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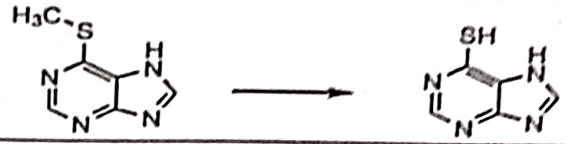
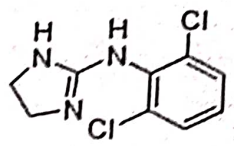
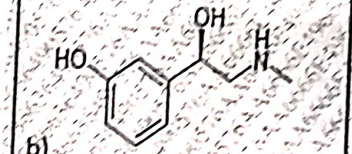
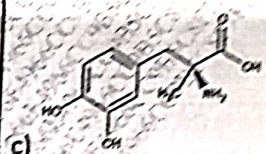
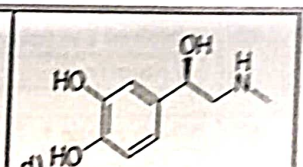
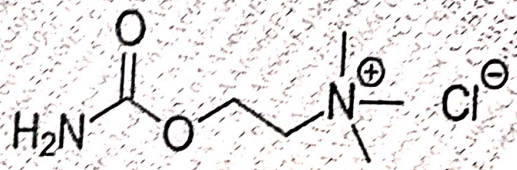
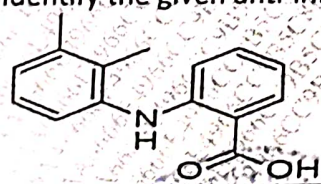
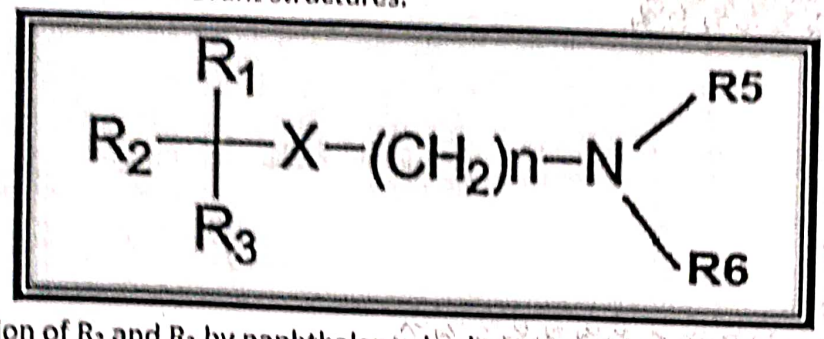
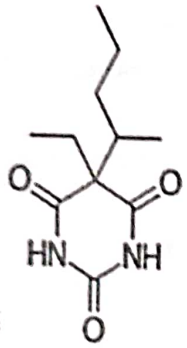
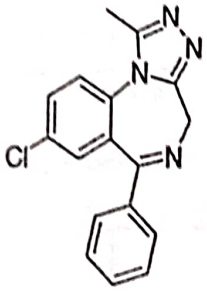
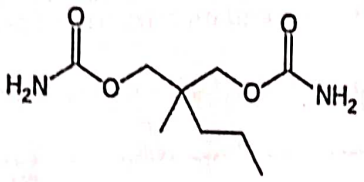
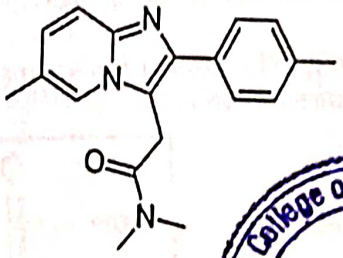
Subject: Medicinal Chemistry-I **Year and Sem: S.Y. B.Pharm.(SEM-IV)**
Duration: 3 hours **Total marks: 80 M**

N.B. : 1. All questions are compulsory
2. Figures to right indicate full marks

Q. 1	**Choose the appropriate option for following multiple choice-based questions. Each question carries one mark.**	20 M
1	The type of metabolic reaction which occurs in the following biotransformation is 	
	[a]Oxidation at benzylic carbon [b]Oxidation of Aromatic ring [c]Oxidation of C -S system [d] S-demethylation	
2	Which of the following statement is incorrect about metabolism of drugs	
	[a] Metabolism is also called a detoxification process [b] Phase I and Phase II reactions are metabolism pathways [c] Phase II reactions are also called as functionalization reactions [d] Cytochrome enzymes play an important role in the metabolism of drugs	
3	Which of the following is a selective α-1 receptor agonist?	
	a)  b)  c)  d) 	
4	Which drug contains a 4-amino- 6,7-dimethoxyquinazoline ring system attached to an acyl piperazine moeity?	
	[a] Tolazoline [b] Phentolamine [c]Phenoxy-benzamine [d] Prazosin	
5	What is the name of this cholinergic drug? 	
	[a]Bethanechol chloride [b]Carbachol chloride [c]Methacholine chloride [d] Acetylcholine chloride	
6	Which drug is synthesised using phenyl acetonitrile and 1,5-dibromopentane as precursors?	
	[a] Cyclopentolate [b]Tacrine [c] Neostigmine [d] Dicyclomine	
7	Select the INCORRECT statement with respect to the SAR of adrenergic agonists with specific reference to 3',5'-dihydroxy ring substitution pattern.	
	[a] Increases the drug distribution [b] Increases resistance to metabolism by COMT [c] Provides selectivity for β2-receptors [d] Gives orally active bronchodilator	

