

(Autonomous) (ISO/IEC - 27001 - 2005 Certified)

WINTER-2023 EXAMINATION

MODEL ANSWER - ONLY FOR THE USE OF RAC ASSESSORS

Subject Title: PHARMACEUTICAL CHEMISTRY- THEORY

Important Instructions to examiners:

- i. The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- ii. The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- iii. The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills.
- iv. While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- v. Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- vi. In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
- vii. For programming language papers, credit may be given to any other program based on equivalent concept.
- viii. As per the policy decision of Maharashtra State Government, teaching in English/Marathi and Bilingual (English + Marathi) medium is introduced at first year of AICTE diploma Programme from academic year 2021-2022. Hence if the students write answers in Marathi or bilingual language (English +Marathi), the Examiner shall consider the same and assess the answer based on matching of concepts with model answer.

Q. No.	Sub No.	Answers	Marking Scheme
1		Answer any <u>SIX</u> of the following:	30M
1	a	Define the term Impurity. Discuss any four sources of impurities in pharmaceuticals	5M
		Marking Scheme: Definition: 1M; Description of source of impurities: 1M each (Consider any four sources for 4M)	
		Marking Scheme:	
		Answer:	
		Impurity: Undesirable matter which may or may not be toxic but present in the pharmaceutical substances.	1 M
		Sources of Impurities	
		1) Raw materials used in manufacture.	
		2) Processes used in manufacture.	
		3) Material of the plant	
		4) During storage	
		5) Accidental substitution or deliberate adulteration	
		6) Manufacturing hazards	
		1) Raw materials used in manufacture:	1M for
		• Traces of impurities in raw materials may be carried to contaminate the final product.	each source-
		• E.g. common salt (NaCl) prepared from rock salt will almost certainly contain traces of calcium (Ca) and magnesium (Mg) compounds.	consider any 4
		• Metallic zinc may be present as an impurity in zinc oxide (ZnO) sample as it is prepared by heating metallic zinc.	with explaina tion

Subject Code: 20112



(Autonomous) (ISO/IEC - 27001 - 2005 Certified)

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Subje	ect Title	: PHARMACEUTICAL CHEMISTRY- THEORY Subject Cod	le: 20112
Q.	Sub No	Answers	Marking
INO.	110.	2) Processes used in manufacture:	Scheme
		 Some impurities are incorporated during the manufacturing process. This may occur due to Reagents used in process. Reagents added to remove other impurities. Solvents - water is the cheapest solvent widely available. Tap water contains 	
		 many ion impurities in small amounts like Cl-, Ca++, Mg++, Na+ etc The intermediate products may come along the process in the final product as impurity 	
		3) Material of the plant:	
		• The vessels used in the manufacturing process are generally made up of metals like iron, copper, zinc, nickel, aluminium, and stainless steel. Due to the solvent action on the plant material the traces of metals i.e., impurities come in the product. Similarly, glass of an unsatisfactory standard and plastic containers used for handling liquid and semisolid products may yield traces of alkalies and antioxidants respectively.	
		4) During storage:	
		• Filth - stored product may become contaminated with dust, insect, or insect excreta.	
		 Decomposition of the product during storage - many chemical substances undergo changes or decomposition due to careless storage e.g., ferrous sulphate is slowly converted into insoluble ferric oxide by air and moisture. Ether and chloroform decompose in the presence of light and air. Chloroform on decomposition gives carbonyl chloride (phosgene gas) so it should be stored in well filled, well-closed amber coloured bottle. 	
		5) Accidental substitution or deliberate adulteration:	
		 Accidental substitution can take place if toxic substances are stocked with other substances or compounds. Some pharmaceutical products may be adulterated with cheaper substitutes. E.g., Honey may be adulterated with inverted sugar, potassium bromide with sodium bromide. 	
		6) Manufacturing hazards:	
		• Particulate contamination - accidental inclusion of dirt, glass, porcelain, metallic or plastic fragments from sieves, granulating, tableting, and filling machines or even from product containers is possible.	



MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION (Autonomous) (ISO/IEC - 27001 - 2005 Certified)

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Q. Sub Answers Marking Scheme No. • Process error - Process errors arising from incomplete solution of solute in a liquid preparation must be detected by normal analytical procedures. Special care is required for highly potent medicaments of low dose (5 mg or less) • • Cross contamination - the handling of powders, granules and tablets in large quantities creates considerable amount of air-borne dust and may lead to cross- contamination. • • Microbial contamination - liquid preparations and creams for topical application are prone to bacterial and fungal contamination. Special care should be taken in parenteral and ophthalmic preparations to avoid microbial contamination. • • Packing errors - products of similar appearance as tablets of same size, colour and shape packed in similar containers may lead to mislabelling. 5M 1 b What do you mean by Volumetric analysis? Give it's classification depending on chemical reactions with one example of each 5M Marking Scheme: Definition: IM; Classification with explanation of any four types: 4M (1M for each class with example) 1M • Volumetric analysis involves the gradual addition of a solution of accurately known concentration to the solution whose concentration. 1M • Volumetric analysis involves the determined. • 4M for classific ation along 1M • Non-aqueous titration • •<	Subje	ect Titl	e: PHARMACEUTICAL CHEMISTRY- THEORY Subject Cod	le: 20112
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ii. Thus, these are neutralization reactions with formation of salt and water as			solution of base or acid having known concentration.	
			ii. Thus, these are neutralization reactions with formation of salt and water as	
the end products.			the end products.	
iii. A pH indicator is used to indicate the end point of acid-base neutralization			iii. A pH indicator is used to indicate the end point of acid-base neutralization	
reaction.			reaction.	
$Ex:- NaOH + HC1 \longrightarrow NaCl + H_2O$			Ex:- NaOH + HCl \longrightarrow NaCl + H ₂ O	



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Subj	ect Title	tle: PHARMACEUTICAL CHEMISTRY- THEORY Subject Co	
Q. No.	Sub No.	Answers	Marking Scheme
		2. Redox or oxidation-reduction titration	
		 i. In redox reaction, Oxidation and reduction usually occur simultaneously. Oxidation reaction is the reaction where addition of oxygen or removal of hydrogen takes place, while in reduction, there will be addition of hydrogen or removal of oxygen. ii. Redox Titration reaction involves the transfer of electron between the reactant (titrant) and titrate takes place. iii. A redox titration is the same as an acid-base titration except it involves a redox reaction and generally does not require an indicator. iv. Various oxidising agents are employed in the reactions, and depending upon the agents used, they are classified into. 1) Permanganate Titrations: Potassium permanganate is used as an 	
		 oxidant it is also self-indicator. Dichromate Titrations: Potassium dichromate is used as an oxidant. Iodine Titrations: Iodine is used as an oxidising agent. Cerimetry: Ceric salts are used as oxidants. 10FeSo₄ + 2KMnO₄ + 8H₂SO₄ → 5Fe₂ (SO₄)₃ + K₂SO₄ + 2MnSO₄ + 8H₂O 	
		3. Precipitation titration	
		 i. Precipitation titration is a type of titration which involves the formation of precipitate during the titration technique. ii. In precipitation titration, the titrant reacts with analyte and forms an insoluble substance called precipitate. iii. It continues till the last amount of analyte is consumed. iv. In this titration, a substance that precipitates from solution in a clearly visible form at the end point is used as an indicator, e.g. Potassium Chromate in Mohr's method, Ferric ammonium sulphate in Volhard's method etc AgNO₃ + X⁻ → AgX + NO₃⁻ (Silver nitrate) (halides) (silver halides-white coloured precipitate) AgNO₃ + indicator → Indicator complex 	
		 (coloured) at the end point 4. Complexometric titration 	

