

May 2019

(3 Hours)

(Total marks: 70)

- N.B.: (1) All questions are **compulsory**.
 (2) **Figures** to the **right** indicate **full marks**

- Q.1 (a) Answer the following: 12
- Discuss clinical uses of antihistaminics.
 - Why are traditional NSAIDs contraindicated in pregnancy?
 - Comment on the importance of oral rehydration therapy in diarrhea.
 - Explain the mechanism of action (MOA) and therapeutic use of lithium.
 - Discuss the adverse effects of sodium valproate.
 - Explain the mechanism of action of sulfasalazine in irritable bowel disease.
- Q.1 (b) Answer the following: 3
- State the disadvantages of prolonged laxative use.
 - Comment on the use of Fomepizole.
 - State the effects of bradykinin on smooth muscles.
- Q.2 (a) Answer **any two** of the following: 8
- Discuss the role of Levodopa in treatment of Parkinson's disease.
 - Explain the mechanism of action of diazepam and discuss its therapeutic uses.
 - Discuss the pharmacology of morphine.
- Q.2 (b) Answer **any one** of the following: 3
- Nitrous oxide
 - Antianxiety drugs
- Q.3 (a) Answer **any two** of the following: 8
- Discuss the pharmacotherapy of hyperuricaemia.
 - Describe the pharmacological effects of aspirin.
 - Discuss the role of bronchodilators in the treatment of asthma. What are the demerits of their long term use?
- Q.3 (b) Write a short note on **any one** of the following: 3
- Platelet activating factor
 - Ergot alkaloids
- Q.4 (a) Answer **any two** of the following: 8
- Discuss the MOA of omeprazole and sucralfate. Mention one adverse effect of each.
 - Discuss osmotic and lubricant purgatives.
 - Classify antiemetic drugs. Add a note on dopamine receptors antagonist as anti-emetic drugs.

Q.4 (b) Write a short note on **any one** of the following: 3
(i) H₂ receptor blockers
(ii) Emetics

Q.5 (a) Answer **any two** of the following: 8
(i) Classify antidepressant drugs. Discuss the adverse effects of tricyclic antidepressant
(ii) Comment on the adverse effects of ethanol. Add a note on disulfiram.
(iii) Describe the mechanism of action and clinical uses of carbamazepine.

Q.5 (b) Write a short note on **any one** of the following: 3
(i) Analeptics
(ii) Amide local anesthetics

Q.6 (a) Discuss the symptoms and management of **any two** of the following: 8
(i) Arsenic poisoning
(ii) Opioid toxicity
(iii) Mercury poisoning

Q.6 (b) Write a short note on **any one** of the following: 3
(i) Paracetamol
(ii) Sumatriptan

[Time: Three Hours]

[Marks:70]

Please check whether you have got the right question paper.

- N.B:
1. All questions are compulsory.
 2. Answer all sub questions together.
 3. Figures to right indicate full marks.

Q.1

A. Define the following (Any Five)

- i. Repatriate as per Pharmacy act
- ii. Spurious drugs as per D & C Act
- iii. Advertisement as per DMR (OA) Act
- iv. Manufactured drugs as per NDPS Act
- v. Maximum retail price as per DPCO 2013
- vi. Food additives as per FSSA

5M

B. Write legislative intent behind MTP(ED) Act 1955. Define Dutiable goods, Restricted preparation and Denatured spirit

5M

C. Answer the following

- i. Define Bail, differentiate between Bailable and non-bailable offences.
- ii. Discuss measures taken for preventing and combating abuse of narcotic drugs and illicit traffic

3M

2M

Q.2

A. Describe the objectives and features of NPPP 2012.

4M

B. Explain the terms Patent and Copyright with one example of each.

4M

C. Enlist the various administrative bodies under D & C Act and write the functions of DTAB and DCC.

3M

OR

C. Write a short note on manufacture outside bond.

3M

Q.3

A. How is the cultivation of Opium controlled and regulated as per NDPS Act?

4M

B. Enlist the different types of import licenses and Elaborate on import of drugs for examination, test or analysis.

4M

C. Describe in brief the role and responsibility of European Medicine Agency in regulating the quality of medicines

3M

OR

Define Factory. Describe the process for licensing of Factories.

