. John Wiley and sons. New York.US

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ANAND PHARMACY COLLEGE, ANAND
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(Approved by PCI, NAAC Accredited – A+ Grade, 3.38 CGPA)
Awarding University: Gujarat Technological University, Ahmedabad

Name of Program: **Pharm D**
Year: **I**
Course Code: **P020106TT**
Course Name: **Remedial Mathematics**
Course Type: **Core**
Year of Implementation: **2024 – 25**

Teaching and Examination Scheme:

Number of hours/ Week			Number of credits			Total credits	Evaluation Scheme (Marks)						Total Marks
							Sessional Exams				End Semester Assessment		
							Theory		Practical				
L	Tu	P	L	Tu	P		T	CIE	E	T	T	P	
3	1	0	6	2	0	8	30	0	0	0	70	0	100

Scope:
This is an introductory course in mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, Analytical geometry, Calculus, differential equation and Laplace transform

Course Outcomes (CO):
Upon completion of the course student shall be able to

CO1	Understand the basics of mathematics
CO2	Know the theory and their application in Pharmacy
CO3	Solve the different types of problems by utilizing basic concepts
CO4	Apply the basic concept of mathematics in Pharmacy

Detailed Syllabus:
Total Teaching hours: **60 hours**

1	**Algebra**: Determinants, Matrices	**10 hours**
2	**Trigonometry**: Sides and angles of a triangle, solution of triangles	**12 hours**
3	**Analytical Geometry**: Points, straight line, circle, parabola	**12 hours**
4	**Differential calculus**: Limit of a function, differential calculus, differentiation of a sum, product, quotient composite, parametric, exponential, trigonometric and logarithmic function. successive differentiation, Leibnitz's theorem, partial differentiation, Euler's theorem on homogeneous functions of two variables	**18 hours**
5	**Integral Calculus**: Definite integrals, integration by substitution and by parts, properties of definite integrals	**12 hours**
6	**Differential equations**: Definition, order, degree, variable separable, homogeneous, Linear, heterogeneous, linear, differential equation with constant coefficient, simultaneous linear equation of second order.	**16 hours**
7	**Laplace transform**: Definition, Laplace transform of elementary functions, properties of linearity and shifting	**10 hours**

Tutorials **Tutorial hours: 30 Hours**

Tutorials will be based on above syllabus

Recommended Books^: (Latest Editions)

1. Differential Calculus by Shanthinarayan
2. Pharmaceutical Mathematics with application to Pharmacy by Panchaksharappa Gowda D.H.
3. Integral Calculus by Shanthinarayan
4. Higher Engineering Mathematics by Dr. B.S. Grewal

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Scheme of Practical Examination

Item	Internal/ Sessional	External
Identification	04	10
Synopsis	04	10
Major Experiment	07	20
Minor Experiment	03	15
Viva	02	15
Max. marks	**20**	**70**
Duration	**3 hours**	**4 hours**

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for CIE)

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Awarding University: Gujarat Technological University, Ahmedabad

Name of Program: **Pharm. D**
Year: **I**
Course Code:
P020107TP Course
Name: **Biology** Course
Type: **Core**
Year of Implementation: **2024 – 25**

Teaching and Examination Scheme:

Number of hours/ Week			Number of credits			Total credits	Evaluation Scheme (Marks)						Total Marks
							Sessional Exams				Term End Assessment		
							Theory	Practical					
L	Tu	P	L	Tu	P		T	CIE	E	T	T	P	
3	1	3	3	1	3	7	30	10	20	30	70	70	200

Scope:
This is an introductory course in Biology, which gives detailed study of natural sources such as plant and animal origin. This subject has been introduce to the pharmacy course in order to make the student aware of various naturally occurring drugs and its history, sources, classification, distribution and the characters of the plants and animals. This subject gives basic foundation to Pharmacology.