When the formation of stable complex is the reaction involved, certain organic reagents such as ethylene diamine tetraacetic acid (EDTA) from a stable complex with various metal ions and are thus used for analysis of these metal ions



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WINTER-2023 EXAMINATION

Subj	ect Titl	e: PHARMACEUTICAL CHEMISTRY- THEORY Subject Cod	le: 20112			
Q. No.	Sub No.	Answers	Marking Scheme			
1101	1100	5. Non-aqueous titration				
		When reaction takes place in non-aqueous solvent i.e. organic solvent. This type of				
		titration is used for analysis of very weak acids and bases.				
1	c	Define Gastrointestinal agents. Classify with examples. Give uses of sodium	5M			
		bicarbonate & magnesium hydroxide				
	Marking Scheme:					
		Definition-1M; Classification with example $-2M$; Use: 1M for each agent.				
		Answer:				
		Gastro-Intestinal Agents	1M			
		Agents used to treat gastrointestinal disturbance are known as gastrointestinal agents.				
		Classification:				
		Gastrointestinal Agents	214			
			21 V1			
		Acidifying agents Antacids Protective's & Adsorbent Saline Cathartics				
		Which increasesWhich NeutralizedWhich are used in theWhich bring aboutaciditythe excess of acidtreatment of milddefecation (quickening				
		e.g. Dil HCle.g. Sodiumdiarrhea or dysenteryor increasing evacuationBicarbonatee.g. Bismuthfrom bowel				
		subcarbonate e.g. Magnesium Sulphate				
		Uses of Sodium bicarbonate: (0.5M for each use: consider any two uses)				
		Used as antacid	1M			
		Used as electrolyte replenishers				
		• Used in treatment of acidosis				
		Used to produce systemic alkalosis				
		Uses of Magnesium hydroxide: (0.5M for each use; consider any two uses)	1M			
		• Used as non-systemic antacid				
		• Used as mild cathartic				
		• Used as a laxative to relieve occasional constipation.				
		• Used as an antacid to relieve indigestion, sour stomach, and heartburn				
	d	d Draw the structure of Haloperidol. Give its chemical name, uses, formulations & popular brand name.				
		Marking Scheme:				
		Structure of Haloperidol – 1M; Chemical name – 1M; Uses – 1M (0.5M for each use); Formulations – 1M; Brand name – 1M (Consider any one name)				
		Answer:				
		Structure of Haloperidol				



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(ISO/IEC - 27001 - 2005 Certified) WINTER-2023 EXAMINATION **MODEL ANSWER - ONLY FOR THE USE OF RAC ASSESSORS** Subject Code: 20112 Subject Title: PHARMACEUTICAL CHEMISTRY- THEORY **Q**. Sub Answers Marking No. No. Scheme Cl 1MOH 1MChemical name: 4-[4-(4-chlorophenyl)-4-hydroxypiperidin-1-yl]-1-(4-fluorophenyl) butan-1-one Uses: **1M** (0.5M a. Haloperidol is an antipsychotic agent used to treat schizophrenia and other for each psychoses, as well as symptoms of agitation, irritability, and delirium. use) b. It is used to treat uncontrolled movements and outbursts of words/sounds related toTourette's syndrome. c. Haloperidol is also used for severe behavior problems in hyperactive children whenother treatments or medications have not worked. d. Used in the control of agitated state of mania and schizophrenia. 1M for any two **Formulations of Haloperidol:** dosage Tablet, Oral solution, Injection, form **Brand name of Haloperidol:** 1M for Haldol, Serenace, Hexidol, Halidace, Dolsi, Halopel, Hpl, Halobid any one correct (any other brand name should be considered) name 1 State what are Sympathomimetic drugs? Classify and give the structure and uses of **5**M e Nor-epinephrine. **Marking Scheme:** Definition – 1M; Classification – 2M; Structure – 1M; Uses – 1M for 2 uses. Answer: Sympathomimetic drugs 1MA drug or other substances which has effects like or the same as adrenaline (epinephrine). An adrenergic agent is a drug, or other substance, which has effects similar to, or the same as, to those o adrenergic nerve stimulation or injection of epinephrine (adrenaline or drug which stimulate adrenergic nerve. **Classification:**

(Consider any one method of classification)

2M



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Subj	ect Titl	e: PHARMACEUTICAL CHEMISTRY- THEORY Subject Cod	le: 20112
Q .	Sub	Answers	Marking
N0.	No.	I method	Scheme
		Catalalaning E. Nandanalina danalina isang sila dananing	
		• Catecholamines. Eg. Noradrenaline, adrenaline, isoprenaline, dopamine.	
		• Noncatecholamines. Eg. Phenylephrine hydrochloride, Mephentermine sulfate,	
		• Imidazoline: Eg.Naphazoline	
		II method	
		• Directly acting (act directly on α or β receptors) -e.g. Epinephrine,	
		Norepinephrine,	
		• Indirectly acting (act by providing more norepinephrine to act on α or β	
		receptors)- e.g. Amphetamine, hydroxyamphetamine, and propylhexedrine,	
		pseudoephedrine	
		• Mixed acting (act by both mechanisms)- e.g. ephedrine, Metaraminol	
		III method	
		• alpha-adrenoceptor agonists (α -agonists) e.g. Phenylephrine	
		 beta-adrenoceptor agonists (β-agonists) e.g. Terbutaline, Salbutamol 	
		Both alpha and beta agonist- Adrenaline, Noradrenaline	
		Structure of Nor opinophrine:	1M
		OH	
		HO_{1} $CH-CH_{2}-NH_{2}$	
		HO'	
		Uses of Nor-epinephrine:	1M
		• Used in the treatment of Low blood pressure.	(0.5 M
		 Used to relieve bronchial spasm in asthma 	for each
		Used as vasoconstrictor in dental use	use)
		Used in treatment of heart block	
		• Used in the emergency treatment of allergic reactions, to treat low blood	
		pressure during septic shock	
		• Used in eve surgery to maintain dilation of the pupil	