Q.4

- A. Write a note on General Conditions of license for sale as per D and C Act. 4M
- B. Describe in brief the Education Regulations laid down by PCI as per Pharmacy Act. 4M
- OR**
- B. Write a note on Schedule Y as per D and C Act. 4M
- C. State the powers of food safety officer. 3M

Q.5

- A. Elaborate on special labelling directions for 4M
- (i) Medicines for internal use and
- (ii) Patent and proprietary medicines containing vitamins.
- B. Elaborate on exempted advertisements as per DMR(OA) Act. 4M
- OR**
- B. Describe labelling directions for pre-packaged food as per FSSAI and rules thereunder 4M
- C. State recommendations of Chopra committee. 3M

Q.6

- A.
- (I) Describe procedure for registration of establishment as per Bombay Shops and Establishments act. 2M
- (II) Enlist offences under Pharmacy Act. 2M
- B. Explain procedure for inspection by drug inspector under D and C act. 4M
- C. Ms. Amruta was carrying 500 doses of antidepressant tablets and was caught at Mumbai Airport. Comment on the situation. 3M

(3 HOURS)

Total Marks-70

N.B:

1. All questions are compulsory
2. Answer all sub questions together
3. Draw neat labelled diagrams where necessary
4. Figures to the right indicate full marks

Q.1.A. Do as directed: (Any seven)**(7)**

- i. Name any one mobile phase solvent which is used in RP-HPLC analysis
- ii. Write the structure for molecular ion peak of ethanol, stating its m/z value
- iii. Name the detector used in HPLC which allows detection at different wavelengths simultaneously
- iv. Name any one mass analyser
- v. Name the spectrometry technique that can distinguish different isotopes of an element
- vi. Name one reference standard used in ¹H-NMR spectroscopic analysis
- vii. Name any one spraying reagent used for visualisation of spots in paper chromatography
- viii. Name any one type of column used in gas chromatography

Q.1.B. Explain the following terms: (Any four)**(8)**

- i. Chemical shift
- ii. LOD in validation studies
- iii. Headspace analysis
- iv. Fast atom bombardment technique
- v. Internal standard

Q.2.A. Answer the following: (Any two)**(8)**

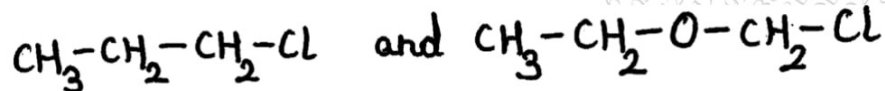
- i. With the help of suitable diagrams explain the working of reciprocating pump in HPLC
- ii. Explain the principle of ion pair chromatography
- iii. Enlist any four interfaces used in LC-MS. Explain any one interface in detail.

Q.2.B. Two compounds 'A' and 'B' were analysed by RP-HPLC using a column of length 30 cm. The retention times of 'A' and 'B' were found to be 5.7 min and 6.9 min respectively. The peak widths measured at the base were 0.98 min and 1.0 min respectively. Calculate the number of theoretical plates for compound A. Justify whether the calculated number of theoretical plates can be accepted or not. **(3)**

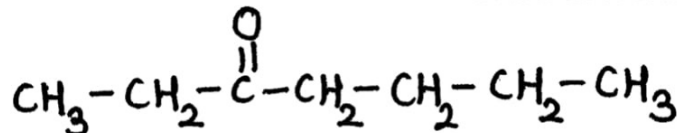
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Q.3.A. Answer the following: (Any two) (8)

- With the help of an inverted tree diagram explain the formation of a quartet for CH_2 protons of ethyl bromide.
- Suggest a suitable spectroscopic method to distinguish the following pairs of compounds, giving spectral characteristics.



- Depict any two different types of fragmentation pathways for the following compound:



Q.3.B. With the help of diagram explain radial chromatographic technique in paper chromatography. (3)

Q.4.A. Answer the following: (Any Two) (8)

- Discuss electron impact method of ionization in mass spectrometry
- Explain the effect of anisotropy on the chemical shift of alkene protons.
- Explain how precision studies for analytical method validation are carried out as described in ICH guidelines.

