WINTER– 2022 EXAMINATION

MODEL ANSWER

Subject Title: PHARMACEUTICAL CHEMSISTRY- THEORY Subject Code: **20112**

Important Instructions to examiners:

1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
2) The model answer and the answer written by the candidate may vary but the examiner may try to assess the understanding level of the candidate.
3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills.
4) While assessing figures, the 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.
5) 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.
6) In case of some questions, credit may be given by judgement on part of the examiner of relevant answer based on the candidate's understanding.
7) For programming language papers, credit may be given to any other program based on an equivalent concept.
8) 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 in first year (first and second semesters) 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 SIX of the following:**	**30M**
1	a	**Explain the principle and procedure involved in the limit test for arsenic.** **Marking Scheme: Principle - 3M (Explanation 2M + Reaction 1M); Procedure – 2M (1M for test solution & 1M for standard solution)** **Answer:** **Limit Test for Arsenic –** **Principle:** 1. It is also called as Gutzeit test and requires special apparatus called Gutzeit apparatus. 2. Limit test of Arsenic is based on the reaction of arsenic gas with hydrogen ion to form yellow stain on mercuric chloride paper in presence of reducing agents like stannous acid, potassium iodide. 3. The sample dissolved in stannated acid, which converts the arsenic impurities to arsenious acid to arsenic acid depending upon valency state of arsenic impurity present in the test sample.	**5M** **Principle – 3M**

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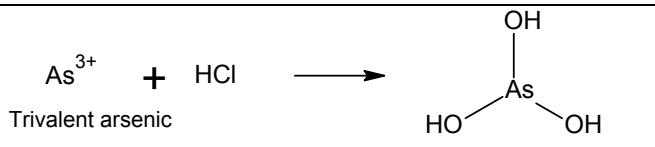
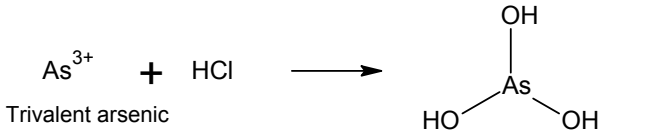
Q. No.	Sub No.	Answers	Marking Scheme



Trivalent arsenic

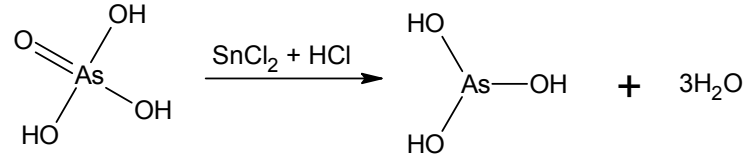
Arsenious acid (trivalent)



Trivalent arsenic

Arsenious acid (trivalent)

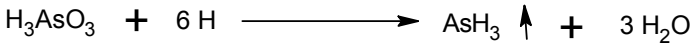
4. When acidic solution of sample treated with reducing agent (stannous chloride) converts pentavalent arsenic acid into trivalent arsenious acid



Arsenic acid (pentavalent)

Arsenious acid (trivalent)

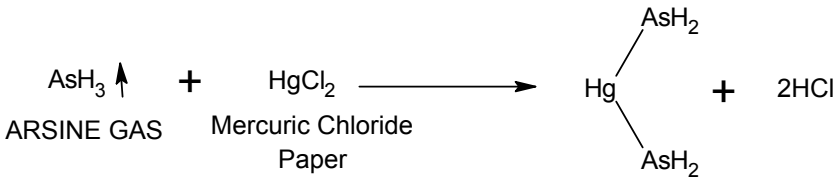
5. The Arsenious acid is then converted into gaseous hydride (arsine gas) with help of nascent hydrogen (which is produced by zinc and HCl).



Arsenious acid (trivalent)

ARSINE GAS

6. Arsine gas is carried through the tube by steam of hydrogen and out through the mercuric chloride paper. A reaction occurs between arsine and mercuric chloride which produces yellow colour stain.