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 MODEL ANSWER - ONLY FOR THE USE OF RAC ASSESSORS

 Subject Title: PHARMACEUTICAL CHEMISTRY- THEORY
 Subject Code: 20112

 Q.
 Sub
 Answers
 Marking

 No.
 No.
 Solution
 Scheme

$ \begin{array}{c c c c c c } 1 & f & Define and classify antimalerial drugs with example. Give structure and uses of Chloroquine phosphate Marking Scheme: Definition – 1M: Classification – 2M; Structure – 1M; Uses – 1M for 2 uses. Answer: Antimalarial Agents: IM The agents or drugs which prevent or cure the infectious disease malaria caused by protozoan plasmodium, characterized by successive chills fever, sweating and body pain. OR Antimalarial agents are a class of drugs specifically designed to treat and prevent malaria. These drugs work by targeting the malarial parasite, Plasmodium, which infects red blood cells and causes the disease. Classification: 1. Quinolines Antimalarials A. Cinchona Alkaloids – Quinine, Cinchonine B. 4-aminoquinolines – Chloroquine, Amodiaquine C. 8-aminoquinolines – Drimaquine, Pamaquine 3. Acridines dye – Quinacrine, Acriquine 3. 4-quinoline carbinolarmines – metfoquine 4. Diaminopyrimidines – Pyrimethanamine 5. Biguanides – Pyrimethanamine 7. Misc. Doxycycline. Structure of Chloroquine phosphate - \int_{HN} - \int_{HV} - \int$	No.	No.		Scheme
$\begin{array}{ c c } & \operatorname{Marking Scheme:} \\ & \operatorname{Definition - 1M; Classification - 2M; Structure - 1M; Uses - 1M for 2 uses. \\ & \operatorname{Answer:} & \\ & \operatorname{Antimalarial Agents:} & \\ & \operatorname{Antimalarial Agents:} & \\ & \operatorname{The agents or drugs which prevent or cure the infectious disease malaria caused by protozon plasmodium, characterized by successive chills fever, sweating and body pain. OR \\ & \operatorname{Antimalarial agents are a class of drugs specifically designed to treat and prevent malaria. These drugs work by targeting the malarial parasite, Plasmodium, which infects red blood cells and causes the disease. \\ \hline \\ & \begin{array}{c} \operatorname{Classification:} \\ 1. \ Quinolines Antimalarials \\ A. \ Cinchona Alkaloids \ Quinine, Cinchonine \\ B. 4-aminoquinolines - Chloroquine, Amodiaquine \\ C. 8-aminoquinolines - Primaquine, Pamaquine \\ 3. 4-quinoline carbinolamines - mefloquine \\ 4. \ Diaminopyrimidines - Pyrimethanamine \\ 5. \ Biguandes \ Proguani1, Chloroproguani1 \\ 6. \ Sulphones - Dapsone \\ 7. \ Misc Doxycycline. \\ \hline \\ & \begin{array}{c} & & & \\ & & \\ & & \\ & & & \\ & & \\ & & $	1	f	Define and classify antimalerial drugs with example. Give structure and uses of Chloroquine phosphate	5M
Definition – 1M; Classification 2M; Structure 1M; Uses – 1M for 2 uses. Answer: Antimalarial Agents: The agents or drugs which prevent or cure the infectious disease malaria caused by protozoan plasmodium, characterized by successive chills fever, sweating and body pain. OR Antimalarial agents are a class of drugs specifically designed to treat and prevent malaria. These drugs work by targeting the malarial parasite, Plasmodium, which infects red blood cells and causes the disease. Classification: 1. Quinolines Antimalarials A. Cinchona Alkaloids – Quinine, Cinchonine B. 4-aminoquinolines – Chloroquine, Amodiaquine C. 8-aminoquinolines – Primethanamine 3. 4-quinoline carbinolamines – mefloquine 4. Diaminopyrimidines – Pyrimethanamine 5. Bigunides – Poguanit, Chloroproguanil 6. Sulphones – Dapsone 7. Misc. – Doxycycline. Structure of Chloroquine phosphate			Marking Scheme:	
Answer:IMAntimalarial Agents:IMThe agents or drugs which prevent or cure the infectious disease malaria caused by protozoan plasmodium, characterized by successive chills fever, sweating and body pain. ORIMAntimalarial agents are a class of drugs specifically designed to treat and prevent malaria. These drugs work by targeting the malarial parasite, Plasmodium, which infects red blood cells and causes the disease.IM Classification: 1. Quinolines AntimalarialsA. Cinchona Alkaloids – Quinine, CinchonineB. 4-aminoquinolines – Chloroquine, Amodiaquine C. 8-aminoquinolines – Primaquine, Pamaquine2. Acridines dye – Quinacrine, Acriquine3. 4-quinoline carbinolamines – mefloquine3. Biguanides – Pryrimethanamine5. Biguanides – Proguani, Chloroproguanil6. Sulphones – Dapsone7. Mise. Doxycycline.MM			Definition – 1M; Classification – 2M; Structure – 1M; Uses – 1M for 2 uses.	
$\begin{array}{ c c } & \textbf{Antimalarial Agents:} & \textbf{IM} \\ & The agents or drugs which prevent or cure the infectious disease malaria caused by protozoan plasmodium, characterized by successive chills fever, sweating and body pain. OR & Antimalarial agents are a class of drugs specifically designed to treat and prevent malaria. These drugs work by targeting the malarial parasite, Plasmodium, which infects red blood cells and causes the disease. \\ \hline & \textbf{Classification:} & 1. Quinolines Antimalarials & A. Cinchona Alkaloids – Quinine, Cinchonine & B. 4-aminoquinolines – Chloroquine, Amodiaquine & C. 8-aminoquinolines – Primaquine, Pamaquine & S. Biguanides – Poguani, Chloroproguanil & Sulphones – Dapsone & Mise. – Poxycycline. \\ \hline & \textbf{Structure of Chloroquine phosphate} & \begin{matrix} & \varphi^{+}_{+} & \varphi$			Answer:	
The agents or drugs which prevent or cure the infectious disease malaria caused by protozoan plasmodium, characterized by successive chills fever, sweating and body pain. OR Antimalarial agents are a class of drugs specifically designed to treat and prevent malaria. These drugs work by targeting the malarial parasite, Plasmodium, which infects red blood cells and causes the disease. Classification 1. Quinolines Antimalarials A. Cinchona Alkaloids – Quinine, Cinchonine B. 4-aminoquinolines – Chloroquine, Amodiaquine C. 8-aminoquinolines – Chloroquine, Amodiaquine C. 8-aminoquinolines – Primaquine, Pamaquine 3. 4-quinoline carbinolamines – mefloquine 4. Diaminopyrimidines – Pyrimethanamine 5. Biguanides – Proguanil. (Chloroproguanil 6. Sulphones – Dapsone 7. Misc. – Doxycycline. Structure of Chloroquine phosphate			Antimalarial Agents:	1M
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Classification:2M1. Quinolines Antimalarials A. Cinchona Alkaloids – Quinine, Cinchonine B. 4-aminoquinolines – Chloroquine, Amodiaquine C. 8-aminoquinolines – Primaquine, Pamaquine2M2. Acridines dye – Quinacrine, Acriquine 3. 4-quinoline carbinolamines – mefloquine 4. Diaminopyrimidines – Pyrimethanamine 5. Biguanides – Proguanil, Chloroproguanil 6. Sulphones – Dapsone 7. Misc. – Doxycycline.1MImage: CH3 CH3 CH3 CH3OR CH3 			cells and causes the disease.	
1. Quinolines Antimalarials A. Cinchona Alkaloids – Quinine, Cinchonine B. 4-aminoquinolines – Chloroquine, Amodiaquine C. 8-aminoquinolines – Primaquine, Pamaquine 2. Acridines dye – Quinacrine, Acriquine 3. 4-quinoline carbinolamines – mefloquine 4. Diaminopyrimidines – Pyrimethanamine 5. Biguanides – Proguanil, Chloroproguanil 6. Sulphones – Dapsone 7. Misc. – Doxycycline. Structure of Chloroquine phosphate			Classification:	
A. Cinchona Alkaloids – Quinine, Cinchonine B. 4-aminoquinolines – Chloroquine, Amodiaquine C. 8-aminoquinolines – Primaquine, Pamaquine 2. Acridines dye – Quinacrine, Acriquine 3. 4-quinoline carbinolamines – mefloquine 4. Diaminopyrimidines – Pyrimethanamine 5. Biguanides – Proguanil, Chloroproguanil 6. Sulphones – Dapsone 7. Misc. – Doxycycline. Structure of Chloroquine phosphate			1. Quinolines Antimalarials	2 M
B. 4-aminoquinolines – Chloroquine, Amodiaquine C. 8-aminoquinolines – Primaquine, Pamaquine 2. Acridines dye – Quinacrine, Acriquine 3. 4-quinoline carbinolamines – mefloquine 4. Diaminopyrimidines – Pyrimethanamine 5. Biguanides – Proguanil, Chloroproguanil 6. Sulphones – Dapsone 7. Misc. – Doxycycline. Structure of Chloroquine phosphate			A. Cinchona Alkaloids – Quinine, Cinchonine	
C. 8-aminoquinolines – Primaquine, Pamaquine 2. Acridines dye – Quinacrine, Acriquine 3. 4-quinoline carbinolamines – mefloquine 4. Diaminopyrimidines – Pyrimethanamine 5. Biguanides – Proguanil, Chloroproguanil 6. Sulphones – Dapsone 7. Misc. – Doxycycline. Structure of Chloroquine phosphate $ \begin{array}{c} $			B. 4-aminoquinolines – Chloroquine, Amodiaquine	
2. Acridines dye – Quinacrine, Acriquine 3. 4-quinoline carbinolamines – mefloquine 4. Diaminopyrimidines – Pyrimethanamine 5. Biguanides – Proguanil, Chloroproguanil 6. Sulphones – Dapsone 7. Misc. – Doxycycline. Structure of Chloroquine phosphate $ \begin{array}{c} & \downarrow & \downarrow \\ & \downarrow & \downarrow \\ $			C. 8-aminoquinolines – Primaquine, Pamaquine	
3. 4-quinoline carbinolamines – melloquine 4. Diaminopyrimidines – Pyrimethanamine 5. Biguanides – Proguanil, Chloroproguanil 6. Sulphones – Dapsone 7. Misc. – Doxycycline. Structure of Chloroquine phosphate $\downarrow \qquad \qquad$			2. Acridines dye – Quinacrine, Acriquine	
1. Diaminopyrimidines – Pyrimetnanamine 5. Biguanides – Proguanil, Chloroproguanil 6. Sulphones – Dapsone 7. Misc. – Doxycycline. Structure of Chloroquine phosphate $ \begin{array}{c} & \downarrow & \downarrow \\ & \downarrow & \downarrow $			3. 4-quinoline carbinolamines – metloquine	
1. Signatures – Program, chronoprogram 6. Sulphones – Dapsone 7. Misc. – Doxycycline. Structure of Chloroquine phosphate $\downarrow \qquad \qquad$			4. Diaminopyrimidines – Pyrimethanamine	
1. Supports - Dapsone 7. Misc Doxycycline. Structure of Chloroquine phosphate $\downarrow \qquad \qquad$			5. Biguandes – Floguann, Chloroproguann 6. Sulphones Dansone	
$\begin{bmatrix} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$			 Surprofies - Dapsone Misc Doxycycline. 	
$\begin{array}{ c c } & & & & & & & \\ & & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & & \\$			Structure of Chloroquine phosphate	
			CH_{3} C	1M