Q.4.B. With the help of a diagram, explain the term asymmetry factor. (3)

Q.5.A. Answer the following: (Any Two) (8)

- Discuss flame ionization detector used in gas chromatographic analysis.
- Predict the structure of the following compound whose spectral characteristics are as follows:

Molecular formula: $\text{C}_7\text{H}_9\text{N}$

I.R. (cm^{-1}): 3433, 3350, 3034, 2900, 1300

1 H-NMR (δ -ppm) = 7.0 - 7.3 (m) (4H)

3.5 (broad, s) (2H)

2.3 (s) (3H)

Give appropriate justification for your answer.

TURN OVER

- iii. Predict the structure of the following compound whose spectral characteristics are as follows:

Molecular formula: $C_3H_6O_2$

I.R. (cm^{-1}): 3200- 2800, 1670

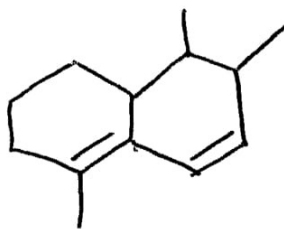
1H -NMR (δ -ppm)= 1.1 (t) (3H)-6.5 Hz

2.3 (q) (2H)-6.5 Hz

11.2 (broad s) (1H)

Give appropriate justification for your answer.

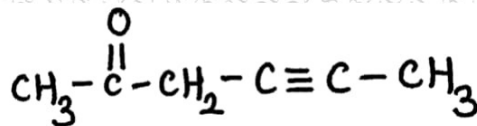
- Q.5.B** Predict the λ max for the following compound showing UV absorbance: **(3)**



- Q.6.A. Answer the following: (Any two)** **(8)**

- Explain the working of evaporative light scattering detector used in HPLC
- Discuss any four factors affecting resolution in thin layer chromatography.
- Explain multicomponent analysis by UV spectroscopy using Simultaneous equations method.

- Q.6.B.** Predict the positions of absorption bands in the IR spectra of the following compound: **(3)**



(3 hours)

70 marks

N.B: All questions are compulsory.

Q.1. Answer the following questions.

(i) Write the reaction involved in the activation of 6-mercaptopurine, also name the enzyme involved.

[2]

(ii) Name an iodine containing antiviral agent.

[1]

(iii) Name the receptor activated by Pioglitazone.

[1]

(iv) Predict the structure and therapeutic use of the following:

[1]

2-[4-[(4-Chlorophenyl)phenylmethyl]-1-piperazinyl]ethoxyacetic acid

(v) Write the structure and generic name of an osmotic diuretic

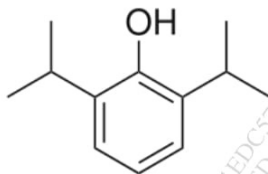
[1]

(vi) Name the enzyme inhibited by digoxin

[1]

(vii) Name the following drug and give its mechanism of action

[1]



(viii) Write the structure of a prodrug belonging to fibrate class of antihyperlipoproteinemics and indicate the chiral centre.

[1]

(ix) Give 2 binding interactions of captopril with the target enzyme.

[1]

(x) Esmolol is shortest acting β blocker. Justify.

[1]

(xi) Classify following antiarrhythmic drugs based on mechanism of action.

(i) Amiodarone (ii) Disopyramide

[1]

(xii) Explain mechanism of action of amyl nitrite.

[1]

(xiii) Give the structures of 2 metabolites of warfarin.

[1]