8	Following are structural requirements essential for sympathomimetic activity of arylethanolamines EXCEPT? [a] (1S)-OH [b] Catechol ring [c] β-phenylethylamine [d] (1R)-OH
9	Identify the triazole ring fused benzodiazepine from the following. [a] Chlordiazepoxide [b] Diazepam [c] Oxazepam [d]Alprazolam
10	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
11	Droperidol is a member of ---- class of antipsychotic agents. [a]Phenothiazine [b] Butyrophenone [c] Benzazepine [d] Benzoisoxazole
12	The spacer group present between the ring nitrogen and the side chain amino nitrogen in phenothiazines for optimum antipsychotic activity is [a]Butyl [b] Methyl [c] Ethyl [d] Propyl
13	Identify the name of ring present in phenytoin from the following [a]Succinimide [b] Oxazolidinedione [c]Hydantoin [d]Iminostilbene
14	Which of the following phenothiazine derivatives contains piperidine side chain. [a] Thioridazine [b] Prochlorperazine [c] Triflupromazine [d] Chlorpromazine
15	Which of the following is structural isomer of Enflurane [a] Isoflurane [b] Sevoflurane [c] Methoxyflurane [d]Desflurane
16	Which of the following is not an example of Inhalation anaesthetics [a] Halothane [b] Enflurane [c] Ketamine [d] Sevoflurane
17	Which of the following is INCORRECT statement about Methadone [a] Methadone is a synthetic opioid [b] R-enantiomer is more potent than S enantiomer [c] Methadone is opioid antagonist [d] N-demethylation is major metabolic pathway for Methadone
18	Which of the following is not a structural feature of Opioid Antagonist [a] Presence of allyl/cyclopropyl methyl group at 17th position [b] Replacement of 6-OH with keto group [c] Presence of 7-8 double bond [d]Substitution of 14 OH
19	The isosteric replacement of the indole ring with the Indene ring system resulted in which of the following anti-inflammatory drug [a] Sulindac [b] Diclofenac [c] Tolmetin [d]Naproxen
20	Identify the given anti-inflammatory agent  [a] Piroxicam [b] Tolmetin [c] Phenacetin [d] Mefenamic acid

Q.2 Answer any one of the following two questions.

A	(I) State whether following statements are true or false in relation to the compounds (structure drawn below) active as antimuscarinic agents. If false, correct the statement and justify. Support your answer with relevant structures.		12M
		6M	
	1. Substitution of R_2 and R_3 by naphthalene ring increases the anticholinergic activity. 2. Introduction of hydroxyl group at R_1 increases the anticholinergic activity. 3. Compound belong to the amino alcohol ether class if X = -COO- and R_1 = -OH.		
	(II) Outline the synthesis of Salbutamol along with reaction conditions and necessary reagents and give its mechanism of action.	4M	
	(III) Phenoxybenzamine and Prazosin are two α-adrenergic antagonists. Is their mechanism of action the same? Explain.	2M	
B	(I) Answer the following questions	6M	
	 a  b  c  d		
	1. Indicate the chemical classes of 'a' and 'b' 2. Predict the effect of attaching a methyl group on both the ring nitrogens of 'a' 3. Write the mechanism of action of 'c' 4. Predict the effect of replacing the ring methyl group of 'b' by H 5. Name the enzymes involved in the metabolism of 'd'		
	(II) Explain the basis of GI side effects, generally caused by the non-selective class of NSAIDs.	2M	
	(III) (1) Give two examples of Narcotic antagonists with structure. (2) Give two examples of flexible opioid agonists with structure.	4M	