Course Outcomes (CO):
Upon completion of the course student shall be able to

CO1	Understand the classification and key features of the kingdoms of life
CO2	Explore the morphology of plant, flower, fruit, and seed
CO3	Analyze the key aspects of plant anatomy, physiology, and microbial interactions
CO4	Examine various tissue and organ systems in animals, focusing on poisonous species, human anatomy, and detailed frog systems
CO5	Summarize cell components, differentiate root and stem modifications, and analyze various plant families
CO6	Conduct biological experiments and identify animal species

Detailed Syllabus:
Total Teaching hours: **90 hours**

1	Introduction	**02 Hours**
	General organization of plants and its inclusions	**04 Hours**
	Plant tissues	**04 Hours**
	Plant kingdom and its classification.	**04 Hours**
2	Morphology of plants	**05 Hours**
	Root, Stem, Leaf and Its modifications	**08 Hours**
	Inflorescence and Pollination of flowers	**06 Hours**
	Morphology of fruits and seeds	**06 Hours**

3	Plant physiology	**04 Hours**
	Taxonomy of Leguminosae, Umbelliferae, Solanaceae, Lilliaceae	**08 Hours**
	Zinziberaceae, Rubiaceae, Study of Fungi, Yeast, Penicillin and Bacteria	**10 Hours**
4	Study of Animal cell	**04 Hours**
	Study animal tissues	**04 Hours**
5	Detailed study of frog	**06 Hours**
	Study of Pisces, Raptiles, Aves	**08 Hours**
	General organization of mammals	**04 Hours**
	Study of poisonous animals	**03 Hours**

Tutorials **Tutorial hours: 30 Hours**

Tutorials will be based on the above syllabus

List of Practicals

1. Introduction of biology experiments.
2. Study of cell wall constituents and cell inclusions.
3. Study of Stem modifications.
4. Study of Root modifications.
5. Study of Leaf modifications.
6. Identification of Fruits and seeds.
7. Preparation of Permanent slides.
8. T.S. of Senna, Cassia, Ephedra, Podophyllum.
9. Simple plant physiological experiments.
10. Identification of animals
11. Detailed study of Frog
12. Computer based tutorials

Scheme of Practical Examination

	Internal/Sessional	**External**
Identification	04	10
Synopsis	04	10
Major Experiment	07	20
Minor Experiment	03	15
Viva	02	15
Max. marks	**20**	**70**
Duration	**3 hours**	**4 hours**

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva- voce and record maintenance)

Recommended Books^: (Latest Editions)

1. Gokhale SB, Kokate CK. A Manual for Pharmaceutical Biology Practical. Nirali Prakashan. Pune.
2. Thulajappa PL, Dr. Seetaram. A Textbook of Biology. Expert Educational Publishers, Bangalore, India.
3. Goyal RK, Patel NM. Practical Anatomy and Physiology. B. S. Shah Prakashan. Ahmedabad.
4. Dutta AC. Botany for Degree Students. Oxford University Press. New Delhi.
5. Shah BK. Kapadia NS. Pharmacognosy. Nirav & Roopal Prakashan. Ahmedabad.

6. Khandelwal KR. Practical Pharmacognosy: Techniques and Experiment. Nirali Prakashan. Pune.
7. Dutta AC. Botany for Degree Students. Oxford University Press. New Delhi.
8. Ayyer EM, Ananthakrishnan TN. Outlines of Zoology. S. Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai.

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(Approved by PCI, NAAC Accredited – A+ Grade, 3.38 CGPA)
Awarding University: Gujarat Technological University, Ahmedabad

Name of Program: **Pharm D**
Year: **I**
Course Code: **P020108PP**
Course Name**: Communicative English**
Course Type: **Ability Enhancement Course (AEC)**
Year of Implementation: **2024 – 25**

Teaching and Examination Scheme:

Number of hours/ Week			Number of credits			Total credits	Evaluation Scheme (Marks)						Total Marks
							Sessional Exams				Term End Assessment		
							Theory	Practical					
L	Tu	P	L	Tu	P		T	CIE	E	T	T	P	
0	0	1	0	0	1	1	0	5	10	15	0	35	50

Scope:
This course aims to enhance the proficiency in listening, speaking, reading, and writing through interactive and practical activities, preparing them for effective communication in academic and everyday contexts.

