FACULTY OF PHARMACEUTICAL SCIENCES

Effective from Academic Batch: 2025-26

Programme: **Bachelor of Pharmacy**

Semester: **II**

Course Code: **108010201**

Course Title: **Human Anatomy and Physiology- II**

Course Objectives: Upon completion of the course the student shall be able to

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.
5. Appreciate coordinated working pattern of different organs of each system.
6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
3	1	-	4	25/10	75/30	-	-	100/50

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Nervous system** Organization of nervous system, neuron, neuroglia, classification and properties of nerve fiber, electrophysiology, action potential, nerve impulse, receptors, synapse, neurotransmitters. **Central nervous system** Meninges, ventricles of brain and cerebrospinal fluid. structure and functions of brain (cerebrum, brain stem, cerebellum), spinal cord (gross structure, functions of afferent and efferent nerve tracts, reflex activity)	10

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2	**Digestive System** Anatomy of GI Tract with special reference to anatomy and functions of stomach, (Acid production in the stomach, regulation of acid production through parasympathetic nervous system, pepsin role in protein digestion) small intestine and large intestine, anatomy and functions of salivary glands, pancreas and liver, movements of GIT, digestion and absorption of nutrients and disorders of GIT. **Energetics** Formation and role of ATP, Creatinine Phosphate and Basal metabolic rate (BMR).	**6**
3	**Respiratory system** Anatomy of respiratory system with special reference to anatomy of lungs, mechanism of respiration, regulation of respiration, Lung Volumes and capacities transport of respiratory gases, artificial respiration, and resuscitation methods. **Urinary System** Anatomy of urinary tract with special reference to anatomy of kidney and nephrons, functions of kidney and urinary tract, physiology of urine formation, micturition reflex and role of kidneys in acid base balance, role of Renin angiotensin system (RAS) in kidney and disorders of kidney	**10**
4	**Endocrine system** Classification of hormones, mechanism of hormone action, structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, pineal gland, thymus and their disorders.	**10**
5	**Reproductive system** Anatomy of male and female reproductive system, Functions of male and female reproductive system, sex hormones, physiology of menstruation, fertilization, spermatogenesis, oogenesis, pregnancy and parturition. **Introduction to genetics** Chromosomes, genes and DNA, protein synthesis, genetic pattern of inheritance.	**9**

Reference Books:

1	Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi
2	Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3	Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
4	Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A
5	Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A
6	Textbook of Human Histology by Inderbir Singh, Jaypee brothers medical publishers, New Delhi
7	Textbook of Practical Physiology by C.L. Ghai, Jaypee brothers medical publishers, New Delhi
8	Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi
9	Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
10	Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A
11	Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje ,Academic Publishers Kolkat

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12	Anatomy &Physiology I health and illness – ross and Wilson by Anne Waugh and Allison Grant, 14th edition, Elsevier, New York.
13	Essentials of anatomy and Physiology by Valerie C. Scanlon and Tina Sanders, 8th edition,

Pedagogy:

1. ICT tools (LCD projector, Laptop)
2. Traditional method (Black board)
3. Hands on Learning/models/charts (3D anatomical models)
4. Case-based and clinical Learning.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
40	45	15	0	0	0	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Explain the gross morphology, structure, and functions of the nervous system in the human body.	**15**
CO-2	Explain the gross morphology, structure, and functions of the digestive a in the human body and discuss formation and role of ATP, creatinine, phosphate and BMR in human energetic.	**20**
CO3	Explain the gross morphology, structure, and functions of the respiratory systems and urinary system in the human body.	**30**
CO-4	Explain gross morphology, structure and functions of the endocrine systems in the human body.	**15**
CO-5	Explain gross morphology, structure and functions of the reproductive systems in the human body and describe the basic concept of genetics and molecular biology.	**20**

Curriculum Revision:	
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FACULTY OF PHARMACEUTICAL SCIENCES

Effective from Academic Batch: 2025-26

Programme: **Bachelor of Pharmacy**

Semester: **II**

Course Code: **108010202**

Course Title: **Pharmaceutical Organic Chemistry-I**

Course Objectives: Upon completion of the course the student shall be able to

1. Write the structure, name and the type of isomerism of the organic compound
2. Write the reaction, name the reaction and orientation of reactions
3. Account for reactivity/stability of compounds
4. Identify/confirm the identification of organic compound

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
3	1	-	4	25/10	75/30	-	-	100/50

