GATE - 1988

PY-PHARMACEUTICAL SCIENCES

Time : 3 hours **Maximum Marks : 200**

N. B.
1. *This question paper contains two parts A and B.*
2. *Answer all the question from part A.*
3. *Answer Any 20 Question from part B.*

PART - A

N. B.
1. *There are 2 sections in this part*
2. *Answer all the question in both sections – 1 and 2.*
3. *Answer should be given serial order in the answer book.*
4. *Do not skip question while writing the answers.*
5. *Write the question number and show your answer by writing the alphabet (against the No.) in Capital letters.*
6. *In section 1 each question carriers 1-Marks.*
7. *In section 2 each question carries 2-marks.*
8. *A model is shown at the beginning of each section in part A.*
9. *Answer to the question in this part must be Witten in the first three pages only.*

SECTION - I

CHOOSE THE CORRECT ANSWER

Model Question

1. To understand the drug receptor interaction is necessary to quantify the relation between
   (a) Drug and its toxicity (b) Drug and its absorption
   (c) Drug and its biological effect (d) Drug and intermediate product
2. Penicillinase resistance penicillin is-
   (a) Amoxycillin (b) Amipicillin (c) Penicillin V (d) Methicillin

3. Morphine is present in –

(a) *Atropa belladona* (b) *Papaver somniferum*

(c) *Ricinus communis* (d) *Solanum nigrum*

4. Ion exchange chromatography is the method of choice for separation of –

(a) Metals (b) Sugar (c) Fatty acid (d) Sterols

5. Rideal Walker test is performed by using the strain –

(a) *Escherichia coli* (b) *Straphylococcus neruri*

(c) *Straphylococcus pyrogenes* (d) *Salmonella typhii*

6. Pheniramine maleate is an antihistaminic agent belonging to the class-

(a) Ethylenediamine derivative (b) Cyclic basic class analogs

(c) Aminoallyl ether analoges (d) None of the above

7. Tetracycline undergo epimerization C-4 between pH 4 and 8 to give –

(a) Isotetracyclines (b) Epitetracyclines

(c) Nortetracyclines (d) None of above

8. Tyndalisation means –

(a) Successive autoclaving with a bactericide

(b) Successive heating with a bactericide

(c) Successive heating at low temperature

(d) Successive autoclaving at low temperature and incubator

9. Morphine and heroin differ from each other in respect of –

(a) Mehyl group on nitrogen (b) Acetyl groups at C_3 and C_6

(c) Abesence of double bond between C_4 and C_6 (d) Absence of D ring

10. Vincristine and Vinblastine act by –

(a) Binding with the protein tubulin and arrest at metaphase

(b) Inhibiting the protein synthesis

(c) Acting as antimetabolite

(d) Inhibiting the enzyme system

11. A rhamno-glucoside on complete hydrolysis will give –

(a) Aglycon + Fructose + Rhamnose (b) Aglycon + Ribose + Rhamnose

(c) Aglycon + Rhamnose + Glucose (d) Rhamnose + Fructose

12. The technique employed to study the insoluble film at oil water interface is –

(a) Micellization (b) Defloculation

(c) Electrostatic balance (d) Film balance

13. Gray baby syndrome is due to the indiscrimate use of-

(a) Streptomycin (b) Chloramphenicol

(c) Penicillin (d) Tetracycline

14. N,N dimethyl –(1-methyl-1-oxo-3,3-diphenylhexyl) ammonium chloride is the chemical -

(a) Methadone hydrochloride (b) Alpha proline hydrochloride

(c) Meperidine hydrochloride (d) Darvon

15. Sulphonamide tragedy was due to combination with -

(a) Penicillin (b) Streptomycin

(c) Diethylene hydrochloride (d) Bicarbonate

16. In the preparation of tablets, powdered medicaments are mixed by -

(a) To reduce the total volume (b) To increase adsorption

(c) To increase adhesiveness (d) To reduce inter particle

17. One nanometer (nm) is equal to –

(a) 10^{10}cm (b) 10^{-4}cm (c) 10^{-7}cm (d) 10^{-8} cm

18. Cholinergic receptor present on intestinal muscle is –

(a) H_2 receptor (b) Muscarinic receptor

(c) Nicotinic receptor (d) Beta receptor

19. Indicate the correct order of increasing eluent power of benzene, ether, chloroform and ethyl acetate-

(a) Chloroform < Benzene < Ethyl acetate < Ether (b) Benzene < Ether < Chloroform < Ethyl acetate