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Subje	ect Titl	e: PHARMACEUTICAL CHEMISTRY- THEORY Subject Cod	le: 20112
Q.	Sub	Answers	Marking
NO.	NO.	Uses:	Scheme 1M
		Chloroquine is used to prevent and treat malaria	(0.5M
		 It is also used to treat liver infection caused by protozoa (extraintestinal amebiasis). 	for each
		• Chloroquine may also be used to treat coronavirus (COVID-19) in certain	use)
		hospitalized patients.	
1	~	• To treat giardiasis, rheumatoid arthritis, systemic erythematosus.	514
1	g	Chloramphenicol.	5171
		Marking Scheme:	
		Definition – 1M; Classification with example – 2M; Structure – 1M; Uses – 1M for 2 uses.	
		Answer:	
		Antibiotics:	
		Chemical compounds derived from living organism and capable to inhibit the growth of	1M
		micro-oraganism or kill the micro-organism are called as antibiotics.	
		OR	
		The substances which <u>produced by micro-organism</u> and have capacity to inhibit the	
		growth or destroy the microorganism are called as antibiotics.	
		Classification:	
		Chemical classification of antibiotics	
		1. Beta-lactam antibiotics:	2M
		a. Penicillin - Phenoxymethylpenicillin, flucloxacillin, amoxicillin.	
		b. Cephalosporins - Cefaclor, cefadroxil and cephalexin.	
		2. Tetracyclines: Doxycycline and Minocycline.	
		3. Aminoglycosides: Streptomycin	
		4. Macrolides: Erythromycin, azithromycin	
		5. Polypeptides: Bacitracin,	
		6. Polyenes Antifungal antibiotics: Amphotericin, Nystatin and Candicidin	
		7. Ansamycins: Rifamycins (Rifampin, Rifampicin, Rifabutin)	
		8. Lincomycins: Clindamycin.	
		9. Quinolones: Ciprofloxacin, levofloxacin and norfloxacin	
		10. Antibiotics derived from single aminoacid: s-Cycloserine & Chloramphenicol	
		11. Miscellaneous: s-fusidic acid, griseofulvin, novobiocin etc	
		(Classification of antibiotics based on chemical structure is expected however if students	
		write classification of antibiotics-based Mode of action or Spectrum of activity; the same	
		should be considered for 1M)	



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MODEL ANSWER - ONLY FOR THE USE OF RAC ASSESSORS Subject Code: 20112 Subject Title: PHARMACEUTICAL CHEMISTRY- THEORY Marking 0. Sub Answers No. Scheme No. Classification of antibiotics according to Mode of Action 1. Inhibitors of bacterial cell wall synthesis: Penicillin, Cephelosporins 2. Inhibitors of Protein synthesis: Tetracyclines, Chloramphenicol, Macrolide, Aminoglycoside 3. Inhibitors of Nucleic acids metabolism (DNA/RNA): Griseofulvin, Actinomycin Classification of antibiotics depending on spectrum of activity 1. Narrow Spectrum: Bacitracin 2. Broad Spectrum: Cephalosporin 1M**Structure of chloramphenicol:** NO_2 CH₂OH Cl₂HC Ĥ ĠН **Uses of chloramphenicol:** 1. It was used in the treatment of typhoid. 1M(0.5M 2. It may be used as a second-line agent in the treatment of tetracycline-resistant for each cholera. use) 3. It is also useful in the treatment of brain abscesses. 4. It is also applied locally for treatment of ear, eye and skin infection. 5. It is used in treatment of Rickettsia, Chlamydia and mycoplasma. 2 Answer any <u>TEN</u> of the following: 30 M 2 Explain principle and procedure involved in limit test for Iron. **3M** a Marking Scheme: Principle-1.5M; Procedure- 1.5M Answer: Limit Test for Iron (Principle) 1.5M The limit test for iron is based on the interaction of iron with thioglycolic acid in the presence of citric acid and ammonia solution. Iron forms a purple-coloured ferrous thioglycolate complex. The original state of iron is insignificant as thioglycolic acid reduces ferric (Fe^{3+}) to ferrous ion (Fe^{2+}).



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Standard solution (A)	Test solution (B)
In a Nessler's cylinder, Take 2.0 mL of	In a Nessler's cylinder, add specific
iron standard solution (20 ppm Fe).	amount of sample as per IP and dissolve
	in 20 mL of water.
Add 2 mL of a 20% w/v solution of iron-	Add 2 mL of a 20% w/v solution of iron-
free citric acid.	free citric acid.
Then, add 0.1 mL of thioglycolic acid,	Then, add 0.1 mL of thioglycolic acid,
mix well, make alkaline with iron free	mix well, make alkaline with iron free
ammonia solution.	ammonia solution.
Dilute to 50 mL with distilled water and	Dilute to 50 mL with distilled water and
llow to stand for 5 minutes	allow to stand for 5 minutes.
View the colour intensity produced agai	nst white background and compare with
standard	