Course Outcomes (CO):
Upon completion of the course student shall be able to

CO1	Enhance listening, comprehension skills and spoken English to improve fluency and quality in these contexts
CO2	Develop effective reading strategies and improve writing skills using principles of grammar

Detailed Syllabus:
Total Teaching hours: **30 hours**

1	**Fundamentals of English Communication:** Introduction, pronunciation, basic listening and reading skills, foundational writing, and vocabulary	**06 hours**
2	**Practical Speaking and Listening:** Self-introductions, following instructions, vocabulary enhancement, grammar basics, reading comprehension, and paragraph writing	**06 hours**
3	**Interactive Communication**: Everyday conversations, news listening, idioms, inference reading, email writing, and tenses.	**06 hours**
4	**Advanced Communication Skills:** Public speaking, dialogues, academic vocabulary, essay writing, critical reading, and conditionals	**06 hours**
5	**Applied English and Review:** Group discussions, interview listening, phrasal verbs, summarizing, presentation skills, and comprehensive course review	**06 hours**

Recommended Books^: (Latest Editions)

1. David Green. Contemporary English Grammar Structures and Composition. Laxmi Publication, New Delhi, 2015 OR
2. Wren PC & Martin H. English Grammar and Composition, S Chand Publishing. New Delhi. India.
3. Roman Kenneth and Raphaelson Joel. Writing That Works, How to Communicate Effectively in Business. HarperCollins Publishers Gurugram, Haryana. India.
4. Sharma RC & Mohan Krishna. Business Correspondence and Report Writing. Tata McGraw Hill, New Delhi. India.
5. Inthira SR & Saraswathi V. Enrich your English – Communication skills, CIEFL & OUP.India
6. Pachter Barbara. The Essentials of Business Etiquette: How to Greet, Eat, and Tweet Your Way to Success. McGraw-Hill Education. India.
7. Lewis Norman. Unlock your Word Power: Have English at your Fingertips. Penguin Random House. India.
8. Thomson AJ & Martinet AV. A Practical English Grammar. Oxford University Press. Noida. India.

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આણંદ ફાર્મસી કોલેજ, આણંદ

(યુજીસી રેગ્યુલેશન્સ 2023 હેઠળ ઓટોનોમસ કોલેજ)

શ્રી રામકૃષ્ણ સેવા મંડળ સંચાલિત

(PCI માન્ય, એક્રીડીટેશન NAAC– A+ ગ્રેડ, 3.38 CGPA)

એવોર્ડિંગ યુનિવર્સિટી. ગુજરાત ટેકનોલોજીકલ યુનિવર્સિટી, અમદાવાદ

કાર્યક્રમનું નામ: ફાર્મ.ડી

વર્ષ: ૧

અભ્યાસક્રમ નો કોડ: P020109PP

અભ્યાસક્રમ નું નામ: Communicative Gujarati -Practical

અભ્યાસક્રમ નો પ્રકાર: એબિલિટી એન્હાન્સમેન્ટ કોર્સ (એઇસી)

અમલીકરણ નું વર્ષ: 2024 – 25

અધ્યાપન અને પરીક્ષા યોજના:

Number of hours/ Week			Number of credits			Total credits	Evaluation Scheme (Marks)						Total Marks
							Sessional Exams				Term End Assessment		
							Theory		Practical				
L	Tu	P	L	Tu	P		T	CIE	E	T	T	P	
0	0	1	0	0	1	1	0	5	10	15	0	35	50

અવકાશ: આ કોર્સ ગુજરાતી ભાષાની બુનિયાદ સાથે સંબંધિત છે.

અભ્યાસક્રમ પૂર્ણ થયા પછી વિદ્યાર્થી નીચે આપેલા અભ્યાસક્રમ ના પરિણામો (CO) ને સમજવાં માં સક્ષમ હશે:

CO1	શ્રવણશક્તિ,સમજણ શક્તિ અને ગુજરાતી બોલવા માં વધારો કરે છે અને એની પ્રવાહિતામાં સુધારો કરી આપેલાસંદર્ભોમાં ગુણવત્તા વધારે છે.
CO2	વ્યાકરણ ના સિદ્ધાંતોનો ઉપયોગ કરીને અસરકારક વાંચન વ્યૂહરચના વિકસાવવી અને લેખન કુશળતામાં સુધારો કરવો.