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Classification, nomenclature and isomerism:** Classification of Organic Compounds Common and IUPAC systems of nomenclature of organic compounds (up to 10 Carbons open chain and carbocyclic compounds), Structural isomerism in organic compounds	7

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2	**Alkanes*, Alkenes* and Conjugated dienes*:** SP^3 hybridization in alkanes, Halogenation of alkanes, uses of paraffins, Stabilities of alkenes, SP^2 hybridization in alkenes, E1 and E2 reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeff's orientation and evidences. E1 verses E2 reactions, Factors affecting E1 and E2 reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's orientation, free radical addition reactions of alkenes, Anti Markownikoff's orientation. Stability of conjugated dienes, Diel-Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement	**10**
3	**Alkyl halides*:** SN1 and SN2 reactions - kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations SN1 versus SN2 reactions, Factors affecting SN1 and SN2 reactions Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform **Alcohols*-** Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene Glycol	**10**
4	**Carbonyl compounds* (Aldehydes and ketones):** Nucleophilic addition, Electromeric effect, aldol condensation, Crossed Aldol condensation, Cannizzaro reaction, Crossed Cannizzaro reaction, Benzoin condensation, Perkin condensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanillin, Cinnamaldehyde	**10**
5	**Carboxylic acids*:** Acidity of carboxylic acids, effect of substituents on acidity, inductive effect and qualitative tests for carboxylic acids, amide and ester Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid **Aliphatic amines* -** Basicity, effect of substituent on Basicity. Qualitative test, Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine	**8**

Reference Books:

1	Organic Chemistry by Morrison and Boyd
2	Organic Chemistry by I. L. Finar, Volume-I
3	Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
4	Organic Chemistry by P. L. Soni
5	Practical Organic Chemistry by Mann and Saunders.
6	Vogel's text book of Practical Organic Chemistry
7	Advanced Practical organic chemistry by N.K.Vishnoi.
8	Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.

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9	Reaction and reaction mechanism by Ahluwaliah/Chatwal.
10	Organic Chemistry, 2nd Edition by Bhupinder Mehta and Manju Mehta

Pedagogy:

1. Use of Traditional method of teaching (Blackboard) for pedagogy
2. Use ICT tools: Power point presentation (Laptop and projector, Smart Board)

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
50	30	20	-	-	-	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	% Weightage
CO-1	Describe IUPAC nomenclature, Classification, and Isomerism of organic compounds	**20**
CO-2	Explain properties, preparations, uses, chemical reactions with their reactivity, stability and orientation, and qualitative test for Alkanes, Alkenes and Conjugated dienes.	**30**
CO-3	Explain properties, preparations, uses, chemical reactions with their reactivity, stability and orientation, and qualitative test for Alkyl halides, Alcohols and Carbonyl compounds like aldehyde and ketones.	**30**
CO-4	Describe properties, preparations, uses, chemical reactions with their reactivity, stability and orientation, and qualitative test for Carboxylic acids and aliphatic amines.	**20**

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FACULTY OF PHARMACEUTICAL SCIENCES

Effective from Academic Batch: 2025-26

Programme: **Bachelor of Pharmacy**

Semester: **II**

Course Code: **108010203**

Course Title: **Pharmaceutical Engineering**

Course Objectives: Upon completion of the course the student shall be able:

1. To know various unit operations used in pharmaceutical industries.
2. To understand the material handling techniques.
3. To perform various processes involved in pharmaceutical manufacturing process.
4. To carry out various test to prevent environmental pollution.
5. To appreciate and comprehend significance of plant lay out design for optimum use of resources.
6. To appreciate the various preventive methods used for corrosion control in pharmaceutical industries

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
3	1	-	4	25/10	75/10	-	-	100/50

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Flow of fluids:** Types of manometers, Reynolds number and its significance, Bernoulli's theorem and its applications, Energy losses, Orifice meter, Venturimeter, Pitot tube and Rotameter. **Size Reduction:** Objectives, Mechanisms & Laws governing size reduction, factors affecting size reduction, principles, construction, working, uses, merits and demerits of Hammer mill, ball mill, fluid energy mill, Edge runner mill & end runner mill. **Size Separation:** Objectives, applications & mechanism of size separation, official standards of powders, sieves, size separation. Principles, construction, working, uses, merits and demerits of Sieve shaker, cyclone separator, Air separator, Bag filter & elutriation tank	10