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2	b	Describe Mohr's method for precipitation titrations with reaction.	3M				
		Marking Scheme: Method-2M; Reaction- 1M					
		Answer:					
		Mohr's Method:					
		• Mohr's method is a type of precipitation titration used to determine the concentration of chloride ions in a solution.					
		• It is based on the reaction between silver nitrate (AgNO ₃) and chloride ions (Cl-) in					
		an aqueous solution to form a silver chloride (AgCl) precipitate.					
		• The Mohr's method involves the addition of a known volume of silver nitrate solution of known concentration to the solution containing chloride ions.					
		• The silver nitrate is added until all the chloride ions have reacted, forming a white precipitate of silver chloride.					
		 The endpoint of the titration is determined by using an indicator such as potassium chromate which gives a brick red precipitate at the end point of the titration. The amount of silver nitrate solution added to the sample can be used to calculate the concentration of chloride ions present in the sample, using stoichiometry of the reaction. It is a simple, inexpensive, and reliable method for the determination of chloride ions 					
		 in aqueous solutions. However, it may suffer from some limitations such as interference from other ions in the sample, and the need for careful handling of the silver nitrate solution due to its toxicity and light sensitivity. 					
		Reaction:					
		$\begin{array}{rcl} AgNO_3 & + & NaCl & \rightarrow & AgCl & + & NaNO_3\\ Silver Nitrate & Sodium chloride & (Silver chloride)\\ & & & & & & & & & & & & & & & & & & &$	1M				
		$2Ag^+ + CrO_4^{2-} \rightarrow Ag_2CrO_4$					
		AgNO ₃ + indicator \rightarrow indicator complex (Reddish brown) at the end point					
2	c	Draw the structure from given IUPAC name .	3M				
		i. 5, 5-diphenylimidazolidine-2, 4-dione.					
		ii. 3 (2-chloro-10H-phenothiazin-10-yl)-N, N-dimethylpropan-1-amine					
		iii. 7-chloro-1, 3-dihydro-1-methyl-5-phenyl-1, 4-benzodiazepine-2-one.					
		Marking Scheme: Each correct structure – 1M.					



Q.

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- i. 5, 5-diphenylimidazolidine-2, 4-dione

 - 3 (2-chloro-10H-phenothiazin-10-yl)-N, N-dimethylpropan-1-amine ii.
 - H₂Ċ-CH₂-CH₂
 - iii. 7-chloro-1, 3-dihydro-1-methyl-5-phenyl-1, 4-benzodiazepine-2-one
 - CH_3 \cap
 - What are cholinergic antagonists? Give their examples. Name the drug used in d Parkinsonism. Marking Scheme: Definition: 1M; Example: 1M (Any two examples); Drugs used in Parkinsonism - 1M (Any two drugs) Answer:
 - **Cholinergic antagonists:**
 - Block or interfere with actions of acetylcholine (Ach) •
 - Opposing the actions of the neurotransmitter acetylcholine.
 - Antagonise the actions of the muscarine so they are also called as antimuscarinic • agents.
 - Inhibit the transmission of parasympathetic nerve impulses, thereby reducing spasms of smooth muscles.

1M

1M

1M

3M

1M



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WINTER-2023 EXAMINATION

Subje	ect Title	e: PHARMACEUTICAL CHEMISTRY- THEORY Subject Cod	e: 20112		
Q. No.	Sub No.	Answers	Marking Scheme		
		• These drugs do not prevent the release of acetylcholine at nerve endings, but they			
		can act by competing with it, for the cholinergic receptor sites.			
		Examples of cholinergic antagonists: (Consider any two examples for 1M)	1M		
		• Atropine	(0.5M		
		• Hyoscine	ior each example		
		Homatropine)		
		Cyclopentolate			
		Tropicamide			
		Clidinium bromide			
		Dicyclomine			
		Propantheline Biperiden			
		Bentropine			
		Drugs used in Parkinsonism: (Consider any two examples for 1M)	1M		
		Benztropine, Benzhexol, Biperiden, Procyclidine			
2	e	Draw the structure of propranolol. Give its uses and popular brand name.	3M		
		Marking Scheme:			
		Structure of propranolol-1M; Uses-1M (any two uses); Brand name-1M.			
		Answer:			
		Structure of propranolol			
		HO			
	$O_{}CH_{2}-CH_{}CH_{2}-NH-HC'_{-}$				
			1M		
	Uses:		(0.5 M		
	• It is used to treat- tremors, angina (chest pain), hypertension (high blood pressure		for each		
	heart rhythm disorders and Other heart or circulatory conditions.		use)		
	• It is also used to treat or prevent heart attacks, and to reduce the severity and				
		frequency of migraine headaches.			
		Brand name:	1M for		
		Betacan Cinlar Cinlar-I.A Inderal Provanol Pranosol Resprot Arminol	anyone		
		(any other brand name should be considered)	name		
		(any other or and name should be considered)			



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WINTER-2023 EXAMINATION

Subje	ect Titl	e: PHARMACEUTICAL CHEMIS	STRY- THEORY Subject Cod	le: 20112	
Q.	Sub No	Answers		Marking	
<u>1NO.</u> 2	NO. f	Classify diuretics with example. V	Vrite structure of frusemide.	Scheme 3M	
-		Marking Scheme: Classification w Structure: 1M. Answer:	ith example: 2M (Consider any four classes);		
		Classification of Diuretics:			
		1. Thiazide Diuretics	Hydrochlorthiazide, Chlorothiazide, Benzothiazide	2M (0.5M for	
		2. Loop / High–ceiling Diuretics	Furosemide, Bumetanide, Ethacrynic acid, Torsemide	each class with example)	
		3. Carbonic anhydrase inhibitors	Acetazolamide, Methazolamide.	example)	
		4. Potassium-sparing diuretics	Aldosterone antagonists: spironolactone Sodium channel blockers: amiloride and triamterene.		
		5. Osmotic diuretics	Mannitol, Urea, Glycerine		
		6. Methylxanthines	Aminophylline, Caffeine		
		Structure of frusemide COOH		1M	
		H ₂ NO ₂ S NH CH ₂			
2	g	What is Diabetes mellitus? Give s	tructure and chemical name of metformin.	3M	
		Marking Scheme: Definition: 1M;	Structure: 1M; Chemical Name: 1M		
		Answer:			
		Diabetes mellitus:			
		Diabetes mellitus is a condition in w cells stop responding to the insulin absorbed into the cells of the body.	which the pancreas no longer produces enough insulin or that is produced, so that glucose in the blood cannot be	1M	
		OR			
		 A group of diseases that rest Insulin deficiency Hyperglycaemic 	ult in too much sugar in the blood (high blood glucose)		
		• Hypergrycaenna			



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WINTER-2023 EXAMINATION

 MODEL ANSWER - ONLY FOR THE USE OF RAC ASSESSORS

 Subject Title: PHARMACEUTICAL CHEMISTRY- THEORY
 Subject Code: 20112

 Q.
 Sub
 Answers
 Marking

 No.
 No.
 Structure of Metformin:
 Structure of Metformin:

No.	No.		Scheme
		Structure of Metformin:	1M
		H ₃ C NH NH	IIVI
		$N - C - NH - C - NH_2$	
		H ₃ C	
		Chemical Name of Metformin:	1M
		1,1-dimethlybiguanide or 1,1-dimethyl biguanidine hydrochloride	
2	h	State what are NSAID's? Give uses and popular brand names of Aspirin.	3M
		Marking Scheme: Definition of NSAID's:1M; Uses:1M (0.5M for each use); Popular brand name: 1M for any one brand name.	
		Answer:	
		Nonsteroidal anti-inflammatory drugs (NSAID's):	1M
		The drugs which do not have the steroidal nucleus & are used to diminish or reduce	
		inflammation & give relief from pain in arthritis & rheumatic diseases are called	
		non-steroidal anti-inflammatory agents. NSAIDs work by inhibiting the activity of $cyclooxygenase enzymes$ (COX 1 or COX 2)	
		eyclooxygenase enzymes (cox-1 of cox-2).	
		Uses of Aspirin-	1M
		Used as an antipyretic to reduce fever.	(0.5M for each
		 Used as an anti-inflammatory medication. Used long term to help prevent further heart attacks and blood clots (an antiplatelet.) 	use)
		activity).	
		• Used for Angina (heart-related chest pain), heart attack and Stroke.	
		• Used as an analgesic to relieve minor aches and pains.	
		Popular brand names of Aspirin-	1M
		Ecosprin, Dispirin, Asprin, CV sprin, ASA, Loprin, Alpyrin, Anacin, Apidin	
		(any other brand name should be considered)	
2	i	Define and classify antitubercular drugs. Draw the structure of Isoniazid (INH).	3M
		Marking Scheme: Definition:1M; Classification:1M; Structure of Isoniazid:1M.	
		Answer:	
		Antitubercular drugs:	1M
		Antitubercular medications are a group of drugs used to treat tuberculosis, a disease caused by Mycobacterium tuberculosis (M-TB).	
		Classification of Antitubercular drugs-	
		a. p-amino salicylic acid derivative – e.g. PAS	1M
		b. Pyridine derivatives – e.g. Isoniazid, Ethionamide	
		c. Pyrazine derivatives- e.g. Pyrazinamide	



