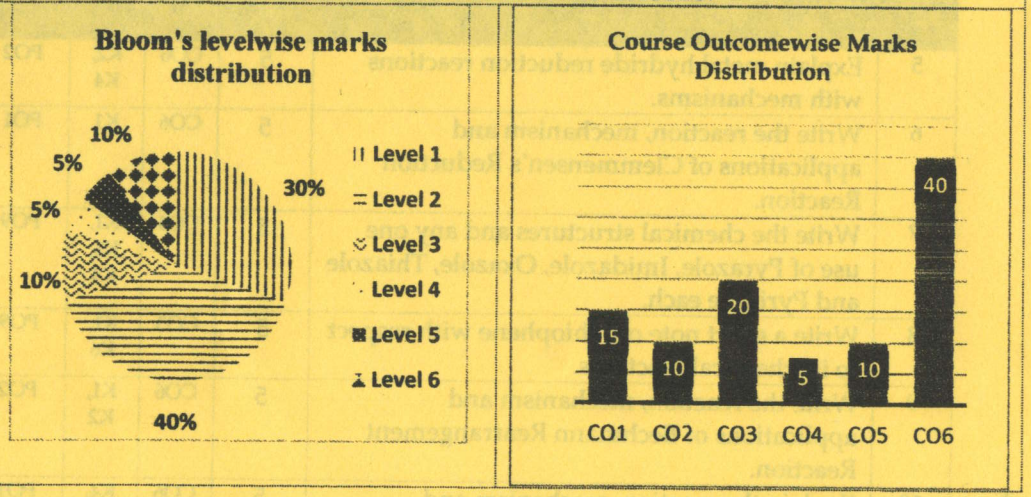
13	Write a note on the Rectus and Sinister system of nomenclature of isomers.	5	CO1	K6	PO2

CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Learn stereo-isomerism and racemic modification and resolution of racemic mixture.
	CO2	Understand the geometrical isomerism and conformations, stereoselective and stereo specific reaction mechanism
	CO3	Understand the nomenclature and numbering of five, six membered heterocyclic compounds with fused heterocyclic structures
	CO4	Understand the physical and chemical properties of five, six membered heterocyclic and fused ring compounds
	CO5	Learn about the drugs and their therapeutic usage, derived from heterocyclic compounds
	CO6	Describe detailed mechanisms for common naming reactions.

GRAPHICAL REPRESENTATION



ARKA JAIN University
Jharkhand
NAAC GRADE A ACCREDITED UNIVERSITY

[30-04-2026]
END SEM EXAMINATION
School of Health & Allied Sciences

Program	**Bachelor of Pharmacy**		
Subject Name	**Pharmaceutical Organic Chemistry-III**	**Session**	**Even, 2025-2026**
Semester	**IV**	**Year**	**April, 2026**
Time: 3 Hour **Max. Marks: 75**	• Start writing from 2nd page onwards; don't Write on the 1st Page Backside • **Answer all Questions of Section A (Compulsory)** • **Answer Any *Two* out of *Three* of Section B** • **Answer Any *Seven* out of *Nine* of Section C** • **Possession of Mobile Phones or any kind of Written Material, Arguments with the Invigilator or Discussing with Co-Student will come under Unfair Means and will Result in the Cancellation of the Papers.**		
Knowledge Level (KL)	**K1:** Remembering	**K3:** Applying	**K5:** Evaluating
	K2: Understanding	**K4:** Analysing	**K6:** Creating

Section A (Each question Carry 01 Mark from Q1-i to xx) – 20 Marks

Q. N I	QUESTIONS	Marks	COs	KL	PO
i	Catalyst used in Clemmensens's reduction reaction is a) Zn-Hg+Conc.HCl b) Al $(OH)_3$ c) $CaCl_2$ d) NaCl	1	CO1	K1, K2	PO9
ii	Reimer-Tiemann reaction is a characteristic reaction for a) Carboxylic acids b) Amines c) Phenols d) Alcohols	1	CO2	K1, K2	PO1
iii	Tolmetin contains: a) thiazole b) triazole c) imidazole d) pyrrole	1	CO1	K3	PO2
iv	Aldehyde group in benzaldehyde is a) ortho-para directing b) meta directing c)para directing d) ortho directing	1	CO3	K1, K2	PO2
v	Thiophene undergoes electrophilic substitution reaction to give-------substituted product? a) Only α b) Only β c) Both α and β d) None of these	1	CO1	K1, K2	PO1
vi	Which of the following catalyst used to reduce nitro group to amine	1	CO3	K1	PO2