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2	**Heat Transfer:** Objectives, applications & Heat transfer mechanisms. Fourier's law, Heat transfer by conduction, convection & radiation Heat interchangers & heat exchangers. **Evaporation:** Objectives, applications and factors influencing evaporation, differences between evaporation and other heat process. Principles, construction, working, uses, merits and demerits of Steam jacketed kettle, horizontal tube evaporator, climbing film evaporator, forced circulation evaporator, multiple effect evaporator & Economy of multiple effect evaporator **Distillation:** Basic Principles and methodology of simple distillation, flash distillation, fractional distillation, distillation under reduced pressure, steam distillation & molecular distillation	**10**
3	**Drying:** Objectives, applications & mechanism of drying process, measurements & applications of Equilibrium Moisture content, rate of drying curve. Principles, construction, working, uses, merits and demerits of Tray dryer, drum dryer spray dryer, fluidized bed dryer, vacuum dryer, freeze dryer **Mixing:** Objectives, applications & factors affecting mixing, Difference between solid and liquid mixing, mechanism of solid mixing, liquids mixing and semisolids mixing. Principles, Construction, Working, uses, merits and demerits of Double cone blender, twin shell blender, ribbon blender, Sigma blade mixer, planetary mixers, Propellers, Turbines, Paddles & Silverson Emulsifier	**10**
4	**Filtration:** Objectives, applications, Theories & Factors influencing filtration, filter aids, filter medias. Principle, Construction, Working, Uses, merits and demerits of plate & frame filter, filter leaf, rotary drum filter, Meta filter & Cartridge filter, membrane filters and Seidtz filter **Centrifugation:** Objectives, principle & applications of Centrifugation, principles, construction, working, uses, merits and demerits of Perforated basket centrifuge, non-perforated basket centrifuge, semi continuous centrifuge & super centrifuge.	**8**
5	**Materials of pharmaceutical plant construction, Corrosion, and its prevention:** Factors affecting during materials selected for pharmaceutical plant construction, Theories of corrosion, types of corrosion and their prevention. Ferrous and nonferrous metals, inorganic and organic nonmetals, basic of material handling systems.	**7**

Reference Books:

1	Introduction to chemical engineering – Walter L Badger & Julius Banchero, Latest edition.
2	Solid phase extraction, Principles, techniques, and applications by Nigel J.K. Simpson-Latest edition.
3	Unit operation of chemical engineering – Mcabe Smith, Latest edition.
4	Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latest edition.
5	Remington practice of pharmacy- Martin, Latest edition.
6	Theory and practice of industrial pharmacy by Lachmann., Latest edition.

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7	Physical pharmaceutics- C.V.S Subrahmanyam et al., Latest edition.
8	Cooper and Gunn's Tutorial pharmacy, S.J. Carter, Latest edition
9	Pharmaceutical Engineering, K Sambamurthy
10	Pharmaceutical Engineering by Dulal Krishna Tripathi, Latest edition

Pedagogy:

1. ICT based (Presentations, Audio Video Tools)
2. Traditional methods (Blackboard learning)
3. Laboratory Demonstrations and Industrial Visits

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
28	37	18	12	5	0	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Acquire a comprehensive understanding of fundamental unit operations, with emphasis on particle size characterization and fluid flow properties.	**22**
CO-2	Understand the principles of heat transfer, evaporation, and distillation as applied in pharmaceutical processes.	**23**
CO-3	Explain the mechanisms, underlying theories, and influencing factors associated with drying and mixing operations.	**23**
CO-4	Explain the theoretical concepts and significance of filtration and centrifugation techniques in pharmaceutical production.	**17**
CO-5	Highlight the importance of material selection for pharmaceutical plant construction, addressing corrosion and material handling systems.	**15**

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FACULTY OF PHARMACEUTICAL SCIENCES

Effective from Academic Batch: 2025-26

Programme: Bachelor of Pharmacy

Semester: II

Course Code: 108010204

Course Title: Computer Applications in Pharmacy

Objectives: Upon completion of the course the student shall be able to
1.Know the various types of application of computers in pharmacy
2.Know the various types of databases
3. Know the various applications of databases in pharmacy

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
3	-	-	3	15/6	35/14	-	-	50/25

***J: Jury; V: Viva; P: Practical**

Detailed Syllabus:

Sr.	Contents	Hours
1	Number system: Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to binary, binary to decimal, octal to binary etc., binary addition, binary subtraction – One's complement, Two's complement method, binary multiplication, binary division Concept of Information Systems and Software : Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project	6
2	Web technologies: Introduction to HTML, XML, CSS and Programming languages, introduction to web servers and Server Products. Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database	6