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WINTER- 2023 EXAMINATION MODEL ANSWER - ONLY FOR THE USE OF RAC ASSESSORS

Q. Sub No. Answers Marking Scheme d. Ethylene diamine derivatives: e.g. Ethambutol e. Fluoroquinolones- Ofloxacin, Levofloxacin, Moxifloxacin f. Antibiotics – e.g. Cycloserine. Streptomycin, Rifampicin IM 2 j What are β -lactum antibiotics? Give the structure and uses of Amoxicillin. Marking Scheme: Definition:1M; Structure:1M; Uses:1M (0.5M for each use) Answer: β -lactum antibiotics: 3M 2 j What are β -lactum antibiotics? Give the structure and uses of Amoxicillin. Marking Scheme: Definition:1M; Structure:1M; Uses:1M (0.5M for each use) Answer: β -lactum antibiotics: 3M 9 Beta-lactam antibiotics are a class of antibioties that contain a beta-lactam ring (a four membered cyclic amide ring) in their chemical structure. They are bactericidal agents that prevent bacteria from forming cell walls. IM • Estample: Penicillin, Cephalosporins IM Structure of Amoxicillin: • IM • HO $ intervent in forming cell walls. • • Example: Penicillin antibiotic. IM • It is used to treat bacterial infections, such as chest infections (including pneumonia)and dental abscesses. IM • It is used to treat bacterial infections to treat stomach/intestinal ulcers caused by thebacteria H. pylori and to prevent the ulcers from returning. IM • Uses of to tr$	Subje	ect Title	e: PHARMACEUTICAL CHEMISTRY- THEORY Subject Cod	le: 20112
e.Ethanbutole.g. Ethanbutole.Huoroquinolones-Ofloxacin, Levofloxacin, MoxifloxacinIMf.Antibiotics – e.g. Cycloserine. Streptomycin, RifampicinIMStructure of Isoniazidi:IM $\mathcal{G}(\mathcal{Y})$ What are β -lactum antibiotics? Give the structure and uses of Amoxicillin.Marking Scheme: Definition:1M; Structure:1M; Uses:1M (0.5M for each use)3MAnswer: β -lactum antibiotics are a class of antibiotics that contain a beta-lactam ring (a four membered cyclic anide ring) in their chemical structure. They are bactericidal agents that prevent bacteria from forming cell walls.IMeExample: Penicillin; CephalosporinsIMMarking Scheme: Definition:1M; Structure: They are bactericidal agents that prevent bacteria from forming cell walls.eExample: Penicillin; CephalosporinsIMMarking Scheme: Definition: a penicillin antibiotic.It is used to treat bacterial infections, such as chest infections (including pneumonia) and dental abscesses.It is also used with other medications to treat stomachrintestinal ulcers caused by the bacteria H. pylori and to prevent the ulcers from returning.Uses of to treat bacterial infection such as middle ear infection, strep throat, pneumonia, skin infections, and urinary tract infections among others.	Q. No.	Sub No.	Answers	Marking Scheme
e.Fluoroquinolones- Ofloxacin, Levofloxacin, Moxifloxacin f. Antibiotics – e.g. Cycloserine, Streptomycin, RifampicinIMStructure of Isoniazid: 			d. Ethylene diamine derivatives – e.g. Ethambutol	
f. Antibiotics – e.g. Cycloserine, Streptomycin, RifampicinIMStructure of Isoniazid: $(ONHNH_2)$ IMjWhat are β-lactum antibiotics? Give the structure and uses of Amoxicillin. Marking Scheme: Definition:1M; Structure:1M; Uses:1M (0.5M for each use) Answer: β-lactum antibiotics are a class of antibiotics that contain a beta-lactam ring (a four membered cyclic amide ring) in their chemical structure. They are bactericidal agents that prevent bacteria from forming cell walls. • Example: Penicillin, Cephalosporins Structure of Amoxicillin: $Uses of Amoxicillin:$ • It is used to treat bacterial infections, such as chest infections (including pneumonia) and dental abscesses. • It is also used with other medications to treat stomach/intestinal ulcers caused by the bacteria H. pipori and to prevent the ulcers from returning. • Used to treat bacterial infection such as middle car infection, strep throat, pneumonia, skin infections, and urinary tract infections among others.IM (0.5M for each use)			e. Fluoroquinolones- Ofloxacin, Levofloxacin, Moxifloxacin	
Image: Structure of Isoniazid:Image: CONHNH2Image: CONHNH22JWhat are β-lactum antibiotics? Give the structure and uses of Amoxicillin. Marking Scheme: Definition:1M; Structure:1M; Uses:1M (0.5M for each use) Answer: β-lactum antibiotics: • Beta-lactam antibiotics are a class of antibiotics that contain a beta-lactam ring (a four membered cyclic amide ring) in their chemical structure. They are bactericidal agents that prevent bacteria from forming cell walls. • Example: Penicillin, Cephalosporins Structure of Amoxicillin: $HO = \int_{O} \int$			f. Antibiotics – e.g. Cycloserine, Streptomycin, Rifampicin	
$\begin{array}{ c c c } I & & & & & & & & & & & & & & & & & & $			Structure of Isoniazid:	
2jWhat are J-lactum antibiotics? Give the structure and uses of Amoxicillin. Marking Scheme: Definition: 1M; Structure: 1M; Uses: 1M (0.5M for each use) Answer: J-lactum antibiotics e Beta-lactam antibiotics are a class of antibiotics that contain a beta-lactam ring (a four membered cyclic amide ring) in their chemical structure. They are bactericidal agents that prevent bacteria from forming cell walls. e Example: Penicillin, CephalosporinsJMStructure of Amoxicillin: $G(f) = G(f) = G(f$			CONHNH ₂	1M
2jWhat are ß-lactum antibiotics? Give the structure and uses of Amoxicillin. Marking Scheme: Definition: 1M: Structure: 1M: Uses: 1M (0.5M for each use) Answer: B-lactum antibiotics 03M Beta -lactam antibiotics: 0• Beta-lactam antibiotics that contain a beta-lactam ring (a four membered cyclic amide ring) in their chemical structure. They are bactericidal agents that prevent bacteria from forming cell walls. • Example: Penicillin, CephalosporinsIMStructure of Amoxicillin: $Uses of Amoxicillin:Uses of Amoxicillin:• Amoxicillin is a penicillin antibiotic.• It is used to treat bacterial infections, such as chest infections (including pneumonia)and dental abscesses.• It is also used with other medications to treat stomach/intestinal ulcers caused by thebacteria H. pylori and to prevent the ulcers from returning.• Used to treat bacterial infections such as middle ear infection, strep throat,pneumonia, skin infections, and urinary tract infections among others.IM$				
2jWhat are β -lactum antibiotics? Give the structure and uses of Amoxicillin. Marking Scheme: Definition:1M; Structure:1M; Uses:1M (0.5M for each use) Answer: B-lactum antibiotics 9-lactum antibiotics are a class of antibiotics that contain a beta-lactam ring (a four membered cyclic amide ring) in their chemical structure. They are bactericidal agents that prevent bacteria from forming cell walls. • Example: Penicillin, Cephalosporins Structure of Amoxicillin: $Uses of Amoxicillin:$ • Amoxicillin is a penicillin antibiotic. • It is used to treat bacterial infections, such as chest infections (including pneumonia) and dental abscesses. • It is also used with other medications to treat stomach/intestinal ulcers caused by the bacteria H. pylori and to prevent the ulcers from returning. • Used to treat bacterial infection such as middle ear infection, strep throat, pneumonia, skin infections, and urinary tract infections among others.IM				
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 j What are β-lactum antibiotics? Give the structure and uses of Amoxicillin. Marking Scheme: Definition:1M; Structure:1M; Uses:1M (0.5M for each use) Answer: β-lactum antibiotics: Beta-lactam antibiotics are a class of antibiotics that contain a beta-lactam ring (a four membered cyclic amide ring) in their chemical structure. They are bactericidal agents that prevent bacteria from forming cell walls. Example: Penicillin, Cephalosporins Structure of Amoxicillin: MH2 Muther the fourther of the prevent bacterial infections, such as chest infections (including pneumonia) and dental abscesses. It is used to treat bacterial infections, such as middle ear infection, strep throat, pneumonia, skin infections, and urinary tract infections among others. 				
 Marking Scheme: Definition: 1M; Structure: 1M; Uses: 1M (0.5M for each use) Answer: β-lactum antibiotics: Beta-lactam antibiotics are a class of antibiotics that contain a beta-lactam ring (a four membered cyclic amide ring) in their chemical structure. They are bactericidal agents that prevent bacteria from forming cell walls. Example: Penicillin, Cephalosporins Structure of Amoxicillin: HO	2	j	What are β -lactum antibiotics? Give the structure and uses of Amoxicillin.	3M
 Answer: β-lactum antibiotics: Beta-lactam antibiotics are a class of antibiotics that contain a beta-lactam ring (a four membered cyclic anide ring) in their chemical structure. They are bactericidal agents that prevent bacteria from forming cell walls. Example: Penicillin, Cephalosporins Structure of Amoxicillin: 			Marking Scheme: Definition:1M; Structure:1M; Uses:1M (0.5M for each use)	
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 Beta-lactam antibiotics are a class of antibiotics that contain a beta-lactam ring (a four membered cyclic amide ring) in their chemical structure. They are bactericidal agents that prevent bacteria from forming cell walls. Example: Penicillin, Cephalosporins Structure of Amoxicillin: 			β-lactum antibiotics:	
Structure of Amoxicillin: IM HO Im HO Im HO Im HO Im Im			 Beta-lactam antibiotics are a class of antibiotics that contain a beta-lactam ring (a four membered cyclic amide ring) in their chemical structure. They are bactericidal agents that prevent bacteria from forming cell walls. Example: Penicillin, Cephalosporins 	1M
 IM IM IM Uses of Amoxicillin: Amoxicillin is a penicillin antibiotic. It is used to treat bacterial infections, such as chest infections (including pneumonia) and dental abscesses. It is also used with other medications to treat stomach/intestinal ulcers caused by the bacteria H. pylori and to prevent the ulcers from returning. Used to treat bacterial infections such as middle ear infection, strep throat, pneumonia, skin infections, and urinary tract infections among others. 			Structure of Amovicillin.	
Uses of Amoxicillin:1M (0.5M for each use)• Amoxicillin is a penicillin antibiotic.• It is used to treat bacterial infections, such as chest infections (including pneumonia) and dental abscesses.• It is also used with other medications to treat stomach/intestinal ulcers caused by the bacteria H. pylori and to prevent the ulcers from returning.• Used to treat bacterial infection such as middle ear infection, strep throat, pneumonia, skin infections, and urinary tract infections among others.• Used to treat bacterial infections among others.			Structure of Annoxic HO $\xrightarrow{NH_2}$ $\xrightarrow{NH_2}$ \xrightarrow{NH} \xrightarrow{S} $\xrightarrow{CH_3}$ $\xrightarrow{CH_3}$ \xrightarrow{COOH}	1M
 Amoxicillin is a penicillin antibiotic. It is used to treat bacterial infections, such as chest infections (including pneumonia) and dental abscesses. It is also used with other medications to treat stomach/intestinal ulcers caused by the bacteria H. pylori and to prevent the ulcers from returning. Used to treat bacterial infection such as middle ear infection, strep throat, pneumonia, skin infections, and urinary tract infections among others. 			Uses of Amoxicillin:	1M
 It is used to treat bacterial infections, such as chest infections (including pneumonia) and dental abscesses. It is also used with other medications to treat stomach/intestinal ulcers caused by the bacteria H. pylori and to prevent the ulcers from returning. Used to treat bacterial infection such as middle ear infection, strep throat, pneumonia, skin infections, and urinary tract infections among others. 			• Amoxicillin is a penicillin antibiotic.	(0.5M
 It is also used with other medications to treat stomach/intestinal ulcers caused by the bacteria H. pylori and to prevent the ulcers from returning. Used to treat bacterial infection such as middle ear infection, strep throat, pneumonia, skin infections, and urinary tract infections among others. 			• It is used to treat bacterial infections, such as chest infections (including pneumonia) and dental abscesses.	for each use)
 Used to treat bacterial infection such as middle ear infection, strep throat, pneumonia, skin infections, and urinary tract infections among others. 			• It is also used with other medications to treat stomach/intestinal ulcers caused by the bacteria H , pylori and to provent the places from returning	
pneumonia, skin infections, and urinary tract infections among others.			• Used to treat bacterial infection such as middle ear infection stron throat	
			pneumonia, skin infections, and urinary tract infections among others.	