ARSINE GAS

Mercuric Chloride Paper

Mercuric Hydrogen Arsenide
(Yellow/ Brown in colour)

7. The depth of yellow stain on mercuric chloride paper will depend upon the quality of arsenic present in the sample.
8. Stannous chloride is used for complete evolution of arsine.
9. Zinc, potassium iodide and stannous chloride is used as a reducing agent.
10. Hydrochloric acid is used to make the solution acidic

Q. No.	Sub No.	Answers	Marking Scheme
		11. Lead acetate pledger or papers are used to trap any hydrogen sulphide which may be evolved along with arsine. **Procedure:** Take two 50 ml of Arsenic LT apparatus bottles. Label one "Test" and the other as "Standard".	**2M**

Standard Solution	Test Solution
1. A known amount of dilute arsenic solution is kept in the wide-mouthed bottle of the apparatus.	1. Dissolving a specific amount of sample in water and stannate HCl (as free) and kept in the wide-mouthed bottle of the apparatus.
2. To this solution, 1 gm of KI, 5 ml of stannous chloride, and 10 gm of zinc are added (all these reagents should be arsenic-free).	2. To this solution, 1 gm of KI, 5 ml of stannous chloride, and 10 gm of zinc are added (all these reagents should be arsenic-free).
3. Keep the solution aside for 40 minutes.	3. Keep the solution aside for 40 minutes.
4. Compare the stain obtained on the mercuric chloride paper with that in the apparatus containing the test solution.	4. Compare the stain obtained on the mercuric chloride paper with that in the apparatus containing standard solution.

Observation: The colour produce in sample solution should not be greater than standard solution. If colour produces in sample solution is less than the standard solution, the sample will pass the limit test of heavy metals and vice versa.

1	**b**	**Define and classify Antibiotics giving suitable example of compounds under each class.** **Marking Scheme: Definition- 1M; Classification with correct examples – 4M** **Answer:** **Antibiotics:** Antibiotics are chemical substances produced by certain species of microorganisms and their synthetic analogues having the property of inhibiting the growth of or destroying other microorganisms in high dilutions or low concentration OR	**5M** **1M**

Q. No.	Sub No.	Answers	Marking Scheme
		Chemical compounds derived from living organism and capable to inhibit the growth of micro-organism or kill the micro-organism. OR The substances which produced by micro-organism and have capacity to inhibit the growth or destroy the microorganism. **Chemical classification of antibiotics** 1. **Beta-lactam antibiotics:** 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 2M*) ***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	**4M** **classification**

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Subject Title: PHARMACEUTICAL CHEMSISTRY- THEORY Subject Code: **20112**

Q. No.	Sub No.	Answers	Marking Scheme
1	C	**Give a brief account of: i) Precipitation titration ii) Acid- base titration** **Marking Scheme:** 2.5 marks each type of Titration **Answer:** **i) Precipitation titration-** • Precipitation titration is a type of titration which involves the formation of precipitate during the titration technique. • In precipitation titration, the titrant reacts with analyte and forms an insoluble substance called precipitate. • It continues till the last amount of analyte is consumed. • 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. **Argentometry Titration** • The titration in which silver nitrate (AgNO3) is used as a precipitating agent is named as argentometric titration. • End point can be determined using a suitable indicator which forms a coloured precipitate at the end point. For example o Mohr's method- Potassium chromate indicator; o Volhard's method - Ferric ammonium sulphate • The titration is used to determine halides like Cl-, Br-, and I- $AgNO_3$ + X^- → AgX + NO_3 (silver nitrate) (halides) (silver halides white coloured precipitate) $AgNO_3$ + indicator → indicator complex (coloured) at the end point **Types of argentometric titrations:** • Mohr's method • Volhard's method • Fajan's method • Gay-lussac method	**5M**

Q. No.	Sub No.	Answers	Marking Scheme

ii) Acid- Base titration-

- An acid–base titration is a method of quantitative analysis for determining the concentration of an acid or base by exactly neutralizing it with a standard solution of base or acid having known concentration.
- Thus, these are neutralization reactions with formation of salt and water as the end products.
- A pH indicator is used to indicate the end point of acid-base neutralization reaction.

Four Basic Types of Acid-Base Titrations

- The below Table shows the four types of titrations, and you note that the titrant (compound in the burette that is added to the analyte) is always strong, while the analyte can be strong or weak.

Type	Analyte	Titrant
SA/SB	Strong Acid	Strong Base
WA/SB	Weak Acid	Strong Base
SB/SA	Strong Base	Strong Acid
WB/SA	Weak Base	Strong Acid

- In acid- base titration, a solution of known concentration (the titrant) is added to a solution of the substance being studied (the analyte).
- In an acid-base titration, the titrant is a strong base or a strong acid, and the analyte is an acid or a base, respectively.
- For example, hydrochloric acid and sodium hydroxide form sodium chloride and water:

$$HCl(aq) + NaOH(aq) \rightarrow H_2O + NaCl(aq)$$

- Neutralization is the basis of titration.
- A pH indicator shows the equivalence point — the point at which the equivalent number of moles of a base have been added to an acid & a sharp colour change is observed.
- Examples of acid- base titration are Assay of Sodium bicarbonate, Assay of Ibuprofen, Assay of Boric acid etc.