	a) $LiAlH_4$ b) $NaBH_4$ c) Sn, HCl d) $KMnO_4$				
vii	Identify the 6-membered heterocyclic ring: a) Pyrrole b) Pyridine c) Imidazole d) Pyrrazole	1	CO3	K1, K3	PO1
viii	Phenothiazine contains: a) N and N b) N and S c) N and P d) N and Ag	1	CO3	K1, K3	PO1
ix	Alcohols can be converted into carboxylic acids by a) Oxidation b) Reduction c) Hydrolysis d) Elimination	1	CO2	K1, K2	PO9
x	Effect of ortho-NO_2 group on basicity of thiophene a) Increases b) Decreases c) No effect d) Strongly increases	1	CO1	K2	PO1
xi	Thiophene contains: - a) Nitrogen b) Sulphur c) Oxygen d) Iodine	1	CO6	K1, K2	PO2
xii	Imidazole contains _____ Nitrogen: - a) 2 b) 1 c) 3 d) 4	1	CO6	K1, K2	PO1
xiii	Triazole contains _____ Nitrogen: - a) 2 b) 1 c) 3 d) 4	1	CO6	K1, K2	PO2
xiv	Furan contains: - a) Nitrogen b) Sulphur c) Oxygen d) Iodine	1	CO6	K1, K2	PO1
xv	Tetrazole contains _____ Nitrogen: - a) 2 b) 1 c) 3 d) 4	1	CO6	K1, K2	PO2
xvi	Pyrrole on oxidation with CrO_3/CH_3COOH gives a) Maleic imide b) Acetic anhydride c) Both (a) and (b) d) No reaction	1	CO6	K2, K3	PO2
xvii	Imidazole contains Nitrogen in first and _____ position: - a) 2^{nd} b) 1^{st} c) 3^{rd} d) 4^{th}	1	CO3	K2, K3	PO2
xviii	Pyrrazole contains Nitrogen in first and _____ position: - a) 2^{nd} b) 1^{st} c) 3^{rd} d) 4^{th}	1	CO3	K1, K2	PO2
xix	Oxazole contains: - a) N&O b) S&N c) I&N d) S&O	1	CO5	K1, K3	PO1
xx	Pyrrole contains: - a) Nitrogen b) Sulphur c) Oxygen d) Iodine	1	CO4	K1, K2	PO1

Section B (Answer any TWO out of THREE) – 20 Marks
(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL	PO
2	Explain Cis-Trans, E-Z, Anti and Syn system of Isomerism with one example each.	10	CO2	K1, K2, K4	PO10
3	Write the synthesis, chemical reactions and medicinal uses of five membered heterocyclic ring containing Nitrogen.	10	CO3	K6	PO2
4	Explain Optical isomerism in detail with suitable examples.	10	CO1	K2, K5, K1	PO1

Section C (Answer any SEVEN out of NINE) – 35Marks
(Each question Carry 05 Marks)

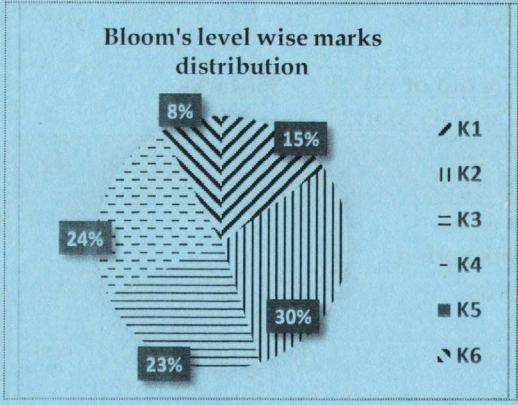
Q. No.	QUESTIONS	Marks	COs	KL	PO
5	Explain metal hydride reduction reactions with mechanisms.	5	CO6	K2, K4	PO2
6	Write the reaction, mechanism and applications of Clemmensen's Reduction Reaction.	5	CO6	K1	PO1
7	Write the chemical structures and any one use of Pyrazole, Imidazole, Oxazole, Thiazole and Pyridine each.	5	CO4	K1, K3, K4	PO9
8	Write a short note on Thiophene with respect to its chemical reactions.	5	CO3	K1, K6	PO9
9	Write the reaction, mechanism and applications of Bechmann Rearrangement Reaction.	5	CO6	K1, K2	PO2
10	Explain the reaction, mechanism and applications of Dakin reaction.	5	CO6	K4, K5	PO1
11	What is Racemic mixture? Explain the concept of Resolution.	5	CO1	K1, K3	PO2
12	Differentiate Stereoselective and Stereospecific reactions.	5	CO1	K6	PO2

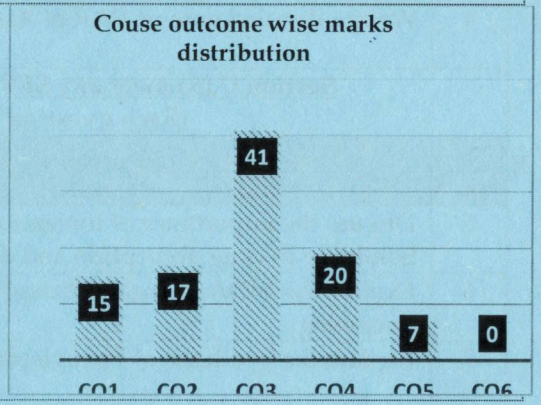
8	Explain the synthesis of Neostigmine.	5	CO5	K3, K6	PO9
9	Write a note on MOA and Use of Ethosuximide.	5	CO2	K2, K3	PO1
10	Discuss the SAR of BARBITURATES.	5	CO3	K3, K4	PO2
11	Write a short note on Ketamine hydrochloride.	5	CO4	K2	PO1
12	Explain the MOA and uses of Ibuprofen.	5	CO1	K2, K3	PO1
13	Write the SAR of fenamate derivatives (Mefenamic acid).	5	CO3	K3, K4	PO2

CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Understand the correlation between pharmacology of a disease and its mitigation or cure
	CO2	Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
	CO3	Analyze the Structural Activity Relationship (SAR) of different class of drugs
	CO4	Understand the classification, mode of action, structure-activity relationship and use of different drugs acting on autonomic nervous system (ANS).
	CO5	Apply the synthesis of some important class of drugs
	CO6	Apply reaction mechanisms involved in the synthesis of medicinally important compounds