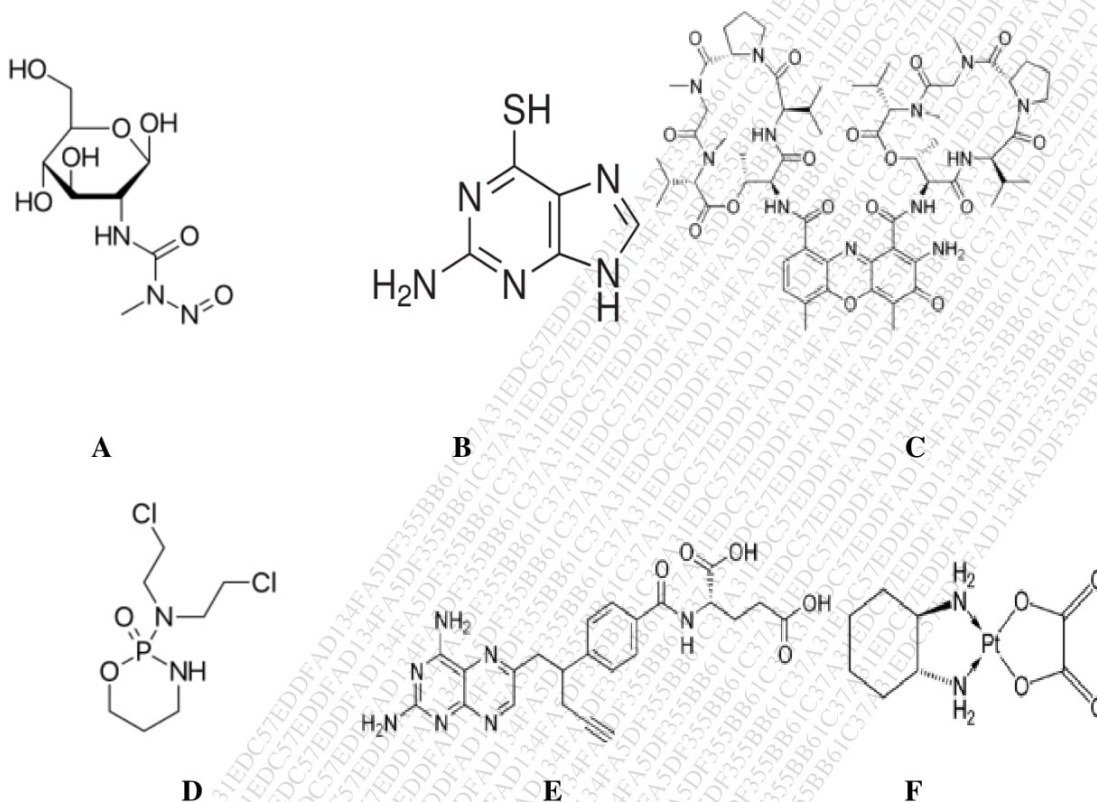
(xiv) Dipyridamol is antianginal and antiplatelet drug. Justify.

[1]

Turn Over

2

Q.2. (a) Answer the following questions with respect to the structures given below. [4]



- Which of the above is used specifically in the treatment of pancreatic cancer and identify its name.
- Identify which of the above are prodrugs. Show the active moiety of any one of them.
- Indicate the mechanism of action of E and mention the advantage of introducing an alkynyl group in the structure.
- Identify C and indicate to which chemical class it belongs.

(b) Justify the following statements. (any 2)

[4]

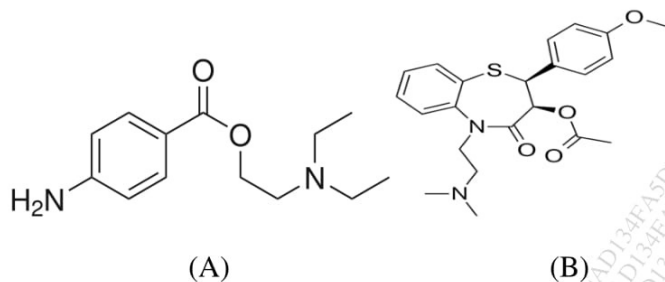
- Lisinopril is not given as prodrug
- C₃ and C₅ positions in 1,4 DHP class are not equivalent.
- In the amino ester series, an electron donating substituent in the o- and/or p- positions increases local anaesthetic potency.

(c) Outline the synthesis of amantadine along with reaction conditions and necessary reagents. [3]

Turn Over

3

Q.3. (a) With respect to the structures below, answer the following questions [4]



- (i) Discuss the effect of isosteric replacement of ester by amide in structure A on pharmacological activity and metabolism
- (ii) Identify drug B, indicate its salt and give the structures of its metabolites.