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MODEL ANSWER

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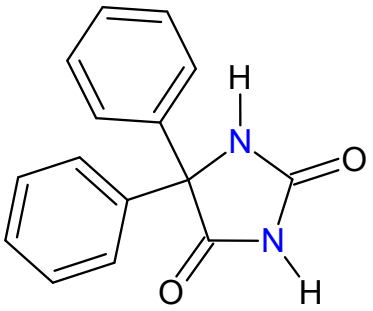
Q. No.	Sub No.	Answers	Marking Scheme
1	d	**Draw the structure of Phenytoin and give its chemical name, Therapeutic uses, Formulations, Stability-storage conditions and Popular Brand Names.** **Marking Scheme:** Structure – 1M; Chemical name – 1M; Therapeutic uses – 1M; Stability-storage conditions – 1M; Brand names- 0.5M; Formulation – 0.5M **Answer: Structure of Phenytoin-**  **Chemical name of Phenytoin-** **5, 5-diphenylimidazolindine-2,4-dione or 5, 5-diphenyl-2,4-imidazolindinedione** **Therapeutic uses of Phenytoin-** 1. Phenytoin, formerly known as diphenylhydantoin, is a potent anticonvulsant used to treat and prevent generalized grand mal seizures, complex partial seizures and status epilepticus. 2. Used as Anticonvulsant and Hypnotics 3. Used in Cardiac arrhythmias **Stability-storage of Phenytoin-** Store at room temperature between 68^0 -77^0 F (20^0- 25^0 C) away from light and moisture. Do not freeze. **Brand names of Phenytoin-** Dilantin, Spentoin, Eptoin **Formulations of Phenytoin –** Injection, Capsule	**5M** **1M** **1M** **1M** **1M** **0.5M** **0.5M**
1	e	**Write storage condition and uses of: i) Carbon Dioxide ii) Hydrogen Peroxide** **Marking Scheme:** Storage condition – 1M for each drug; Uses – 1.5M for each drug (Any three uses/drug)	**5M**

Q. No.	Sub No.	Answers	Marking Scheme

Answer:

Storage condition of Carbon dioxide:

- Carbon Dioxide is supplied in metal cylinders at a temperature not exceeding 31^0C.
- The shoulder of the cylinder is painted grey and has the name and symbol of CO_2 stencilled on it.

Uses of Carbon dioxide:

1. Carbon dioxide is important for regulating the acid-base balance of the blood & tissues.
2. Carbon dioxide has been used as a respiratory stimulant.
3. Carbon dioxide 5 to 7 % in oxygen has been used in the treatment of carbon monoxide poisoning.
4. Carbon dioxide, when given by mouth in solution form or as carbonates or bicarbonates, promotes the absorption of liquids by the mucous membrane. Therefore, aerated waters rapidly relieve thirst, hasten the action of alcohol & soon cause diuresis.
5. The frozen form of carbon dioxide, dry ice, has been used in the treatment of skin disorders like acne, angiomas, corns, eczema, moles, warts, etc.

Storage condition of Hydrogen peroxide:

- It is stored in containers protected from light, in bottles closed with glass stoppers or plastic caps provided with a vent for the escape of oxygen. It is kept in a cool place. The label of the container should indicate whether it contains a stabilizing agent or not.

Uses of Hydrogen peroxide:

- Hydrogen peroxide solution is primarily used for its antiseptic action.
- The antiseptic action is associated with mechanical cleansing provided by rapid foaming release of oxygen. This helps in removal of dirt, bacteria from cuts and wounds and acts as cleaning-antiseptic.
- Hydrogen peroxide is effective against many pathogenic bacteria including anaerobic bacteria.
- The diluted solution (1:1 with water) is used for gargle, mouthwash or for treatment of infections of the throat.