GRAPHICAL REPRESENTATION





ARKA JAIN University Jharkhand | NAAC GRADE A ACCREDITED UNIVERSITY

[04-05-2026]
END SEM EXAMINATION
School of Health & Allied Sciences

Program	**Bachelor of Pharmacy**		
Subject Name	**Medicinal Chemistry I - Theory**	**Session**	**Even, 2025-26**
Semester	**IV**	**Year**	**April, 2026**
Time: 3 Hour **Max. Marks: 75**	• Start writing from 2nd page onwards; **don't Write on the 1st Page Backside** • **Answer all Questions of Section A (Compulsory)** • **Answer Any *Two* out of *Three* of Section B** • **Answer Any *Seven* out of *Nine* of Section C** • **Possession of Mobile Phones** or any kind of **Written Material, Arguments with the Invigilator or Discussing with Co-Student** will comes under **Unfair Means** and will **Result** in the **Cancellation of the Papers**.		
Knowledge Level (KL)	**K1 :** Remembering	**K3 :** Applying	**K5 :** Evaluating
	K2 : Understanding	**K4 :** Analysing	**K6 :** Creating

Section A (Each question Carry 01 Mark from Q1-i to xx) – 20 Marks

Q. N 1	QUESTIONS	Marks	COs	KL	PO
i	Hydrogen bonding in drugs affects: A. Size B. Shape C. Solubility & binding D. Color	1	CO3	K2	PO10
ii	Cytochrome P450 enzymes are involved in: A. Phase II B. Phase I C. Excretion D. Absorption	1	CO2	K1	PO1
iii	A drug shows high lipid solubility, high protein binding, and slow metabolism. What is the expected duration of action? A. Short B. Moderate C. Long D. No effect	1	CO2	K3, K4	PO2
iv	A weak acid drug (pKa = 4.5) administered orally will show maximum absorption in: A. Stomach due to high solubility B. Intestine due to large surface area despite ionization C. Colon due to low pH D. Blood due to buffering capacity	1	CO2	K3, K4	PO10
v	Dopamine is: A. Antagonist B. Neurotransmitter	1	CO4	K1	PO1

	C. Enzyme D. Hormone only				
vi	Catechol structure is responsible for: A. Increased oral activity B. Rapid metabolism by COMT C. Decreased potency D. Reduced binding	1	CO3	K2	PO2
vii	Propranolol contains: A. Ester linkage B. Aryloxy propanolamine structure C. Amide linkage D. Ketone group	1	CO3	K1	PO1
viii	Organophosphates contain: A. Phosphorus group B. Ester only C. Amide D. Alcohol	1	CO4	K1	PO1
ix	Atropine acts as: A. Muscarinic agonist B. Muscarinic antagonist C. Nicotinic agonist D. Enzyme inhibitor	1	CO4	K1	PO1
x	Barbiturates act on: A. GABA receptor B. Dopamine receptor C. Adrenergic receptor D. Nicotinic receptor	1	CO4	K1	PO1
xi	Hydantoin ring is present in: A. Diazepam B. Phenytoin C. Morphine D. Aspirin	1	CO3	K1	PO1
xii	Electron-withdrawing groups in CNS drugs: A. Decrease activity B. Increase receptor binding C. Destroy structure D. Reduce solubility	1	CO3	K2	PO2
xiii	Removal of one –OH group from catechol ring leads to: A. Increased metabolism B. Increased duration C. Decreased activity D. No change	1	CO3	K3, K4	PO2
xiv	Isoproterenol shows high β activity due to: A. Small substituent B. Bulky N-substituent C. No hydroxyl group D. Ester linkage	1	CO3	K2	PO2
xv	Volatile anesthetics require: A. High polarity B. Low boiling point C. High boiling point D. Ionic structure	1	CO1	K2	PO2
xvi	Indirect sympathomimetics act by: A. Blocking receptors B. Releasing neurotransmitter C. Enzyme inhibition D. Ion channel blocking	1	CO4	K2	PO2
xvii	The benzodiazepine analog which has the least sedative activity A. ortho-substituted 5-aryl benzodiazepine B. di-ortho-substituted 5-aryl benzodiazepine C. para-substituted 5-aryl benzodiazepine D. unsubstituted 5-aryl benzodiazepine	1	CO3	K3, K4	PO2
xvii i	Codeine differs from morphine by: A. Methylation of OH B. Removal of ring C. Addition of ester D. No change	1	CO3	K2	PO10
xix	NSAIDs act by inhibiting: A. LOX B. COX C. MAO D. COMT	1	CO1	K1	PO1
xx	Aspirin irreversibly inhibits: A. COX B. LOX C. MAO D. CYP450	1	CO1	K1	PO1

Section B (Answer any TWO out of THREE) – 20 Marks
(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL	PO
2	Describe how Medicinal Chemistry has progressed from traditional remedies to modern approaches.	10	CO1	K2, K4	PO1
3	Write the chemical structure and uses of the following drugs: Chlorpromazine hydrochloride, Ethosuximide	10	CO3	K1, K2	PO10
4	Write a detailed note on SAR of Acetylcholine.	10	CO3	K3, K4	PO2

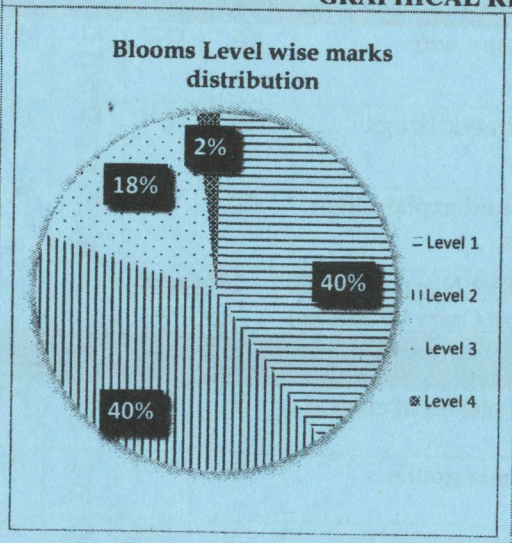
Section C (Answer any SEVEN out of NINE) – 35Marks
(Each question Carry 05 Marks)