Q.3 Answer any four of the following five questions. **48M**

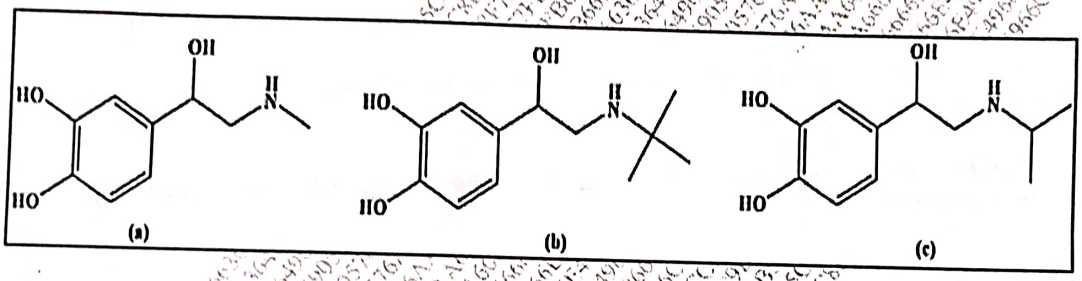
A **12M**

(I) Match the following **6M**

	Drugs		Column A		Column B
1	Clonidine	a	Metabolized to α-methyl NE	i	2-Arylimidazoline
2	Naphazoline	b	Contains resorcinol nucleus	ii	Non-catecholamine β2-selective agonist
3	Methyldopa	c	Indirect acting adrenergic agonist	iii	Phenylethylamine
4	Terbutaline	d	Contains naphthalene ring	iv	2-aminoimidazoline
5	Isoproterenol	e	Presence of o-chlorine groups and NH bridge	v	Phenyl propanolamine
6	Pseudoephedrine	f	Non-selective β-agonist	vi	Catecholamine with isopropyl N-substituent

(II) Which structural modifications in sympathomimetics bestow the following properties - **3M**
(1) Resistance to COMT (2) Resistance to MAO (3) Oral activity

(III) Answer the questions with respect to the structures given below **3M**

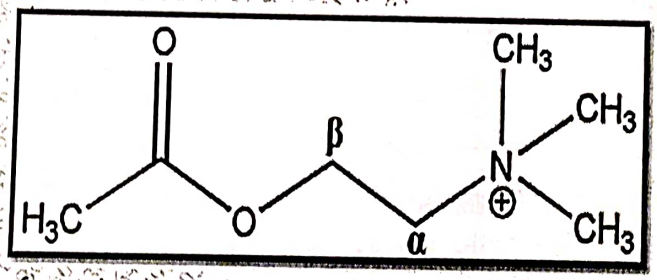


1. Which of the above structures is a selective β2-agonist?
2. Predict the effect of isopropyl group on selectivity in structure C.
3. Arrange the above structures in the increasing order with respect to rate of metabolism by MAO.

B **12M**

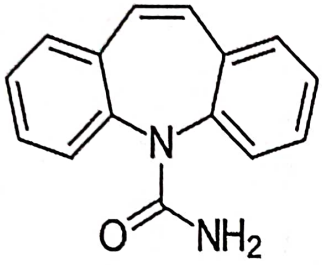
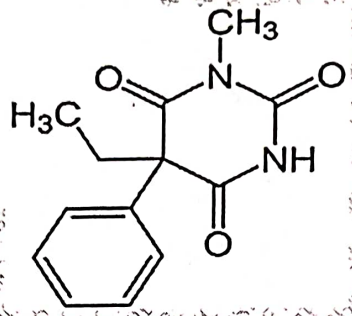
(I) Describe biosynthesis, storage, release and metabolism of acetylcholine. **6M**

(II) Explain the effect of following structural changes on the activity of muscarinic agonist (structure drawn below). **4M**



1. Replacement of acetyl group with propionyl group
2. Replacement of all three -CH_3 groups on the quaternary nitrogen with -C_2H_5
3. Replacement of acetyl group of acetylcholine with carbamate
4. Addition of methyl group on α carbon atom

(III) Differentiate between reversible and irreversible acetylcholine esterase inhibitors. **2M**

C	(I) Answer the following questions. Support your answer with relevant structures wherever required 1. Protein binding can prolong the duration of action. Explain 2. 'Geometrical isomerism influences biological activity'. Explain with suitable examples. 3. Enlist Phase I reductive metabolic reactions 4. Explain the concept of bioisosterism with suitable examples 5. Give an example of 'hydrolysis' as biotransformation pathway. [II] Elaborate on factors affecting drug metabolism [III] Write the structure of any two Phase I metabolites of following  [a]  [b]	5M 3M 4M	12M
D	(I) Classify antipsychotic drugs based on their chemical structures with at least one example from each class. (Structures needed) (II) Outline the synthetic scheme of chlorpromazine indicating the reagents and reaction conditions used. (III) Compare the antipsychotic activity and side effect profile of chlorpromazine with prochlorperazine	4M 4M 4M	12M
E	(I) Explain why morphine has poor oral bioavailability. Discuss the structure activity relationship of morphine analogues with suitable examples. (II) Classify the following drugs into various subclasses of NSAIDS and give their structures and mechanism of action Indomethacin, Diclofenac, Aspirin, Acetaminophen, Antipyrine, Ketorolac	6M 6M	12M