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WINTER-2023 EXAMINATION

Subje	ect Titl	e: PHARMACEUTICAL CHEMISTRY- THEORY Subject Cod	le: 20112
Q.	Sub	Answers	Marking
<u>No.</u> 2	No.	Classify antineonlastic drugs with example. Discuss uses of cisplatin	Scheme 3M
4	N		5111
		Marking Scheme: Classification:2M (with examples); Uses:1M (0.5M for each use)	
		Answer:	
		Classification of Anti-neoplastic Agents	2M
		Alkylating agents:	
		 Mustine, Cyclophosphamide, Busulfan, Chlorambucil, Thiotepa. 	
		Antimetabolites:	
		✓ Folic Acid Analogues - Methotrexate,	
		 Pyrimidine Analogues – Fluorouracil, 	
		 Purine Analogues - 6-mercaptopurine, 6-thioguanine. 	
		• Antibiotics: (Anticancer Antibiotics) -Dactinomycin, Doxorubicin, Mitomycin-C, Daunorubicin	
		 Hormones and antagonists: Diethylstibesterol. tamoxifem. 	
		 Plant products - Vinca alkaloids: Vincristine, Vinblastine 	
		• Enzymes: Asparginase	
		• Miscellaneous Agents: Cisplatin, Carboplatin, procarbazine, Hydroxyurea.	
		Uses of Cisplatin:	
		• Cisplatin is particularly effective against testicular cancer.	1M
		Used to treat several cancers	(0.5M
		• Testicular cancer,	for each
		• Ovarian cancer,	use)
		• Cervical cancer,	
		• Bladder cancer,	
		• Head and neck cancer,	
		 Esophageal cancer, 	
		• Lung cancer,	
		• Brain tumors.	
3		Attempt ALL questions	20 M
		Important Instructions: In case, multiple answer options are observed for the	
		same sub question of question No. 3, the option (Answer) appearing first in	
		the answer book shall be treated as answer and assessed accordingly.	
3	a	Guitzet's test apparatus is used to carry out limit test of	1M
		Marking Scheme: 1M for correct answer.	
		Answer:	
		Arsenic	