અભ્યાસક્રમ નો વિષય:

શિક્ષણ ના કુલ કલાકો: **30 કલાક**

૧	**ગુજરાતી ભાષાનો સંક્ષિપ્ત ઇતિહાસ:** અ. ગુજરાતી ભાષાની ઉત્પત્તિ અને ઉત્ક્રાંતિ બ. ગુજરાતી ભાષાના પ્રાદેશિક પ્રકારો	**૦૨ કલાકો**
૨	**ગુજરાતી કલા, સંસ્કૃતિ અને જીવનશૈલી:** અ. ગુજરાતનું સાંસ્કૃતિક યોગદાન બ. મુખ્ય તહેવારો અને ઉજવણીઓ ક. રાંધણકળાનો વારસો ડ. સામાજિક માળખું અને આજીવિકા ઇ. ઐતિહાસિક સીમાચિહ્નો	**૦૩ કલાકો**
૩	**ગુજરાતી ભાષાનું મૂળ:** અ. ગુજરાતી લિપિ અને મૂળાક્ષરો	**૦૩ કલાકો**

	બ. મૂળભૂત ઉચ્ચારણ નિયમો ક. સામાન્ય શુભેચ્છાઓ અને પરિચય	
૪	**વાક્યો:** અ. વાક્ય નું માળખું બ. સર્વનામોનો પરિચય ક. ગુજરાતીમાં સહાયક ક્રિયાપદો: વર્તમાન, ભૂતકાળ અને ભવિષ્ય ડ. બે શબ્દોનાં વાક્યો, બે કરતાં વધુ શબ્દોનાં વાક્યો અને ત્રણ શબ્દો નાં વાક્યો ઇ.અનિવાર્ય અને પૂછપરછના વાક્યો	**૦૩ કલાકો**
૫	**સંખ્યાઓ, સામાન્ય શબ્દો અને શબ્દસમૂહો:** અ. સંખ્યાઓ ૧-૫૦ બ. સામાન્ય શબ્દો - સમાનાર્થી શબ્દો અને વિરોધી શબ્દો ક. સામાન્ય શબ્દસમૂહો અને રૂઢિપ્રયોગો	**૦૩ કલાકો**
૬	**ગુજરાતી વ્યાકરણ:** અ. સમાનાર્થી શબ્દો અને વિરોધી શબ્દો બ. સંધી	**૦૨ કલાકો**
૭	**બોલવાની અને સાંભળવાની કળા ને અમલ મા મુકવુ:** અ. ગુજરાતી વાર્તાઓ સાંભળવી :ટૂંકા સંવાદોનું અર્થઘટન કરવું અને સારાંશ બ. ગુજરાતી કાર્યક્રમને સાંભળવું: ટૂંકા સંવાદોનું અર્થઘટન ક. નવા ગુજરાતી કાર્યક્રમને સાંભળવું અને તેની ચર્ચા કરવી ડ. ગુજરાતી વક્તાઓને સાંભળવા અને તેમને અમલ મા મુકવુ	**૦૮ કલાકો**
૮	**વિવિધ ઘટનાક્રમો નું ગુજરાતીમાં વાર્તાલાપ:** અ. સામાજિક ક્રિયાપ્રતિક્રિયાઓ: કાર્યસ્થળ માટે શબ્દભંડોળ, વ્યાવસાયિક સંદેશાવ્યવહાર માટેના શબ્દસમૂહો અને ઘટનાક્રમો ને અમલ મા મુકવુ બ. વાસ્તવિક જીવનની પરિસ્થિતિ (ખરીદી કરવી, જમવાનું, મુસાફરી વગેરે કરી રહ્યા હોય) પર ભૂમિકા ભજવવી. ક. આરોગ્ય અને કટોકટી : આરોગ્ય અને તબીબી પરિસ્થિતિઓ માટે શબ્દભંડોળ, કટોકટીમાં મદદ મેળવવા માટેના શબ્દસમૂહો, દૃશ્યાવલિઓ ભજવતી ભૂમિકા	**૦૬ કલાકો**

Recommended Books:

1. પ્રા. ડૉ. પ્રતિભા શાહ. પ્રા. ડૉ. બી. સી. રાઠોડ.ગુજરાતી વ્યાકરણ પરિચય.અક્ષર પબ્લિકેશન, અમદાવાદ.
2. બિપિન પી. ત્રિવેદી.વ્યાકરણ વિહાર. ત્રિવેદી પબ્લિકેશન. ગાંધીનગર
3. પ્રા. આશાબહેન સી. પટેલ. વિશાલ ચૌધરી. ગુજરાતી વ્યાકરણ. બુક બર્ડ પબ્લિકેશન. ગાંધીનગર.
4. નારસંગ ડોડિયા. ગુજરાતી વ્યાકરણ ભાષાદર્પણ. ત્રિપાદા પબ્લિકેશન. ભાવનગર
5. "Learn Gujarati in 30 Days" by Krishna Gopal Vikal
6. "Gujarati: A Complete Course for Beginners" by Dr. K. G. Venkataraman
7. "Colloquial Gujarati" by J. S. Speake
8. "Gujarati for Beginners" by Anjana Patel
9. "Complete Gujarati: A Teach Yourself Guide" by David G. Smith
10. "A Modern Gujarati Grammar" by M. G. Patel
11. "Gujarati-English/English-Gujarati Dictionary" by R. G. Desai