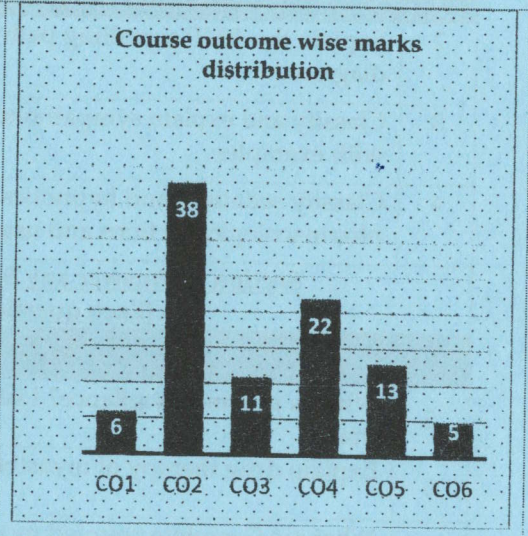
Q. No.	QUESTIONS	Marks	COs	KL	PO
5	Discuss the importance of Ionization & Solubility in drug absorption and distribution.	5	CO2	K2, K4	PO10
6	Explain the MOA of organophosphorus poisoning.	5	CO4	K2, K4	PO2
7	Explain the Synthesis of Phenylephrine.	5	CO5	K3, K6	PO9

CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Explain the general principles of pharmacology
	CO2	Describe the pharmacokinetic, pharmacodynamics, adverse drug reactions and drug interactions
	CO3	Explain drug discovery and clinical evaluation of new drugs
	CO4	Explain the drugs acting on the peripheral nervous system
	CO5	Describe the drugs acting on the central nervous system
	CO6	Strengthen the basic knowledge in the field of pharmacology and to impart recent advances in the drugs used for the treatment of various diseases.

GRAPHICAL REPRESENTATION





ARKA JAIN University
Jharkhand

NAAC GRADE A
ACCREDITED UNIVERSITY

[08-05-2026]
END SEM EXAMINATION
School of Allied Health Sciences

Program	Bachelor of Pharmacy		
Subject Name	Pharmacology-I	Session	Even, 2025-26
Semester	IV	Year	April, 2026
Time: 3 Hour Max. Marks : 75	• Start writing from 2nd page onwards; don't Write on the 1st Page Backside • Answer all Questions of Section A (Compulsory) • Answer Any *Two* out of *Three* of Section B • Answer Any *Seven* out of *Nine* of Section C • Possession of Mobile Phones or any kind of Written Material, Arguments with the Invigilator or Discussing with Co-Student will comes under Unfair Means and will Result in the Cancellation of the Papers.		
Knowledge Level (KL)	K1 : Remembering	K3 : Applying	K5 : Evaluating
	K2 : Understanding	K4 : Analysing	K6 : Creating

Section A (Each question Carry 01 Mark from Q1-i to xx) – 20 Marks

Q. N 1	QUESTIONS	Marks	COs	KL	PO
i	The neurotransmitter released at all preganglionic autonomic fibers is: a. Dopamine b. Acetylcholine c. Noradrenaline d. Serotonin	1	CO4	K1, K2	PO1
ii	Local anesthetics act by blocking: a. Potassium channels b. Sodium channels c. Calcium channels d. Chloride channels	1	CO5	K1, K2	PO1
iii	Myasthenia gravis is treated with: a. Atropine b. Neostigmine c. Propranolol d. Diazepam	1	CO5	K1, K2	PO1
iv	Which is an example of a natural drug source? a. Aspirin b. Insulin (recombinant) c. Morphine d. Paracetamol	1	CO3	K1, K2	PO1
v	Which process involves movement of drugs against a concentration gradient? a. Passive diffusion b. Facilitated diffusion c. Active transport d. Filtration	1	CO2	K1, K2	PO1
vi	In glaucoma, drugs reduce intraocular pressure by: a. Increasing aqueous humor b. Decreasing aqueous humor or increasing	1	CO5	K1, K2	PO1

	outflow c. Increasing blood flow d. Blocking retina				
vii	Drug distribution depends on: a. Blood flow b. Tissue permeability c. Protein binding d. All of the above	1	CO2	K1, K2	PO1
viii	Therapeutic index indicates: a. Drug potency b. Drug safety c. Drug absorption d. Drug metabolism	1	CO1	K1, K2	PO1
ix	GPCR activation typically involves: a. Direct DNA binding b. G-protein coupling and second messenger generation c. Ion influx only d. Protein degradation	1	CO2	K1, K2	PO1
x	The IP_3-DAG pathway is activated by: a. Adenylyl cyclase b. Phospholipase C c. Protein kinase A d. Gs protein	1	CO2	K1, K2	PO1
xi	Potency of a drug is indicated by: a. Maximum effect b. EC50 value c. Toxic dose d. Half-life	1	CO2	K1, K2	PO1
xii	Which ADR is predictable and dose-dependent? a. Type A b. Type B c. Type C d. Type D	1	CO2	K1, K2	PO1
xiii	Pharmacovigilance primarily deals with: a. Drug synthesis b. Detection and prevention of ADRs c. Drug marketing d. Drug pricing	1	CO2	K1, K2	PO1
xiv	Phase III trials involve: a. Healthy volunteers b. Large patient population c. Animal studies d. In vitro testing	1	CO2	K1, K2	PO1
xv	The major excitatory neurotransmitter in the CNS is: a. Glycine b. Glutamate c. GABA d. Dopamine	1	CO5	K1, K2	PO1
xvi	Which neurotransmitter is mainly involved in Parkinson's disease? a. Serotonin b. Dopamine c. GABA d. Glycine	1	CO5	K2, K2	PO1
xvii	Which drug is used in Alzheimer's disease? a. Donepezil b. Levodopa c. Diazepam d. Phenytoin	1	CO5	K2, K2	PO1
xviii	Which drug is an antipsychotic? a. Haloperidol b. Diazepam c. Phenytoin d. Morphine	1	CO4	K1, K2	PO1
xix	CNS stimulants include: a. Caffeine b. Morphine c. Diazepam d. Haloperidol	1	CO5	K1, K2	PO1
xx	Which drug is an opioid analgesic? a. Morphine b. Fluoxetine c. Diazepam d. Haloperidol	1	CO5	K1, K2	PO1