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3	Application of computers in Pharmacy – Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design, Hospital and Clinical Pharmacy, Electronic Prescribing and discharge (EP) systems, barcode medicine identification and automated dispensing of drugs, mobiletechnology and adherence monitoring, Diagnostic System, Lab-diagnostic System, Patient Monitoring System, Pharma Information System	6
4	Bioinformatics: Introduction, Objective of Bioinformatics, Bioinformatics Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery	6
5	Computers as data analysis in Preclinical development: Chromatographic data analysis (CDS), Laboratory Information management System (LIMS) and Text Information Management System (TIMS)	6

Reference Books:

1	Computer Application in Pharmacy – William E. Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
2	Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Willey and Sons, INC., Publication, USA
3	Bioinformatics (Concept, Skills and Applications) – S. C. Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)
4	Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath – Cary N. Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi - 110002

Pedagogy:

1. Face to Face class room
2. Virtual Class room
3. Online Resources
4. Interactive Learning
5. Personalized Learning
6. Self-Assessment

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %					
R	**U**	**A**	**N**	**E**	**C**
20	30	40	10	-	-

R: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

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Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understand the techniques for number system conversions and fundamental concepts of information systems, software development life cycle, and system analysis techniques.	20
CO-2	Gain foundational knowledge of web technologies including HTML, XML, CSS, programming languages, web servers, and databases.	20
CO-3	Understand the principles and use of computers in drug information storage and retrieval for patient oriented pharmaceutical care, dispensing of medicine, medication adherence system, electronic prescription and drug design.	20
CO-4	Understand the concept of bioinformatics, bioinformatics databases and importance in modern research particularly in vaccine discovery.	20
CO-5	Understanding computer-based tools for efficient data management, analysis, and compliance in preclinical development.	20

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FACULTY OF PHARMACEUTICAL SCIENCES

Effective from Academic Batch: 2025-26

Programme: **Bachelor of Pharmacy**

Semester: **II**

Course Code: **108010205**

Course Title: **Environmental Sciences**

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

1. Create the awareness about environmental problems among learners.
2. Impart basic knowledge about the environment and its allied problems.
3. Develop an attitude of concern for the environment.
4. Motivate learner to participate in environment protection and environment improvement.
5. Acquire skills to help the concerned individuals in identifying and solving environmental problems.
6. Strive to attain harmony with Nature

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
3	-	-	3	15/6	35/14	-	-	50/25

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	The Multidisciplinary nature of environmental studiesNatural Resources Renewable and non-renewable resources: Natural resources and associated problems a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources	10

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2	**Ecosystems**: Concept of an ecosystem. Structure and function of an ecosystem. Introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)	**10**
3	**Environmental Pollution**: Air pollution; Water pollution; Soil pollution	**10**

Reference Books:

1	Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2	Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3	Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India,
4	Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
5	Clark R.S., Marine Pollution, Clanderson Press Oxford
6	Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
7	De A.K., Environmental Chemistry, Wiley Eastern Ltd
8	Down of Earth, Centre for Science and Environment

Pedagogy:

1.Face to Face class room
2. Virtual Class room
3. Online Resources
4. Interactive Learning
5. Personalized Learning
6. Assessment

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
10	30	30	30	-	-	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

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Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understand the multidisciplinary nature of environmental studies, identify various natural resources, environmental challenges and role of individuals in conserving these resources.	**30**
CO-2	Understand concept, structure and functions of an ecosystem	**30**
CO-3	Identify the causes and effects of air, water, and soil pollution, and understand their impact on human health and the environment.	**30**

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FACULTY OF PHARMACEUTICAL SCIENCES

Effective from Academic Batch: 2025-26

Programme: **Bachelor of Pharmacy**

Semester: **II**

Course Code: **108010211**

Course Title: **Human Anatomy and Physiology - II Practical**

Course Objectives: Upon completion of the course the student shall be able to

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.
5. Appreciate coordinated working pattern of different organs of each system.
6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
-	-	4	2	-	-	25/10	75/30	100/50

* **J**: Jury; **V**: Viva; **P**: Practical

List of Practicals:

1	To study the integumentary and special senses using specimen, models, etc.,
2	To study the nervous system using specimen, models, etc.,
3	To study the endocrine system using specimen, models, etc
4	To demonstrate the general neurological examination.
5	To demonstrate the function of olfactory nerve.
6	To examine the different types of taste.
7	To demonstrate the visual acuity.
8	To demonstrate the reflex activity.
9	Recording of body temperature.
10	To demonstrate positive and negative feedback mechanism.
11	Determination of tidal volume and vital capacity.