(c) Ether < Chloroform < Ethyl acetate < Benzene (d) Ethyl acetate < Ether < Benzene < Chloroform

20. Limulus test is rapid in vitro test for parentrals to detect the presence of –

(a) Particulate matter (b) Fungus

(c) Pyrogens (d) Bacteria

21. An essential requirement of the mobile phase in HPLC is that –

(a) It must have constant flow rate with pulses (b) It must be freshly distilled

(c) It must be run at 20°C only (d) It must flow with pulses

22. Indian (Tinnevelly) and Africa seena leaves differ from other with respect to –

(a) Vein islet number (b) Stomatal index

(c) Colour (d) All of the above

23. 3-Etherification of morphine molecules causes –

(a) Morphine antagonism (b) No change in activity

(c) Decrease of analgesic and addiction (d) Increase of analgesic and addiction

24. Addition of electrolyte to a lysol may cause –

(a) Tyndall effect (b) Salting out (c) Coagulation (d) Dilution

25. Salicin, a phenolic glycoside, on hydrolysis yields –

(a) Salicylic alcohol+ Glucose (b) Phenol + Glucose

(c) Salicyl alcohol + Glucose (d) Salicyl aldehyde + Glucose

26. Lignocaine hydrochloride is officially assayed by –

(a) Potentiometric titration (b) Acid base titration

(c) Complexometric titration (d) Non aqueous titration

27. In supra ventricle arrthymia Digoxin when supplemented with ___ is dangerous –

(a) Quinidine (b) Procaine (c) Calcium (d) Xylocaine

28. Injection of insulin I.P. should be kept at PH between –

(a) 5 and 5.5 (b) 3 and 3.5 (c) 7 and 7.5 (d) 9 and 9.5

29. Some adrenocorticoids are referred to as Δ-corticoids because of –

(a) High amount of unsaturation in the molecules

(b) Additional double bond in ring A between carbon 1 and 2

(c) Presence of one double bond in each ring

(d) Absence of double bond in ring A

30. In radioactive pharmaceuticals half life of compound means –

(a) The time taken for one half of the compound to find with serum albumin

(b) The time taken for onset of its action

(c) The time taken for the activity to decay to one half of its inhitial value

(d) The time taken for its complete metabolism

31. Wagner's test is used to detect the presence of –

(a) Steriods (b) Alkaloids (c) Glycoside (d) Terpenes

32. Metronidazole inhibits anaerobic bacteria and protozoa by _

(a) Affecting the structure of DNA molecule of the organism

(b) Destroying the ribosome

(c) Inhibiting the cytochrome system

(d) Inhibiting the protein synthesis

33. Most comman oesterogen progesterone preparation used as oral contraceptive agent contains –

(a) Methanol + Progesterone (b) Estrone + Progesterone

(c) Diethyl stillbestrol + Norgestrol (d) Ethinyloestradiol + Norethindrone

34. Before washing the ampoules the mouth of each ampoule is rotated in Bunson flame to melt down the rough edge .This process is called as –

(a) Flamming (b) Charging (c) Annacaling (d) Grounding

35. In Benzothiadiazides reduction of the double bond between the position 3 and 4 gives rise to –

(a) Decreased diuretic activity
(b) Increase the diuretic activity
(c) No diuretic activity
(d) No change in diuretic activity

36. Peripheral neurotransmitter is -

(a) Histamine (b) Noradrenaline (c) Hydroxytryptamine (d) Prostaglandin

37. Beer's laws state that –

(a) Absorbance of a solution is indirectly proportional to the absorbing solute
(b) Absorbance of a solution is indirectly proportional to the length of cell
(c) Absorbance of a solution is directly proportional to the absorbing solute
(d) Transmittance of a solution is directly proportional to the absorbance solvent

SECTION - II

MATCH THE FOLLOWING

2.1. Given below are the hypertensive agents . Match their mode of action (A to E)

(1) Minoxidil
(2) Parazosin
(3) Alpha methyl dopa
(4) Clonidine

(A) Alpha adereno receptor antagonist
(B) Beta adereno receptor antagonist
(C) From alpha methyl norepinepherine
(D) Direct action on blood vessel
(E) Decrease sympathetic activity through brain