Section B (Answer any TWO out of THREE) – 20 Marks
(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	K's	PO
2	Explain the AMP signalling pathway with diagram.	10	CO2	K1, K2, K3	PO1
3	Classify and explain sympathomimetic drugs with examples.	10	CO4	K1, K2 K3	PO1
4	Classify sedatives and hypnotics and explain their pharmacological actions and uses.	10	CO4	K1, K2 K3	PO1

Section C (Answer any SEVEN out of NINE) – 35Marks
(Each question Carry 05 Marks)

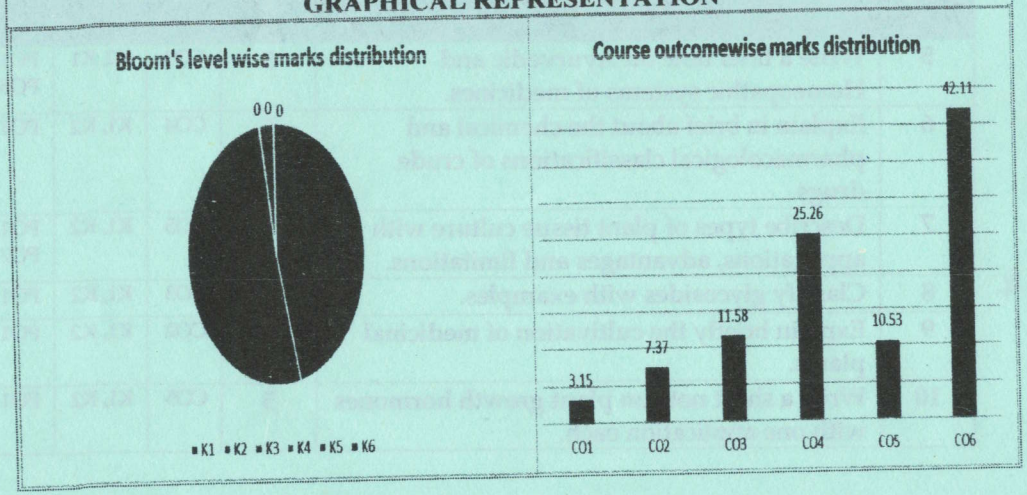
Q. No.	QUESTIONS	Marks	COs	K's	PO
5	What is pharmacovigilance? List phases of clinical trials.	5	CO2	K1, K2	PO1
6	Explain drug therapy of myasthenia gravis.	5	CO3	K1, K2	PO1
7	What are G-protein coupled receptors (GPCRs)?	5	CO2	K1, K2K 3,K4	PO1
8	Describe the scope and branches of pharmacology in detail.	5	CO1	K1, K2	PO1
9	Explain drug distribution and factors influencing it.	5	CO2	K1, K2	PO1
10	Classify and explain routes of drug administration with advantages and disadvantages.	5	CO2	K1, K2	PO1
11	Define general anesthesia and list its stages.	5	CO3	K1, K2	PO1
12	Classify skeletal muscle relaxants with suitable examples. Explain the mechanism of action, therapeutic uses and adverse effects.	5	CO6	K1, K2 K3	PO1
13	Write a short note on opioid analgesics.	5	CO5	K1, K2 K3	PO1

11	Discuss the biological sources, chemical composition and uses of any two of the following plant fibres: a) Cotton b) Hemp c) Jute	5	CO6	K1, K2	PO1
12	Classify Terpenoids with examples.	5	CO6	K1, K2	PO1
13	What is adulteration? Classify its types.	5	CO4	K1, K2	PO1, PO6

CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Know the historical development of Pharmacognosy and about the natural sources of crude drugs
	CO2	Know the techniques in the cultivation and production of crude drugs
	CO3	Describe the role of Pharmacognosy in allopathy and traditional system of medicine
	CO4	Know the evaluation techniques for the herbal drugs
	CO5	Describe fundamental aspects of plant tissue culture
	CO6	Know the biological source, chemical nature and uses of crude drugs

GRAPHICAL REPRESENTATION



ARKA JAIN University
Jharkhand
NAAC GRADE A ACCREDITED UNIVERSITY

[11-05-2026]
END SEM EXAMINATION
School of Health & Allied Sciences

Program	**Bachelor of Pharmacy**		
Subject Name	**Pharmacognosy and Phytochemistry-I – Theory**	**Session**	**Even, 2025-26**
Semester	**IV**	**Year**	**April, 2026**
Time: 3 Hour **Max. Marks: 75**	• Start writing from 2nd page onwards; **don't Write on the 1st Page Backside** • **Answer all Questions of Section A (Compulsory)** • **Answer Any *Two* out of *Three* of Section B** • **Answer Any *Seven* out of *Nine* of Section C** • **Possession of Mobile Phones** or any kind of **Written Material, Arguments with the Invigilator or Discussing with Co-Student** will come under **Unfair Means** and will **Result** in the **Cancellation of the Papers**.		
Knowledge Level (KL)	**K1 :** Remembering	**K3 :** Applying	**K5 :** Evaluating
	K2 : Understanding	**K4 :** Analysing	**K6 :** Creating