Imidazole

Oxazole

iii. iv. MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION

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		WINTER- 2023 EXAMINATION	
		MODEL ANSWER - ONLY FOR THE USE OF RAC ASSESSORS	
Subje	ect Titl	e: PHARMACEUTICAL CHEMISTRY- THEORY Subject Co	de: 20112
Q. No.	Sub No.	Answers	Marking Scheme
3	b	Name the indicator used in the assay of sodium chloride.	1M
		Marking Scheme: 1M for correct answer (Consider any one correct indicator)	
		Answer:	
		Potassium chromate or Ferric ammonium Sulphate (Ferric alum)	
3	c	State the uses of Hydrogen peroxide.	1M
		Marking Scheme: 1M for correct use. (Consider any one correct use of H ₂ O ₂)	
		Answer: Antiseptic or Disinfectant or Oxidizing Agent or Bleaching Agent or Removal of wax from ears.	
3	d	Use of ferrous sulphate is	1M
		Marking Scheme: 1M for correct use. (Consider any one correct use of FeSO ₄)	
		Answer:	
		Haematinics or used to treat and prevent iron deficiency anaemia.	
3	e	Which one of the following five membered unsaturated heterocycle containing oxygen?	1M
		i Duridina	
		ii Oxazole	
		iii. Pyrrole	
		iv. Furan	
		Marking Scheme: 1M for correct option (Consider any one correct option)	
		Answer:	
		ii. Oxazole or	
		iv. Furan	
3	f	The suffix "ole" is used for	1M
		i. Five membered unsaturated ring	
		ii. Six membered unsaturated ring	
		iii. Five membered saturated ring	
		iv. Six membered saturated ring	
		Marking Scheme: 1M for correct option	
		Answer:	
		i) Five membered unsaturated ring	
3	g	Which of the following is not a five membered ring	1M
		i. pyridine	
		ii. Furan	



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WINTER- 2023 EXAMINATION MODEL ANSWER - ONLY FOR THE USE OF RAC ASSESSORS

Subje	ect Titl	e: PHARMACEUTICAL CHEMISTRY- THEORY Subject Co	de: 20112
Q. No.	Sub No.	Answers	Marking Scheme
		Marking Scheme: 1M for correct option	
		Answer:	
		i) pyridine	
3	h	The prefix Thia / Thio is used for a heteroatom	1M
		Marking Scheme: 1M for correct answer	
		Answer:	
		Sulphur	
3	i	Write brand name of phenytoin.	1M
		Marking Scheme: 1M for any one correct brand name of Phenytoin	
		Answer:	
		Dilantin or Eptoin or FenToin or Episol or Celetoin or any other correct brand name of phenytoin	
3	j	In what dosage form diazepam is given?	1M
		Marking Scheme: 1M for any one correct dosage form of diazepam	
		Answer:	
		Tablet or injection or Suppository or Syrup	
3	k	Acetyl-choline is an -	1M
		i. Cholinergic blocker	
		ii. Adrenergic blocker	
		iii. Adrenergic agent	
		iv. Choinergic agent	
		Marking Scheme: 1M for correct option	
		Answer:	
		iv) Cholinergic agent	
3	I	amine with vasoconstrictive activity.	1M
		Marking Scheme: 1M for correct answer	
		Answer: Naphazoline	
3	m	Name the pharmacological category of quinidine sulphate.	1M
		Marking Scheme: 1M for any one correct category	
		Answer: Antiarrhythmic or Antimalarial	
3	n	Captopril is used in treatment of	1M
		Markin Scheme: 1M for correct answer	
		Answer: Hypertension or high blood pressure.	



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WINTER-2023 EXAMINATION

Q. Sub No. Number Subset Marking Scheme 3 o Which of the following diuretic is a derivative of anthranilic acid - IM 3 o Which of the following diuretic is a derivative of anthranilic acid - IM i Frusemide ii. Urea iii. Spironolactone iii. Spironolactone iv. Ethacrynic acid Marking Scheme: 1M for correct option Answer: 3 p Mefanamic acid is used in	Subje	ct Titl	e: PHARMACEUTICAL CHEMISTRY- THEORY Subject Code	le: 20112
No. No. Scheme 3 0 Which of the following diuretic is a derivative of anthranilic acid - i. Frusemide ii. Urea iii. Spironolactone iv. Ethacrynic acid Marking Scheme: 1M for correct option Answer: i) Frusemide IM IM 3 p Mefanamic acid is used in	Q.	Sub	Answers	Marking
3 0 Which of the following durence is a derivative of anthramic acid - IM i. Frusemide ii. Urea iii. Spironolactone iv. iii. Spironolactone iv. Ethacrynic acid Marking Scheme: 1M for correct option Answer: i) Insection IM 3 p Mefanamic acid is used in	No.	No.		Scheme
ii. Urea iii. Spironolactone iv. Ethacrynic acid Marking Scheme: IM for correct option Answer: IVesemide J p Mefanamic acid is used in	3	0	which of the following diuretic is a derivative of anthranilic acid -	IM
Instruction Determined iii. Spironolactone iv. Ethacrynic acid Marking Scheme: IM for correct option Answer: i) Frusemide J p Mefanamic acid is used in				
In. Spinologication iv. Ethacrynic acid Marking Scheme: 1M for correct option Answer: IM Marking Scheme: 1M for any one correct use of mefenamic acid Answer: It is NSAID used to relieve mild to moderate pain Pain associated with Dysmenorrhea (Menstrual pain) Treatment of Rheumatoid arthritis and Osteoarthritis. J q Crocin is a popular brand name of Marking Scheme: 1M for correct answer Answer: Paracetamol J			II. Olea	
N. Endatynic acta Marking Scheme: 1M for correct option Answer: J p Mefanamic acid is used in Marking Scheme: 1M for any one correct use of mefenamic acid Answer: It is NSAID used to relieve mild to moderate pain Pain associated with Dysmenorrhea (Menstrual pain) Treatment of Rheumatoid arthritis and Osteoarthritis. IM Marking Scheme: 1M for correct answer Answer: Paracetamol IM Marking Scheme: 1M for any one correct brand name of IM Marking Scheme: 1M for any one correct brand name IM Marking Scheme: 1M for any one correct brand name IM Marking Scheme: 1M for any one correct brand name IM Marking Scheme: 1M for any one correct brand name IM Marking Scheme: 1M for any one correct brand name Answer: Cipami or Remdac or Desrem or Redyx or Remwin or Remdiz or Remizac or Covifor or any other correct option. IM Marking Scheme: 1M for any one correct dosage form of azithromycin. Answer: Tablet or Syrup or Injection or Suspension IM Marking Scheme: 1M for any one drug which is antimetabolites used as antineoplastic agents. Answer: Answer: Tablet or Syrup or Injection or Suspens			iv Etheorypic acid	
3 p Marking Scheme: 1M for correct option Answer: i) Frusemide 1M 3 p Marking Scheme: 1M for any one correct use of mefenamic acid Answer: 1M 4 A Marking Scheme: 1M for any one correct use of mefenamic acid Answer: 1M 5 V It is NSAID used to relieve mild to moderate pain • Pain associated with Dysmenorrhea (Menstrual pain) • Treatment of Rheumatoid arthritis and Osteoarthritis. 1M 3 q Crocin is a popular brand name of				
3 p Mefanamic acid is used in			Marking Scheme: 1M for correct option	
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