Q. No.	Sub No.	Answers	Marking Scheme
		• It is also used for treatment as ear wash and vaginal douche. • Hydrogen peroxide solution is an effective antidote for phosphorus and cyanide poisoning.	
1	F	**Define and classify Adrenergic drugs giving suitable example of compounds under each class.** **Marking Scheme**: Definition – 1M, Classification – 4M. (Consider any one classification method) **Answer:** **Adrenergic Agents:** An adrenergic agent is a drug, or other substance, which has effects like, or the same as, epinephrine (adrenaline). Thus, it is a kind of sympathomimetic agent. Alternatively, it may refer to something which is susceptible to epinephrine, or similar substances, such as a biological receptor (specifically, the adrenergic receptors). **Classification of Adrenergic Drugs:** The adrenergic drugs can be classified based on their chemical structure. 1. **Catecholamines** – Adrenaline, Nor-adrenaline, Isoprenaline 2. **Non-Catecholamines** – phenylephrine, Salbutamol, Terbutaline, Ephedrine, Pseudoephedrine. 3. **Imidazoline** derivatives – Naphazoline, Tetrahydrozolium. Alternatively, these agents classified as- 1. **Directly acting (act directly on α or β receptors):** Direct stimulation of the α- and β-adrenergic receptors can produce sympathomimetic effects. e.g. Epinephrine, Norepinephrine, Dopamine, Salbutamol, Phenylephrine, Terbutaline, Naphazoline, Tetrahydrozoline. 2. **Indirectly acting (act by providing more norepinephrine to act on α or β receptors):** work by causing the release of dopamine and norepinephrine, along with (in some cases) blocking the reuptake of these neurotransmitters. e.g. Amphetamine, hydroxyamphetamine, and propylhexedrine, pseudoephedrine 3. **Mixed acting (act by both mechanisms)**: ephedrine, Metaraminol Many sympathomimetics alternatively, also classified as- 1. **alpha-adrenoceptor agonists (α-agonists):** Phenylephrine 2. **beta-adrenoceptor agonists (β-agonists):** Terbutaline, Salbutamol 3. **Both alpha and beta agonist:** Adrenaline, Noradrenaline	**5M** **1M** **4M**

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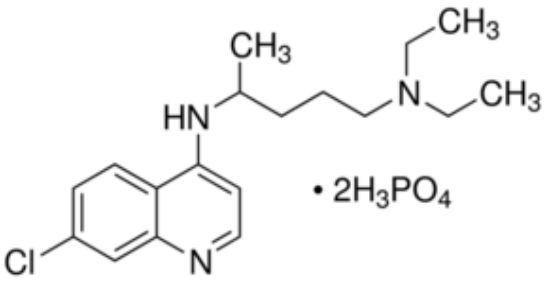
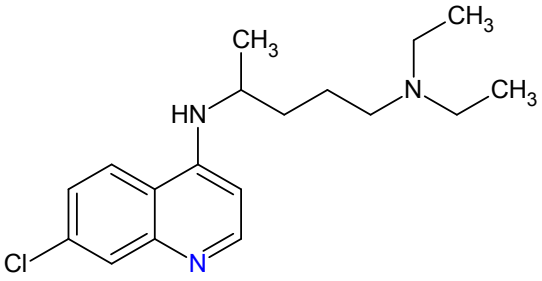
Q. No.	Sub No.	Answers	Marking Scheme
1	G	**Give the structure, Chemical name, Therapeutic uses, Stability-storage conditions and Popular Brand names of Chloroquine Phosphate.**	**5M**
		Marking Scheme: Structure – 1M; Chemical name – 1M; Therapeutic uses – 1M (for two uses); Stability-storage conditions – 1M; Brand names – 1M (for two names).	
		Answer: **Structure of Chloroquine phosphate-**	
			**1M**
		OR	
			
		Chemical name of Chloroquine phosphate: 7-chloro-4-(4'-diethylamino-1'-methyl butyl amino)-quinoline phosphate **OR** N^4-(7-chloroquinolin-4-yl)-N^1,N^1-diethylpentane-1,4-diamine	**1M**
		Therapeutic uses of Chloroquine phosphate: • Chloroquine is used to prevent and treat malaria. • It is also used to treat liver infection caused by protozoa (extraintestinal amebiasis). • Chloroquine may also be used to treat coronavirus (COVID-19) in certain hospitalized patients. • To treat giardiasis, rheumatoid arthritis, systemic erythematosus.	**1M** **1M**
		Stability-storage of Chloroquine phosphate: • Store in a cool, dry place, protected from light & heat.	
		Brand names of Chloroquine phosphate: • Ciplaquin, Nivaquine P, Lariago, Aralen,	**1M**