Section A (Each question Carry 01 Mark from Q1-i to xx) – 20 Marks

Q. N 1	QUESTIONS	Marks	COs	KL	PO
i	Which of the following is the study of crude drugs obtained from natural sources? A. Pharmacology B. Pharmacognosy C. Pharmaceutics D. Toxicology	1	CO1	K1, K2	PO1
ii	Who is known as the father of Pharmacognosy? A. Galen B. Dioscorides C. Hippocrates D. Linnaeus	1	CO1	K1, K2	PO1
iii	Which alkaloid is obtained from Rauwolfia? A. Morphine B. Quinine C. Reserpine D. Atropine	1	CO6	K1, K2	PO2
iv	Adulteration means: A. Purification of drugs B. Addition of foreign substances C. Extraction of active constituents D. Isolation of compounds	1	CO4	K2, K1	PO2
v	Cinchona bark contains which alkaloid? A. Atropine B. Morphine C. Quinine D. Nicotine	1	CO6	K1, K2	PO1

vi	Which part of plant is clove obtained from? A. Root B. Leaf C. Flower bud D. Bark	1	CO6	K1, K2	PO2
vii	Which of the following is a natural polymer? A. Nylon B. Cellulose C. PVC D. Polyester	1	CO6	K1, K2	PO1
viii	Which method is used for the extraction of heat-sensitive drugs? A. Soxhlet extraction B. Decoction C. Maceration D. Percolation	1	CO2	K2, K1	PO1
ix	Which drug is obtained from animal source? A. Acacia B. Honey C. Aloe D. Senna	1	CO1	K1, K2	PO1
x	Which test is used to detect alkaloids? A. Keller-Killiani test B. Borntrager's test C. Dragendorff's test D. Shinoda test	1	CO4	K1, K2	PO1
xi	Which drug contains anthraquinone glycosides? A. Digitalis B. Senna C. Rauwolfia D. Opium	1	CO6	K1, K2	PO2
xii	Which is a hallucinogenic drug? A. Opium B. Cannabis C. Senna D. Clove	1	CO6	K2, K1	PO1
xiii	Tannins give which color with ferric chloride? A. Red B. Blue/Green C. Yellow D. White	1	CO4	K1, K2	PO2
xiv	Which plant is a source of atropine? A. Digitalis B. Belladonna C. Cinchona D. Senna	1	CO6	K1, K2	PO1
xv	Which test detects glycosides? A. Dragendorff's test B. Keller-Killiani test C. Biuret test D. Molisch test	1	CO4	K1, K2	PO2
xvi	Which plant is used as an antihypertensive? A. Rauwolfia B. Senna C. Aloe D. Clove	1	CO6	K2, K1	PO2
xvii	Propagation by stem cutting is called: A. Sexual propagation B. Asexual propagation C. Pollination D. Fertilization	1	CO2	K2, K1	PO2
xviii	Ayurveda is based on how many doshas? A. 2 B. 3 C. 4 D. 5	1	CO3	K1, K2	PO2
xix	Saponins produce: A. Foam B. Color C. Precipitate D. Odor	1	CO6	K1, K2	PO1
xx	Terpenoids are derived from: A. Amino acids B. Isoprene units C. Sugars D. Protein	1	CO6	K1, K2	PO1

Section B (Answer any TWO out of THREE) – 20 Marks
(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL	PO
2	Classify alkaloids with examples and explain their general properties.	10	CO6	K1, K2	PO1
3	Discuss the different methods of evaluation of crude drugs.	10	CO4	K2, K4	PO2
4	Discuss the biological sources, chemical composition and uses of any five of the following drugs: a) Honey b) Castor oil c) Tragacanth d) Acacia e) Chaulmoogra oil f) Gelatin	10	CO6	K2, K1	PO1, PO5

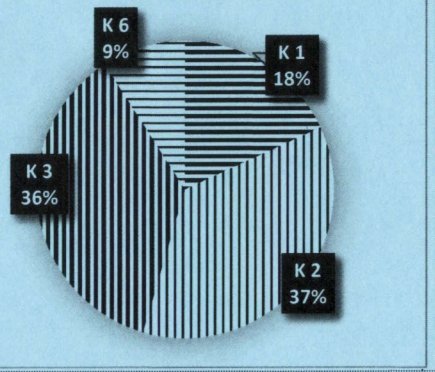
Section C (Answer any SEVEN out of NINE) – 35Marks
(Each question Carry 05 Marks)

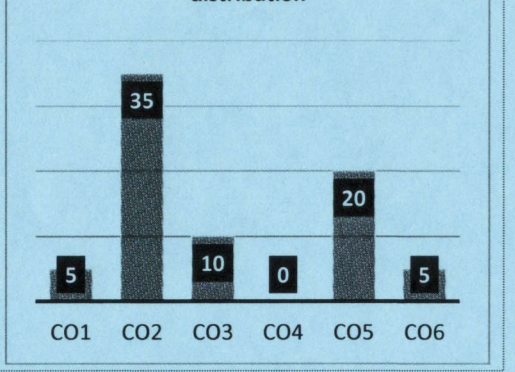
Q. No.	QUESTIONS	Marks	COs	KL	PO
5	Write a brief note on Ayurvedic and Homeopathic systems of medicines.	5	CO3	K2, K1	PO1, PO3
6	Explain in brief about the chemical and pharmacological classifications of crude drugs.	5	CO4	K1, K2	PO1
7	Describe types of plant tissue culture with applications, advantages and limitations.	5	CO5	K1, K2	PO1, PO7
8	Classify glycosides with examples.	5	CO3	K1, K2	PO1
9	Explain briefly the cultivation of medicinal plants.	5	CO2	K1, K2	PO1
10	Write a short note on plant growth hormones with one application each.	5	CO5	K1, K2	PO1

CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Apply the knowledge of mathematics and computing fundamentals to pharmaceutical applications for any given requirement
	CO2	Understand about computers (I/O devices), binary conversion, applications of computers in pharmacy.
	CO3	Understand the Concept of common languages in computers, algorithm flow chart, solution of problems based on biostatistics and other simple problems of pharmaceutical interest.
	CO4	Apply MS Word, MS Excel, MS Power Point.
	CO5	Apply Concept of ISIS, RASMOL, CHEMSKETCH.
	CO6	Create digital tools for pharmaceutical applications.

GRAPHICAL REPRESENTATION





ARKA JAIN University Jharkhand | NAAC GRADE A ACCREDITED UNIVERSITY

[13-05-2026]
END SEM EXAMINATION
School of Allied Health Science

Program	**Bachelor of Pharmacy**		
Subject Name	**Computer Applications in Pharmacy –Theory**	**Session**	**Even, 2025-26**
Semester	**IV**	**Year**	**April, 2026**
Time: 2 Hour Max. Marks : **50**	• Start writing from 2nd page onwards; **don't Write on the 1st Page Backside** • **Answer Any TWO out of THREE of Section A** • **Answer Any SIX out of EIGHT of Section B** • **Possession of Mobile Phones** or any kind of **Written Material, Arguments with the Invigilator or Discussing with Co-Student** will comes under **Unfair Means** and will **Result** in the **Cancellation of the Papers**.		
Knowledge Level (KL)	**K1 :** Remembering	**K3 :** Applying	**K5 :** Evaluating
	K2 : Understanding	**K4 :** Analysing	**K6 :** Creating

Section A : Long Answer (Answer any TWO out of THREE) – 20 Marks
Each question carry 10 marks

Q. No.	QUESTIONS	Marks	COs	KL	PO
1	Explain different number systems (Binary, Decimal, Octal, Hexadecimal) and their characteristics. Illustrate with suitable examples.	10	CO2	K2	P1
2	Describe the role of computers in pharmaceutical data storage and retrieval. Discuss advantages over traditional methods.	10	CO2	K2	PO1 PO11
3	Explain the Text Information Management System (TIMS) in detail. Discuss its working, types of documents managed, and its importance in pharmaceutical research.	10	CO5	K3	PO1 PO11

Section B: Short Answer (Answer any SIX out of EIGHT) – 30 Marks
(Each question Carry 5 Marks)

Q. No.	QUESTIONS	Marks	COs	KL	PO
4	Convert the decimal number 25 into binary and explain the steps.	5	CO1	K3	PO1 PO10
5	Explain binary addition with rules and one example.	5	CO3	K2	PO1 PO2
6	What is LIMS? Write its key features and importance in pharmaceutical laboratories.	5	CO5	K1	PO1 PO11
7	Write short notes on chromatography and its applications in pharmaceutical analysis.	5	CO2	K2	PO1 PO9
8	Briefly explain the role of bioinformatics in vaccine development.	5	CO2	K1	PO1 PO9
9	Write short notes on Bioinformatics and its advantages.	5	CO2	K3	PO1 PO9
10	Explain binary subtraction using 1's complement method with an example.	5	CO3	K3	PO1 PO3
11	Explain how computers are used in pharmaceutical research by integrating concepts of data storage & retrieval, LIMS/TIMS, and bioinformatics	5	CO6 CO5	K6	PO1 PO9

JGI ARKA JAIN University Jharkhand | NAAC GRADE A ACCREDITED UNIVERSITY			[06-05-2026] END SEM EXAMINATION School of Health & Allied Sciences
Program	**Bachelor of Pharmacy**		
Subject Name	**Physical Pharmaceutics II**	**Session**	**Even, 2025-26**
Semester	**IV**	**Year**	**April, 2026**
Time: 3 Hour Max. Marks: **75**	• Start writing from 2nd page onwards; **don't Write on the 1st Page Backside** • **Answer all Questions of Section A (Compulsory)** • **Answer Any *Two* out of *Three* of Section B** • **Answer Any *Seven* out of *Nine* of Section C** • **Possession of Mobile Phones** or any kind of **Written Material, Arguments with the Invigilator or Discussing with Co-Student** will come under **Unfair Means** and will **Result** in the **Cancellation of the Papers**.		
Knowledge Level (KL)	**K1:** Remembering	**K3:** Applying	**K5:** Evaluating
	K2: Understanding	**K4:** Analysing	**K6:** Creating