(b) Match the columns [4]

Name	Structure	Mechanism
A. Furosemide	 a.	i. Blockade of Na ⁺ -Cl ⁻ co-transporter
B. Spironolactone	 b.	ii. Carbonic anhydrase inhibitor
C. Hydrochlorothiazide	 c.	iii. Inhibit Na ⁺ /K ⁺ exchange
D. Acetazolamide	 d.	iv. Inhibit 1Na ⁺ /1K ⁺ /2Cl ⁻ transport

(c) Outline the synthesis of warfarin along with reaction conditions and necessary reagents. [3]

OR

Classify the following antiplatelet drugs on the basis of mechanism of action (structures needed)

- (i) Aspirin (ii) Ticlopidine, (iii) Cilostazole

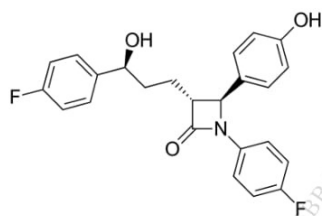
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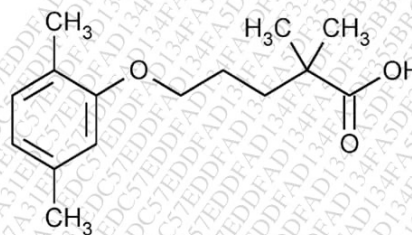
Q.4 (a) Discuss the rationale for the development of second generation H₁-antagonists. List the therapeutic advantages of the same. On the basis of the change in structure, explain the change in the activity when terfenadine is metabolised to fexofenadine. [4]

(b) On the basis of mechanism of action classify the drugs used in diabetes, giving one example from each class. (Structure required). [4]

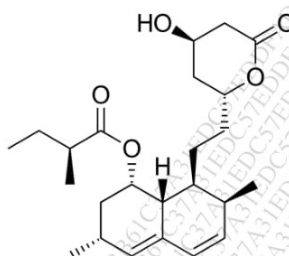
(c) With respect to the structures below, answer the following questions. [3]



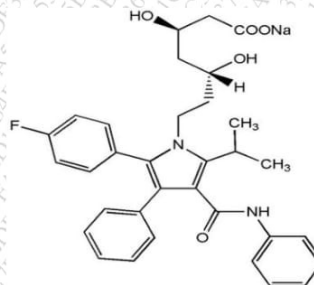
(A)



(B)



(c)



(D)

- Identify the prodrug in above structures and give the structure of its active form
- Give the structures of metabolites of drug B
- Elaborate mechanism of action of drug A.

Q.5. (a) List the agents (structures needed) that belong to the class of antiretroviral agents and indicate their role in therapeutic management of HIV infection. [4]

(b) (i) Write the structure of labetalol. Indicate its chiral centres and discuss influence of chirality on mechanism of action. [2]

(ii) Discuss SAR of angiotensin II receptor blockers. [2]

(c) Outline the synthesis of Melphalan along with reaction conditions and necessary reagents. [3]

Q.6. (a) Match the generic names of the drugs with their IUPAC nomenclature. [4]

Generic name	IUPAC nomenclature
Zidovudine	2-[4-[2-hydroxy-3-(isopropylamino)propoxy]phenyl]acetamide
Prazosin	4-Amino-1-β-D-ribofuranosyl-1,3,5-triazin-2(1H)-one
Azacitidine	1-[(4-amino-6,7-dimethoxy-2-quinazoliny)-4-(2-furoyl)]piperazine
Atenolol	1-[4-Azido-5-(hydroxymethyl)oxolan-2-yl]-5-methylpyrimidine-2,4-dione

Turn Over

5

- (b) State whether True or False with justification. Correct if false. (any 2). [4]
- (i) Reduction of the double bond between position 3 and 4 in thiazide diuretics leads to decrease in activity.
- (ii) Imidazole ring is not required for competitive antagonism of histamine H₂ receptors.
- (iii) Tetracaine is less potent than procaine.
- (c) Outline the synthesis of Ranitidine along with reaction conditions and necessary reagents. [3]

Time: 3 Hours

70 marks

Please check whether you have got right question paper.

N. B. : (1) All questions are compulsory.

(2) Figures to the right indicate full marks.

(3) Draw neat labelled diagram wherever necessary.