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Q. No.	Sub No.	Answers	Marking Scheme
2		**Answer any TEN of the following:**	**30 M**
2	**a**	**What is meant by 'Impurity'? Enlist different sources of impurities. Explain any two.** **Marking Scheme:** Definition: 0.5 M; Enlist: 0.5 M; Explanation (any two): 1 M each **Answer:** **Impurity:** Undesirable matter which may or may not be toxic but present in the pharmaceutical products. **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:** Traces of impurities in raw materials may be carried to contaminate the final product. • E.g. common salt (NaCl) prepared from rock salt will almost certainly contain traces of calcium (Ca) and magnesium (Mg) compounds. • Metallic zinc may be present as an impurity in zinc oxide (ZnO) sample as it is prepared by heating metallic zinc. **2) Processes used in manufacture:** 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	**3M** **0.5M** **0.5M** **1M for each for two sources**

Q. No.	Sub No.	Answers	Marking Scheme

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.

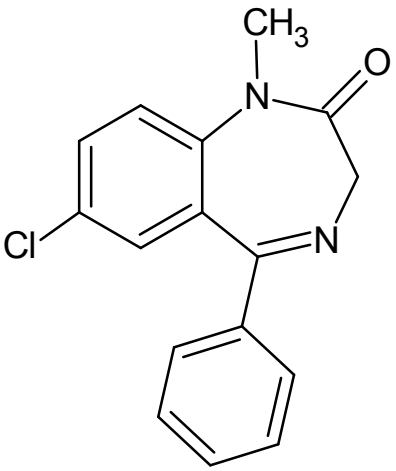
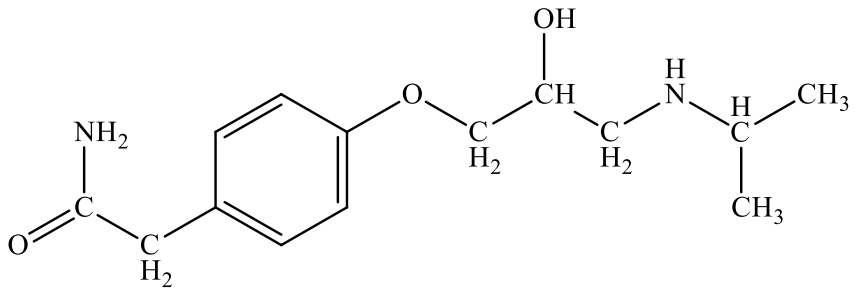
5) Accidental substitution or deliberate adulteration: Accidental substitution can take place if toxic substances are stocked with other substances or compounds. Some pharmaceutical products may be adulterated with cheaper substitutes.

- E.g., Honey may be adulterated with inverted sugar, potassium bromide with sodium bromide.

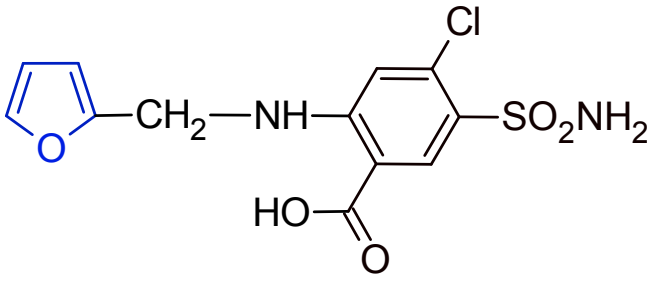
6) Manufacturing hazards:

- **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.
- **Process error** - gross 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

Q. No.	Sub No.	Answers	Marking Scheme
		• **Packing errors** - products of similar appearance as tablets of same size, colour and shape packed in similar containers may lead to mislabelling	
2	b	**Classify different types of Titrimetric Analysis and explain Redox type of titration.** **Marking Scheme:** Classification – 1 M; Explanation – 2 M. **Answer:** **Classification** 1) Acid-base Titrations 2) Non-aqueous Titrations 3) precipitation Titrations 4) Complexometric Titrations 5) Redox Titrations **Redox Titrations** 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. OR Redox Titration reaction involves the transfer of electron between the reactant (titrant) and titrate takes place. OR A redox titration is the same as an acid-base titration except it involves a redox reaction and generally does not require an indicator. 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. 2) **Dichromate Titrations:** Potassium dichromate is used as an oxidant. 3) **Iodine Titrations:** Iodine is used as an oxidising agent. 4) **Cerimetry:** Ceric salts are used as oxidants.	**3M** **1M** **2M**
2	c	**Give the Structure and Chemical name and uses of Diazepam.** **Marking Scheme:** Structure 1M; Chemical name – 1 M; Uses (any two) –1 M	**3M**