Section A (Each question Carry 01 Mark from Q1-i to xx) – 20 Marks

Q. N 1	QUESTIONS	Marks	COs	KL	PO
i	A dispersion system in which gas is dispersed within a liquid phase is best described as: a) Aerosol b) Foam c) Emulsion d) Gel	1	CO1	K1	PO2
ii	A powder sample shows Carr's index below 15%. This typically indicates: a) Cohesive powder b) Poor flow behaviour c) Good to excellent flow d) High compressibility	1	CO5	K2	PO2
iii	Which of the following correctly represents the unit of kinematic viscosity? a) Pascal-second b) Dyne/cm^2 c) Stoke d) Poise	1	CO2	K1	PO2
iv	A system exhibits an increase in viscosity with increasing shear rate. This behaviour is termed: a) Plastic flow b) Pseudoplastic flow c) Dilatant flow d) Newtonian flow	1	CO2	K2	PO2
v	When dispersed particles in a suspension form loosely bound aggregates, the system is: a) Deflocculated b) True solution c) Flocculated d) Colloidal dispersion	1	CO3	K2	PO1

vi	The scattering of light by colloidal particles leading to visible beam formation is known as: a) Brownian motion b) Tyndall effect c) Electrophoresis d) Coagulation	1	CO1	K2	PO1, PO10
vii	Which of the following systems is not classified under colloidal drug delivery? a) Liposomes b) Microspheres c) Tablets d) Noisome	1	CO1	K2	PO2
viii	In an emulsion, upward movement of dispersed droplets without fusion is called: a) Breaking b) Flocculation c) Creaming d) Inversion	1	CO4	K2	PO1
ix	A fluid that maintains constant viscosity regardless of applied shear is categorised as: a) Pseudoplastic b) Newtonian c) Dilatant d) Thixotropic	1	CO2	K2	PO10
x	A powder exhibits low bulk density compared to its true density. This indicates: a) Tight packing b) Minimal void space c) High porosity d) Zero interparticle space	1	CO5	K3	PO1, PO2
xi	A microemulsion system is typically: a) Opaque and unstable b) Turbid due to large globules c) Transparent and thermodynamically stable d) Always phase-separated	1	CO4	K1	PO1
xii	Elastic behaviour of materials is best explained by: a) Fick's law b) Hooke's law c) Arrhenius equation d) Nernst equation	1	CO2	K2	PO1
xiii	Conversion of 1 centipoise into poise gives: a) 0.1 P b) 0.01 P c) 1 P d) 10 P	1	CO2	K1	PO1, PO2
xiv	When a w/o emulsion is diluted with water, it will most likely: a) Remain unchanged b) Convert into o/w system c) Undergo phase separation d) Increase viscosity	1	CO4	K3	PO2, PO10
xv	The graphical representation of shear stress versus shear rate is termed: a) Stress profile b) Flow diagram c) Rheogram d) Viscosity index	1	CO2	K2	PO1, PO2
xvi	A drug product degrades more rapidly at elevated temperatures during stability testing. This behaviour is best explained by: a) Photolysis b) Temperature-independent kinetics c) Arrhenius relationship d) Zero-order kinetics	1	CO6	K3	PO2, PO10
xvii	A reaction where the degradation rate does not depend on concentration is classified as: a) First-order b) Second-order c) Zero-order d) Pseudo-first order	1	CO6	K2	PO2
xviii	To protect a light-sensitive drug, the most suitable packaging is: a) Transparent glass container b) Plastic pouch c) Amber-coloured container d) Open storage	1	CO6	K2	PO2, PO10
xix	The expiry date for a tablet is not mentioned on the label. It means that the expiry time in years is: a) Five years b) Nil c) Three years d) Two years	1	CO6	K2	PO2, PO6
xx	A pharmaceutical suspension shows rapid sedimentation but, upon shaking, forms a viscous, shear-thinning system. However, during stability studies, the drug undergoes faster degradation at elevated temperatures. Which combination of statements is most appropriate? a) System is deflocculated, Newtonian, and follows zero-order degradation b) System is flocculated, pseudoplastic, and degradation follows temperature-dependent kinetics c) System is deflocculated, dilatant, and degradation is independent of temperature d) System is flocculated, Newtonian, and degradation is photolytic	1	CO4	K4, K5	PO1

Section B (Answer any TWO out of THREE) – 20 Marks
(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL	PO
2	What is the specific surface of a particle? Describe one method to determine it experimentally. What are its applications?	10	CO5	K3	PO1

3	Describe the mechanism of action of the emulsifier in the stabilisation of an emulsion with an example.	10	CO3	K2	PO
4	Define thixotropy. Draw different types of thixotropic curves and explain the mechanisms behind their behaviour, with suitable examples.	10	CO2	K6	PO

Section C (Answer any SEVEN out of NINE) – 35 Marks
(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL	PO
5	The reaction A to product is a zero-order reaction. If the time taken for 50% completion is 2 min. Find out the time required for 43.33% completion of the reaction.	5	CO6	K2, K4	PO
6	Write short notes on – i) Bulges and ii) Spurs	5	CO2	K1, K6	PO
7	Write short notes on i) Gold number and ii) Hofmeister-Lyotropic Series.	5	CO1	K3, K4	PO1
8	Distinguish between the reaction rate and the rate constant of a reaction. Derive the integrated rate law for the second order reaction.	5	CO3	K1, K6	PO2
9	Define different types of densities. Explain the differences among them	5	CO5	K1, K2	PO2
10	Explain the causes of the instability of emulsions.	5	CO4	K3, K6	PO1
11	Write the Heckel equation and draw Heckel plots for porosity. Explain the information derived from the plot	5	CO2	K3	PO2
12	Explain the electrical properties of colloidal systems.	5	CO1	K6, K2. K3,	PO2
13	Explain the theory of molecular collision with its support for the Arrhenius equation.	5	CO6	K5	PO10

CO- Course Outcomes, KL- Knowledge Level, PO – Program Outcome

Course Outcomes	CO1	Understand the concept of colloidal dispersion systems.
	CO2	Apply fundamentals and pharmaceutical applications of rheology and deformation of solids.
	CO3	Understand the concept of formulation and stabilization of suspension
	CO4	Understand the concept of formulation and stabilization of emulsions
	CO5	Understand of micromeritics and its application in pharmacy.
	CO6	Analyse the reaction kinetics and chemical stability of various drug products

GRAPHICAL REPRESENTATION