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12	Study of digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens.
13	Recording of basal mass index.
14	Study of family planning devices and pregnancy diagnosis test.
15	Demonstration of total blood count by cell analyser.
16	Permanent slides of vital organs and gonads.

Reference Books:

1	Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi
2	Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3	Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
4	Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A
5	Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A
6	Textbook of Human Histology by Inderbir Singh, Jaypee brothers medical publishers, New Delhi
7	Textbook of Practical Physiology by C.L. Ghai, Jaypee brothers medical publishers, New Delhi
8	Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi
9	Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
10	Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A
11	Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje ,Academic Publishers Kolkat
12	Practical book of human anatomy and physiology-II by Mahesh Prasad, Dr. Antesh K Jha and Ritesh K Srivastav, Nirali Prakashan, Pune Maharashtra.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Record and analyze Physiological parameters: measurement of Body temperature, Basal mass index (BMI), tidal volume, vital capacity.	**25**
CO-2	Demonstrate and perform the sensory functions and neurological examinations: olfactory, taste, visual acuity and general neurological examinations and reflex activity.	**20**
CO-3	Demonstrate the structure and function of Human body systems, vital organs, gonads and Physiological Feedback Mechanisms with the help of models, charts, specimens and slides: digestive, respiratory, cardiovascular, urinary and reproductive systems.	**40**
CO-4	Study of family planning Devices and demonstration of family cell autoanalyzer.	**15**

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FACULTY OF PHARMACEUTICAL SCIENCES

Effective from Academic Batch: 2025-26

Programme: **Bachelor of Pharmacy**

Semester: **II**

Course Code: **108010212**

Course Title: **Pharmaceutical Organic Chemistry-I Practical**

Course Objectives: Upon completion of the course the student shall be able to

1. Write the structure, name and the type of isomerism of the organic compound
2. Write the reaction, name the reaction and orientation of reactions
3. Account for reactivity/stability of compounds
4. Identify/confirm the identification of organic compound

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
-	-	4	2	-	-	25/10	75/30	100/50

* **J**: Jury; **V**: Viva; **P**: Practical

List of Practicals:

1	Systematic qualitative analysis of unknown organic compounds like: A) Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc. B) Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test C) Solubility test D) Functional group test like Phenols, Amides/ Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides. E) Melting point/Boiling point of organic compounds F) Identification of the unknown compound from the literature using melting point/ boiling point G) Preparation of the derivatives and confirmation of the unknown compound by melting point/ boiling point H) Minimum 5 unknown organic compounds to be analyzed systematically
2	Preparation of suitable solid derivatives from organic compounds
3	Construction of molecular models

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Reference Books:

1	Organic Chemistry by Morrison and Boyd
2	Organic Chemistry by I.L. Finar , Volume-I
3	Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
4	Organic Chemistry by P.L.Soni
5	Practical Organic Chemistry by Mann and Saunders.
6	Vogel's text book of Practical Organic Chemistry
7	Advanced Practical organic chemistry by N.K.Vishnoi.
8	Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.
9	Reaction and reaction mechanism by Ahluwaliah/Chatwal.
10	Practical Organic Chemistry by Hitesh G Raval, Dimal A Shah & Sunil Baldania

Course Outcomes (CO):

Sr.	Course Outcome Statements	% Weightage
CO-1	Describe preliminary test, element detection, functional group test, Melting point/boiling point for identification of organic compounds	**60**
CO-2	Explain the preparation of suitable solid derivatives from organic compounds	**20**
CO-3	Explain molecular models of organic compounds	**10**
CO-4	Provide written responses to questions related to various aspects of the practicals performed	**10**

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FACULTY OF PHARMACEUTICAL SCIENCES

Effective from Academic Batch: 2025-26

Programme: **Bachelor Of Pharmacy**

Semester: **II**

Course Code: **108010213**

Course Title: **Pharmaceutical Engineering Practical**

Course Objectives: Upon completion of the course the student shall be able:

1. To know various unit operations used in pharmaceutical industries.
2. To understand the material handling techniques.
3. To perform various processes involved in pharmaceutical manufacturing process.
4. To carry out various test to prevent environmental pollution.
5. To appreciate and comprehend significance of plant lay out design for optimum use of resources.
6. To appreciate the various preventive methods used for corrosion control in pharmaceutical industries.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
-	-	4	2	-	-	25/10	75/30	100/50