Q. No.	Sub No.	Answers	Marking Scheme
		Answer:  **Chemical name:** 7-Chloro-1,3-dihydro-1-methyl-5-phenyl-3*H*-1,4-benzodiazepin-2-one **Uses (any two):** • Diazepam is used to treat anxiety disorders, alcohol withdrawal symptoms, or muscle spasms. • Diazepam is sometimes used with other medications to treat seizures. • Sedatives & Hypnotics • Used in treatment of insomnia.	**1M** **1M** **1M**
2	**d**	**Give the Structure, Uses and Storage condition of Atenolol.** **Marking Scheme:** Structure-1M; Uses (any two) – 1 M; Storage condition –1 M **Answer:**  	**3M** **1M**

Q. No.	Sub No.	Answers	Marking Scheme
		Uses (any two): It is β-blocker used for 1) Management of hypertension, 2) Management of angina pectoris, 3) Management of acute myocardial infarction, 4) Management of heart failure, 5) Management of atrial fibrillation, 6) Management of supraventricular tachycardia, 7) Management of ventricular arrhythmias, 8) Management of symptomatic thyrotoxicosis, 9) Prophylaxis of migraine headaches, 10) Management of alcohol withdrawal. **Storage:** Store at a room temperature 20-25°C, in a dry place.	**1M** **1M**
2	**e**	**Define and Classify Antihypertensive agents with suitable examples.** **Marking Scheme:** Definition - 1M; Classification – 2M. **Answer:** **Definition:** An agent that reduces elevated blood pressure is called as an antihypertensive agent. OR The drugs which are useful for treatment of hypertension are called as antihypertensive agents. **Classification** 1) ACE inhibitors: Captopril, Enalapril, Ramipril 2) Angiotensin antagonist: Losartan, Candesartan 3) Calcium channel blockers: Verapamil, Nifedipine, 4) Diuretics: a. Thiazides: hydrochlorothiazide b. High ceiling: furosemide c. Potassium sparing: spironolactone 5) Beta-adrenergic blockers: Propranolol, Metoprolol, Atenolol 6) Alpha-adrenergic blockers: Prazosin, Terazosin	**3M** **1M** **2M**

Q. No.	Sub No.	Answers	Marking Scheme
		7) Alpha + beta adrenergic blockers: Labetalol, Carvedilol 8) Central sympatholytic: Clonidine, Methyldopa 9) Vasodilators: Hydralazine, Minoxidil sodium	
2	f	**Give the Structure and Chemistry of Frusemide.** **Marking Scheme:** Structure - 1M; Chemistry – 2M (Chemical name – 1M; Chemical nature – 1M) **Answer:**  **Chemistry:** • **Name:** 4-chloro-2-((furan-2-yl methyl) amino)-5-sulfamoylbenzoic acid. • **Formula:** $C_{12}H_{11}ClN_2O_5S$ • **Mol weight:** 330.74 g/mol • It is anthranilic acid derivative containing furan as heterocyclic ring and sulphonamide as functional group.	**3M** **1M** **1M** **1M**
2	g	**Define and classify hypoglycaemic agents giving suitable example of compounds under each class.** **Marking Scheme:** Definition -1M; Classification with examples – 2M. **Answer:** Drugs used in diabetes treat diabetes mellitus by altering the glucose level in the blood. Anti-diabetic drugs administered orally are called Oral Hypoglycaemic Agents. **Classification:** 1) **Hormones**: Insulin and its preparations **2) Oral hypoglycemic agents** a. **Sulfonylureas**: Tolbutamide, Chlorpropamide, Tolazamide, Acetohexamide, Glipizide, Glyburide, Glimepiride, Glicazide	**3M** **1M** **2M**