(a) 1-A, 2-B, 3-D, 4-C
(b) 1-D, 2-A, 3-C, 4-E
(c) 1-E,2-B, 3-D, 4-C
(d) 1-A, 2-E, 3-B, 4-D

2.2. Indicate the from the group A to E the correct compound for the given source –

(1) *Urginea maritima*
(2) *Rheum palmatum*
(3) *Myrstica fragrans*
(4) *Claviceps purpurea*

(A) Camphene
(B) Scilliroside
(C) Emodine
(D) Atropine
(E) Ergometrine

(a) 1-B, 2-C, 3-A, 4-E
(b) 1-A, 2-B, 3-E, 4-C
(c) 1-E, 2-B, 3-D, 4-C
(d) 1-A, 2-E, 3-B, 4-D

2.3. Select the appropriate PH range from A to E for the following indication –

(1) Methyl red
(2) Bromothymol blue
(3) Phenolphathalein
(4) Thymol blue

(A) 1.2 – 2.8
(B) 4.2 - 4.6
(C) 4.8 - 5.2
(D) 8.2 - 10.0
(E) 6.0 - 7.6

(a) 1-A, 2-B, 3-D, 4-C
(b) 1-A, 2-B, 3-E, 4-C
(c) 1-E, 2-B, 3-D, 4-C
(d) 1-C, 2-E, 3-D, 4-A

2.4. Given the drug and their schedule A to E .Match the correctly –

(1) B- Complex tablets
(2) Calcium gluconate injection
(3) Small pox vaccine
(4) Ampicillin capsule

(A) Schedule CL
(B) Schedule F
(C) Schedule H
(D) Schedule L
(E) Schedule C

(a) 1-A, 2-B, 3-D, 4-C
(b) 1-A, 2-B, 3-E, 4-D
(c) 1-E, 2-B, 3-D, 4-C
(d) 1-A, 2-E, 3-B, 4-D

2.5. Given below the antibacterial agent and mode of action (A to E) .Match the correctly –

(1) Gentamycin
(2) Isoniazid
(3) Polymyxin B
(4) Penicillin

(A) Inhibit the mycolic acid synthesis
(B) Prevent the bacterial cell wall synthesis
(C) Bind with 30S ribosomal subunit (take false amino acid)
(D) Get accumulated at cell wall membrane and counteract with cell phospholipids
(E) Destroys the nucleic acid

(a) 1-C, 2-A, 3-D, 4-B
(b) 1-A, 2-B, 3-E, 4-C
(c) 1-E, 2-B, 3-D, 4-C
(d) 1-A, 2-E, 3-B, 4-D

2.6. Match the given ingredients from A to E with the purpose for which it is incorporated in the formulation of tablets –

(1) Glidant
(2) Diluent
(3) Adherents
(4) Disintegrant

(A) Pre – gellitinsed starch
(B) Pyramine
(C) Colloideal silica
(D) Calcium sulphate
(E) Sodium alginate

(a) 1-C, 2-D, 3-A, 4-E
(b) 1-A, 2-B, 3-E, 4-C
(c) 1-E, 2-B, 3-D, 4-C
(d) 1-A, 2-E, 3-B, 4-D

2.7. Match the correct structural feature from A to E for the following compounds –

(1) Pempidine
(2) Phentolamine
(3) Prosympal
(4) Sulindac

(A) Imidazoline ring
(B) Piperidine ring
(C) Indene ring
(D) 1,4 –Dioxane ring
(E) Indole ring

(a) 1-A, 2-B, 3-D, 4-C
(b) 1-A, 2-B, 3-E, 4-C
(c) 1-B, 2-A, 3-D, 4-C
(d) 1-A, 2-E, 3-B, 4-D

2.8. Given below are the aliments and the drugs used (A) to (E) .Match them correctly –

(1) Parkinson's disease
(2) Glaucoma
(3) Gout
(4) Angina

(A) Probencid
(B) Ampicillin
(C) Nitroglycerin
(D) Pilocarpine
(E) Levo dopa

(a) 1-A, 2-B, 3-D, 4-C
(b) 1-A, 2-B, 3-E, 4-C
(c) 1-E, 2-D, 3-A, 4-C
(d) 1-A, 2-E, 3-B, 4-D