- | | | | |
|---|------|--|---|
| 1 | a | Explain the leaker test for thermolabile aqueous parenteral formulation. | 2 |
| | b | Removal of pyrogens from parenteral formulation is difficult. Justify. | 2 |
| | c | Attempt any two | 4 |
| | i) | Explain importance of wool fat in ophthalmic ointments. | |
| | ii) | Enlist advantages of ophthalmic gels. | |
| | iii) | Explain the need for addition of preservative in ophthalmic formulations. | |
| | d | Enlist advantages of SR formulations over conventional formulations. | 2 |
| | e | Explain maintenance dose calculations for SR drug delivery systems. | 2 |
| | f | Discuss importance of Arrhenius equation in calculating shelf life and half life of a product. | 3 |
| 2 | a | Discuss nonaqueous vehicles used in parenteral formulations and route of their administration. | 4 |
| | b | Discuss factors limiting ocular bioavailability. | 3 |
| | c | What is oxidative degradation? Suggest methods for its prevention. | 4 |

OR

Discuss degradation of moisture sensitive drugs.

- | | | | |
|---|---|---|---|
| 3 | a | Enlist evaluation tests for rubber closures stating significance of each. | 4 |
|---|---|---|---|

OR

State various types of glasses and methods to differentiate between them.

- | | | | |
|--|---|---|---|
| | b | Discuss biological properties of drug considered while designing SR dosage forms. | 4 |
| | c | Discuss stability studies as per ICH guidelines. | 3 |

- 4 a Discuss formulation and processing of suspension type of injectable. 4
- b Discuss evaluation tests for ophthalmic ointments. 3
- c Explain ion exchange controlled drug delivery system. 4

OR

Differentiate between dissolution controlled and diffusion controlled SR systems.

- 5 a Discuss packaging of large volume parenteral. 4
- b Explain evaluation of oral SR formulations. 3
- c Discuss influence of plastic as packaging material on stability of pharmaceuticals. 4
- 6 a Discuss the manufacturing facility for parenteral formulation with the help of suitable layout. 4
- b Explain construction and working of HEPA. 3
- c Enlist various types of contact lenses and discuss any two contact lens care products. 4

[Time: Three Hours]

[Marks: 70]

Please check whether you have got the right question paper.

- N.B: 1. All questions are compulsory.
2. Draw chemical structures & diagrams wherever necessary.

Q.1 Answer the following:

15

1. Name the precursor molecule for biosynthesis of Colchicine.
2. Give biological source & use of Sesame oil.
3. Name a nutraceutical and its probable active constituent, used as an immunomodulator.
4. Name and draw the structure of active constituent present in Mustard seeds.
5. Give the biological source of a drug that answer Thalleoquin test positive.
6. Write the principle of a confirmatory test for true tannins.
7. What are the active constituents and demerits of Tobacco as a natural pesticide?
8. Name the confirmatory test for detection of Linseed oil and its observation.
9. Give the biological source and name the active constituents of Poison ivy.
10. Give composition and properties of Tagetes.
11. Write the active constituents and uses of Henna.
12. Give the biological source & active constituent of an anthraquinone drug used as an anti-depressant.
13. Name & draw any two differentiating diagnostic microscopic characters of Kurchi and Arjuna.
14. Give biological source & uses of Alfa-Alfa.
15. Give biological source & active constituent of a terpene alkaloid.

- Q.2 i. Give a detailed account of biological source, chemistry, substituents and uses of Spermaceti wax. 04
ii. Discuss Galls with respect to preparation, chemistry and applications. 04
iii. Outline the biosynthetic pathway of tropane alkaloids. 03
- Q.3 i. Give a detailed account of Cochineal with respect of cultivation preparation chemistry and application. 04
ii. Write a note on cyanogenetic glycosides. 04
iii. Discuss Neem as a natural pesticide. 03
- Q.4 i. Give the detailed account of Ergot. 04
ii. Write a short note on Wheat germ oil and Hydrocarpus oil. 04
iii. Give an account of Gymnema and Momordica as nutraceutical. 03
- Q.5 i. Discuss the pharmacognosy of Senna. 04
ii. Discuss chemistry, preparation and uses of 'Opium' 04
iii. Write the biological source, preparation and chemical constituents of black Catechu. 03
- Q.6 i. Give an account of Kokum butter and Cocoa butter. 04
ii. Give the pharmacognosy of Nux Vomica. 04
iii. Write a short note on Sulphur containing compounds. 03