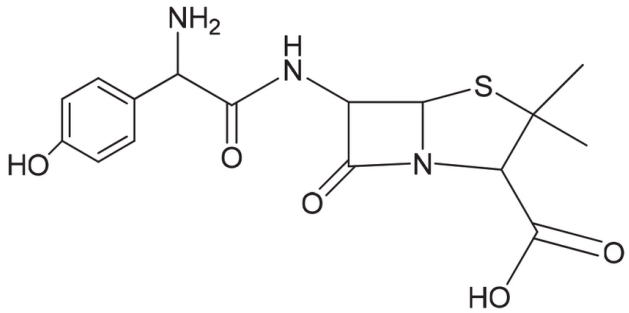
Q. No.	Sub No.	Answers	Marking Scheme
		b. **Thiazolindiones**: Rosiglitazone, Pioglitazone c. **Biguanidines**: Metformin, Phenformin d. **Nonsulfonylureas**: Metaglinides, Repaglinides, Nateglinides e. **α-glucosidase inhibitor**: Acarbose, Miglitol. 3) **Plant based products** eg. Guar gum	
2	**h**	**Write the uses and Popular Brand Names of Piroxicam or Diclofenac Sodium** **Marking Scheme:** Uses (any two) -2 M; Brand names (Any two) – 1 M. ***Consider any one drug*** **Answer:** **Piroxicam** **Uses:** Anti-inflammatory drug used in the treatment of Osteoarthritis, Rheumatoid arthritis, Ankylosing spondylitis. **Brand Names:** Dolonex, Ugesic, Suganril, Doloforce, Doloxicam, Feldex, Dupox, Medicam, Prixicam, Rexicam, Pirox. **OR** **Diclofenac Sodium** **Uses:** Anti-inflammatory drug used in the treatment of Osteoarthritis, Rheumatoid arthritis, Ankylosing spondylitis, Ocular Pain, Toothache, Dysmenorrhoea, renal colic. **Brand Names:** Voltaren, Voltaflam, cataflam, Diclona**c**	**3M** **2M** **1M**
2	**i**	**Define and classify sulphonamides giving suitable examples.** **Marking Scheme:** Definition -1 M; Classification – 2 M. **Answer:** **Definition:** Sulphonamides are the group of synthetic antimicrobial agents that are structural analogues of para-amino benzoic acid (PABA). **Classification:** Any one type of classification can be considered. **Chemical classification** **1. N^1 - substituted sulphonamides** **a.** With acyclic substituents: Sulphacetamide, sulphaguanidine **b.** With heterocyclic substituents: Sulphadiazine, sulphamethoxazole, sulphadimethoxine, sulphamethoxypyridazine.	**3M** **1M** **2M**

Q. No.	Sub No.	Answers	Marking Scheme
		2. **N^4 - substituted sulphonamides** e.g. Sulphasalazine. 3. **Sulphonamides with both N^1 and N^4 substituents** e.g. Phthalylsulphathiazole, succinylsulphathiazole. **On the basis of duration of action** 1. **Short-acting sulphonamide** (plasma half-life less than 10 hours) a. Poorly absorbed and locally acting - succinyl sulphathiazole, Sulphaguanidine, phthalylsulphathiazole. b. absorbed and excreted rapidly - Sulphacetamide. 2. **Medium-acting sulphonamides** (plasma half-life is between 10-24 hours) Sulphamethoxazole, sulphadiazine. 3. **Long-acting sulphonamides** (plasma half-life is more than 24 hours): Sulphadimethoxine, sulphamethoxypyridazine. 4. **Ultra-long-acting sulphonamides -** Sulphamethoxine, Sulphamethoxypyrazine **Depending upon their therapeutic uses** **1. Sulphonamides are used for systemic infections:** a. **Urinary tract infections**: Sulphamethoxazole, Sulphacetamide. b. **Respiratory tract infections:** Cotrimoxazole, Sulphadiazine. c. **Meningeal infections:** Sulphadiazine. **2. Sulphonamides are used for local infections:** a. **Intestinal infections:** Sulphaguanidine, Phthalylsulphathiazole, Succinyl sulphathiazole. b. **Ophthalmic infections:** Sulphacetamide. c. **Burn therapy:** Mefenide, Silver sulphadiazine.	
2	**j**	**Give the Structure, Storage condition and official preparations of any one beta-lactam antibiotics** **Marking Scheme:** Structure-1 M; Storage condition- 1 M, Official preperations-1 M. **Answer:** ***Consider any one penicillin or cephalosporin for the answer according to textbook.***	**3M**