2.9. Givenbelow are the equipment used in manufacturing powder and their purpose (A to E). Match them correctly

(1) Coulter counter
(2) Sorptometer
(3) Andreasen apparatus
(4) Shear box

(A) To determine the total surface
(B) To determine particle size
(C) To determine the flow rate
(D) To determine sedimentation rate
(E) To determine the cohesiveness

(a) 1-A, 2-B, 3-D, 4-C
(b) 1-A, 2-B, 3-E, 4-C
(c) 1-E, 2-B, 3-D, 4-C
(d) 1-B, 2-A, 3-D, 4-E

2.10. Match the following from A to D –

(1) Photocell can be prevented from getting fatigue
(2) Resolving power of grating can be increasing
(3) Two different colour compound can be analysed
(4) λ – max can be found

(A) By selecting excitation and visible
(B) By increasing the radiation for minimal possible time
(C) After separation using binary component system
(D) By finding the absorbance at each wave length

(a) 1-A, 2-B, 3-D, 4-C
(b) 1-B, 2-A, 3-C, 4-D
(c) 1-A, 2-B, 3-E, 4-C
(d) 1-A, 2-E, 3-B, 4-D

2.11. Choose the appropriate drug from A to E for the following categories –

(1) Alkylating agent
(2) Carcinogen
(3) Antimitotic agent
(4) Antimetabolite

(A) Colchicine
(B) 6-Marcaptopurine
(C) Cyclopentamine
(D) Thio- tepa
(E) Aflatoxin –B

(a) 1-D, 2-A, 3-E, 4-B
(b) 1-A, 2-B, 3-E, 4-C
(c) 1-E, 2-B, 3-D, 4-C
(d) 1-A, 2-E, 3-B, 4-D

2.12. Choose the correct synonymous words A to E for the given type of stomata –

(1) Anomocytic
(2) Anisocytic
(3) Diacytic
(4) Paracytic

(A) Caryophyllaceous
(B) Rubiaceous
(C) Solanaceous
(D) Ranunculaceous
(E) Cucurbitaceous

(a) 1-A, 2-B, 3-D, 4-C
(b) 1-A, 2-B, 3-E, 4-C
(c) 1-C, 2-E, 3-A, 4-B
(d) 1-A, 2-E, 3-B, 4-D

2.13. Given below are the drug and their antagonist (A to (E) . match them correctly –

(1) 5-HT
(2) Codeine
(3) Phenobarbitone
(4) Muscarine

(A) Bemegride
(B) Atropine
(C) Cyproheptadine
(D) Naloxone
(E) Pyridoxine

(a) 1-A, 2-B, 3-D, 4-C
(b) 1-A, 2-B, 3-E, 4-C
(c) 1-E, 2-B, 3-D, 4-C
(d) 1-C, 2-D, 3-A, 4-B

2.14. Select the appropriate colour from A to E for the given wave length –

(1) 450-480 nm
(2) 500-560 nm
(3) 575-590 nm
(4) 675- 750 nm

(A) Green
(B) Yellow
(C) Blue
(D) Orange
(E) Red

(a) 1-A, 2-B, 3-D, 4-C
(b) 1-A, 2-B, 3-E, 4-C
(c) 1-E, 2-D, 3-B, 4-C
(d) 1-A, 2-E, 3-B, 4-D

2.15. Match the solubility range from A to E as per I.P. with the following –

(1) Freely soluble
(2) Soluble
(3) Sparingly soluble
(4) Less than 1 part

(A) Less than 1 part
(B) 1 to 10 part
(C) 10 to 30 part
(D) 30 to 100 part
(E) 100 to 1000 part

(a) 1-A, 2-B, 3-D, 4-C
(b) 1-B, 2-C, 3-D, 4-E
(c) 1-E, 2-B, 3-D, 4-C
(d) 1-A, 2-E, 3-B, 4-D

2.16. Given below the drug and their enzyme (A to E) inhibited by them. Match the following –

(1) Physostigmine
(2) Imipramine
(3) Pyrogallol
(4) Disulfiram

(A) COMT
(B) Acetaldehyde dehydrogenase
(C) Carbonic anhydrase
(D) Cholinesterase
(E) MAO

(a) 1-D, 2-E, 3-C, 4-A
(b) 1-D, 2-A, 3-C, 4-B
(c) 1-D, 2-B, 3-A, 4-C
(d) 1-A, 2-C, 3-B, 4-D