ANAND PHARMACY COLLEGE, ANAND
(An Autonomous College under UGC Regulations 2023)
Managed by Shri Ramkrishna Seva Mandal
(Approved by PCI, NAAC Accredited – A+ Grade, 3.38 CGPA)
Awarding University: Gujarat Technological University, Ahmedabad

Name of Program: **Pharm.D**
Year: **I**
Course Code: **P020109PP**
Course Name**: Communicative Gujarati**
Course Type: **Ability Enhancement Course (AEC)**
Year of Implementation: **2024 – 25**

Teaching and Examination Scheme:

Number of hours/ Week			Number of credits			Total credits	Evaluation Scheme (Marks)								Total Marks
							Sessional Exams						Term End Assessment		
							Theory			Practical					
L	Tu	P	L	Tu	P		CIE	E	T	CIE	E	T	T	P	
0	0	2	0	0	1	1	0	0	0	5	10	15	0	35	50

Scope:
This course deals with the fundamentals of Gujarati language

Course Outcomes (CO):
Upon completion of the course student shall be able to

CO1	Enhance listening, comprehension skills and spoken Gujarati to improve fluency and quality in these contexts
CO2	Develop effective reading strategies and improve writing skills using principles of grammar

Detailed Syllabus:
Total Teaching hours: **30 hours**

1	**Brief history of Gujarati Language:** a. Origin and evolution of Gujarati language b. Regional Variants of Gujarati Language	**02 hours**
2	**Gujarati Art, Culture and lifestyle:** a. Cultural contribution of Gujarat b. Major festivals and celebrations c. Culinary heritage d. Social structure and livelihood e. Historic landmarks	**03 hours**
3	**Basic of Gujarati language**: a. Gujarati script and alphabets b. Basic pronunciation rules c. Common Greetings and introduction	**03 hours**
4	**Sentences:** a. Sentence structure b. Introduction to pronouns c. Auxiliary verbs in Gujarati: Present, Past and future d. Sentences of two words, more than two words, three words. e. Imperative sentences and interrogative sentences	**03 hours**

Unit 5	**Numbers, common words and phrases:** a. Numbers 1-50 b. Common words – Synonyms and Antonyms c. Common phrases and idioms	**03 hours**
Unit 6	**Gujarati Grammar:** a. Synonyms and Antonyms b. Sandhi	**02 hours**
Unit 7	**Practicing speaking and listening:** a. Listening to Gujarati stories: Interpreting short dialogues and summarizing b. Listening to Gujarati podcasts: Interpreting short dialogues c. Listening and discussing Gujarati new broadcasts d. Listening and practicing Gujarati orators	**08 hours**
Unit 8	**Conversation in Gujarati in various scenarios**: a. **Social interactions**: Vocabulary for workplace, Phrases for professional communication, Practice scenarios b. Simulating role play on real life situation (Shopping, dining, travelling, etc.) c. **Health and Emergencies**: Vocabulary for health and medical situations, Phrases for seeking help in emergencies, Role playing scenarios	**06 hours**

Recommended Books:

1. પ્રા. ડૉ. પ્રતિભા શાહ. પ્રા. ડૉ. બી. સી. રાઠોડ.ગુજરાતી વ્યાકરણ પરિચય.અક્ષર પબ્લિકેશન, અમદાવાદ.
2. બિપિન પી. ત્રિવેદી.વ્યાકરણ વિહાર. ત્રિવેદી પબ્લિકેશન. ગાંધીનગર
3. પ્રા. આશાબહેન સી. પટેલ. વિશાલ ચૌધરી. ગુજરાતી વ્યાકરણ. બુક બર્ડ પબ્લિકેશન. ગાંધીનગર.
4. નારસંગ ડોડિયા. ગુજરાતી વ્યાકરણ ભાષાદર્પણ. ત્રિપાદા પબ્લિકેશન. ભાવનગર
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