* **J**: Jury; **V**: Viva; **P**: Practical

List of Practicals:

1	Determination of radiation constant of brass, iron, unpainted and painted glass.
2	Steam distillation – To calculate the efficiency of steam distillation.
3	To determine the overall heat transfer coefficient by heat exchanger
4	Construction of drying curves (for calcium carbonate and starch)
5	Determination of moisture content and loss on drying.
6	Determination of humidity of air – i) From wet and dry bulb temperatures –use of Dew point method
7	Description of Construction working and application of Pharmaceutical Machinery such as rotary tablet machine, fluidized bed coater, fluid energy mill, de humidifier
8	Size analysis by sieving – To evaluate size distribution of tablet granulations – Construction of various size frequency curves including arithmetic and logarithmic probability plots

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9	Size reduction: To verify the laws of size reduction using ball mill and determining Kicks, Rittinger's, Bond's coefficients, power requirement and critical speed of Ball Mill
10	Demonstration of colloid mill, planetary mixer, fluidized bed dryer, freeze dryer and such other major equipment
11	Factors affecting Rate of Filtration and Evaporation (Surface area, Concentration and Thickness/viscosity
12	To study the effect of time on the Rate of Crystallization.
13	To calculate the uniformity Index for given sample by using Double Cone Blender

Reference Books:

1	Introduction to chemical engineering – Walter L Badger & Julius Banchero, Latest edition.
2	Solid phase extraction, Principles, techniques and applications by Nigel J.K. Simpson-Latest edition.
3	Unit operation of chemical engineering – Mcabe Smith, Latest edition.
4	Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latest edition.
5	Remington practice of pharmacy- Martin, Latest edition.
6	Theory and practice of industrial pharmacy by Lachmann., Latest edition.
7	Physical pharmaceutics- C.V.S Subrahmanyam et al., Latest edition.
8	Cooper and Gunn's Tutorial pharmacy, S.J. Carter, Latest edition
9	Pharmaceutical Engineering, K Sambamurthy
10	Pharmaceutical Engineering by Dulal Krishna Tripathi, Latest edition

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understand the applications of filtration and drying in pharmaceuticals.	**35**
CO-2	Apply the principles of evaporation, crystallization, and heat transfer in pharmaceutical processes.	**20**
CO-3	Learn the concept of various unit operations concerning pharmaceutical manufacturing.	**10**
CO-4	Effectively communicate the fundamental principles of different pharmaceutical manufacturing operations.	**35**

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FACULTY OF PHARMACEUTICAL SCIENCES

Effective from Academic Batch: 2025-26

Programme: Bachelor of Pharmacy

Semester: II

Course Code: 108010214

Course Title: Computer Applications in Pharmacy Practical

Course Objectives: Upon completion of the course the student shall be able to

1. Know the various types of application of computers in pharmacy
2. Know the various types of databases
3. Know the various applications of databases in pharmacy

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
-	-	2	1	-	-	15/6	35/14	50/25

* **J**: Jury; **V**: Viva; **P**: Practical

List of Practicals:

1	Design a questionnaire using a word processing package to gather information about a particular disease.
2	Create a HTML web page to show personal information
3	Retrieve the information of a drug and its adverse effects using online tools
4	Creating mailing labels Using Label Wizard, generating label in MS WORD
5	Create a database in MS Access to store the patient information with the required fields using access
6	Design a form in MS Access to view, add, delete and modify the patient record in the database
7	Generating report and printing the report from patient database
8	Creating invoice table using – MS Access
9	Drug information storage and retrieval using MS Access

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10	Creating and working with queries in MS Access
11	Exporting Tables, Queries, Forms and Reports to web pages
12	Exporting Tables, Queries, Forms and Reports to XML pages

Reference Books:

1	Computer Application in Pharmacy – William E. Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
2	Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Willey and Sons, INC., Publication, USA
3	Bioinformatics (Concept, Skills and Applications) – S. C. Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)
4	Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath – Cary N. Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi - 110002

Course Outcomes (CO):

Sr.	Course Outcome Statements	%Weightage
CO-1	Generate different questionnaire, envelope labeling , and label using MS WORD package	**20**
CO-2	Learn basic idea of designing HTML web page	**20**
CO-3	Create databases storage and retrieval of data using MS Access	**30**
CO-4	Exporting Tables, Queries, Forms and Reports to web pages and XML pages.	**30**

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