WINTER– 2022 EXAMINATION

MODEL ANSWER

Subject Title: PHARMACEUTICAL CHEMSISTRY- THEORY Subject Code: **20112**

Q. No.	Sub No.	Answers	Marking Scheme
		Amoxicillin **Structure**  **Storage conditions**: • Capsules and tablets are stored at room temperature (20-25°C) away from heat, light and moisture. • Syrups and injections are stored in air tight containers in refrigerator (2-8°C) but do not freeze. **Official preparations:** • Oral tablet /capsules 125, 250, 500 mg per tablet or capsule • Syrup: 125 mg/5 mL, 30 mL bottle • Injection: 125, 250, 500 mg per vial for I.M. / I. V. use **Brand names**: Mox, Novamox, Synomox, Amoxil etc.	
2	**k**	**Define and Classify Antineoplastic agents with suitable examples** **Marking Scheme:** Definition -1 M; Classification – 2 M. **Answer:** **Definition:** Antineoplastic drugs are medications used to treat cancer. Drugs that are effective in the treatment of malignant, or cancerous, disease. **Classification:** **1. Alkylating Agents.** a. Nitrogen mustard drugs: Mustine, Chormabucil, cyclophosphamide b. Aziridines: Thiotepa c. Alkyl sulphonate: Busulphan d. Nitrosourea group compound: Lomustine 2. **Antimetabolites**: Methotrexate, Mercaptopurine, Azathioprine, Fluorouracil 3. **Antibiotics**: Actinomycin, Daunorubicin, Doxorubicin 4. **Plant Products**: Sulphates of vinblastine and vincristine. 5. **Hormones and related drugs**: Glucocorticoids, Tamoxifen 6. **Miscellaneous agents**: Hydroxyurea, Cisplatin	**3M** **1M** **2M**

WINTER– 2022 EXAMINATION

MODEL ANSWER

Subject Title: PHARMACEUTICAL CHEMSISTRY- THEORY Subject Code: **20112**

Q. No.	Sub No.	Answers	Marking Scheme
3		**Solve the following Multiple-Choice Questions:**	**20 M**
3	1.	**Organic Chemistry is the Chemistry of _____** **Answer:** c) Carbon compounds	**1M**
3	2.	**The substance being titrated is called as _____** **Answer:** c) Titrate	**1M**
3	3.	**Name of the group -CH=CH$_2$** **Answer:** b) Vinyl	**1M**
3	4.	**Following is not a topical agent.** **Answer:** c) Oxygen	**1M**
3	5.	**Calcium carbonate is used for _____** **Answer:** c) Dental products	**1M**
3	6.	**The order of preference in numbering the heteroatom's follows:** **Answer:** d) O-S-N	**1M**
3	7.	**The name of five membered heterocyclic ring containing two double bonds ends with _____** **Answer:** c) Ole	**1M**
3	8.	**Example of piperidine heterocyclic ring is _____** **Answer:** a) Pethidine	**1M**
3	9.	**Chlorpromazine contains following heterocycle** **Answer:** c) Phenothiazine	**1M**
3	10.	**Nicotinic action of acetylcholine is _____** **Answer:** d) Stimulation of skeletal muscle	**1M**

WINTER– 2022 EXAMINATION

MODEL ANSWER

Subject Title: PHARMACEUTICAL CHEMSISTRY- THEORY Subject Code: **20112**

Q. No.	Sub No.	Answers	Marking Scheme
3	11.	**Following is the example of adrenergic antagonists** **Answer:** b) Tolazoline	**1M**
3	12.	**Six membered heterocyclic ring containing three double bond & 1 & 3 position nitrogen atom is called _____** **Answer:** d) Pyrimidine	**1M**
3	13.	**Cardiac arrhythmia means disturbance in _____** **Answer:** b) Heart rate	**1M**
3	14.	**Example of calcium channel blocker is _____** **Answer:** a) Nifedipine	**1M**
3	15.	**Brand name of urea:** **Answer:** c) Cotaryl-H	**1M**
3	16.	**NSAIDS stands for _____** **Answer:** c) Non-Steroidal Anti-Inflammatory Drugs	**1M**
3	17.	**Brand name of acetyl salicylic acid is _____** **Answer:** a) Anacin	**1M**
3	18.	**Name of drug used in treatment of dental caries.** **Answer:** b) Sodium fluoride	**1M**
3	19.	**Synonym of ferrous sulphate.** **Answer:** **a**) Green vitriol	**1M**
3	20.	**Cotrimoxazole is a combination of _____** **Answer:** b) Sulphamethoxazole & trimethoprim	**1M**