2.17. According to drug and cosmetics rule a list of schedule are as follows .Match the appropriate statement A to D with them –

(1) Schedule G
(2) Schedule P
(3) Schedule J
(4) Schedule N

(A) Drugs used under medical supervision
(B) Drug used only under medical supervision
(C) Minimum equipment needed for a retail pharmacy
(D) Diseases that a drug should not claim to cure
(E) Life period of drugs

(a) 1-A, 2-B, 3-D, 4-C
(b) 1-E, 2-C, 3-D, 4-A
(c) 1-D, 2-B, 3-A, 4-C
(d) 1-A, 2-E, 3-D, 4-C

2.18 Given below are the drugbs and their structural moiety A to E responsible for the biological action. Match them correctly –

(1) Diphenhydramine
(2) Acetylcholine
(3) Penicillin G
(4) Gardinal

(A) Lactone ring
(B) Substitution at C_3 of barbituric acid
(C) Onium group
(D) Beta - lactam ring
(E) 2-Anminoethyl side chain

(a) 1-A, 2-B, 3-D, 4-C
(b) 1-E, 2-C, 3-D, 4-A
(c) 1-D, 2-B, 3-A, 4-C
(d) 1-B, 2-A, 3-C, 4-D

2.19. Given below are the diuretic and their possible mode of action A to E. Match them correctly-

(1) Acetazolamide	(A) Affecting the osmosis
(2) Furosemide	(B) Inhibits the active transport of Cl^- at ascending loop of Henle
(3) Triamterence	(C) Inhibits the reabsorption of Na^+ in mineralo corticoid dependent portion of renal tubule
(4) Mannitol	(D) Carbonic anhydrase inhibitor
	(E) Causing acidosis

(a) 1-D, 2-B, 3-C, 4-A
(b) 1-A, 2-B, 3-D, 4-C
(c) 1-D,2-B, 3-A, 4-C
(d) 1-A, 2-C, 3-B, 4-D

2.20. Match the following

1. Vaccines	(a) Diptheria antitoxin
2. Toxoids	(b) Tetanus immunoglobudin
3. Human Immune sera	(c) Polio
4. Animal immune sera	(d) Diptheria

(A) 1-(c), 2-(d), 3-(a), 4-(b)
(B) 1-(b), 2-(d), 3-(a), 4-(c)
(C) 1-(d), 2-(c), 3-(a), 4-(b)
(D) 1-(a), 2-(c), 3-(d), 4-(b)

PART - B

N.B. : ***Answer any twenty questions***
If more than 20 questions are attempted only the first 20 will be considered.
Answer should not exceed 15 lines
All Question carry equal marks.

3. How arachidonic acid is liberated endogenously ? Name its major groups of active metabolites.

4. Write briefly and precisely (in 2-3 lines each) one the following terms
   a. Chromophore
   b. Auxochrome
   c. R-bands

5. Name the precautions to be followed in the manufacture of radiopharmaceutical preparations.

6. Described briefly (in about 10 lines) how absorbent cotton wool is prepared form comber waste

7. Give the composition of black fluid as per schedule O. How are they graded? What is their respective Radial-Walker Coefficient

8. Out line two step synthesis of aspirin from phenol, giving mechanism of each step.

9. Balance the following equations

(a) $Cr_2O_7^{+2} + Fe^{+2} = Cr^{+++} + Fe^{+++}$ (b) $MnO_4^- + H_4C_2O_4 = Mn^{++} + CO_2$

(c) $H_2O_2 + I^- = I_2 + H_2O$

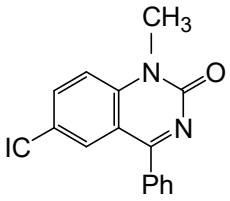
10. Give reasons for using lycopodium as standards as quantitative microscopy. Write the formula.

11. Why water soluble ointment bases are in extensive use.? Mention their specific properties

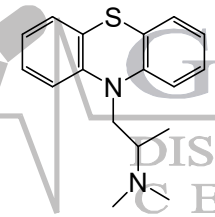
12. A prescription requires 500 ml of sodium chloride to be that it will contain 500 mEq of Na^+. How many of NaCI (mw = 58.5) are required.

13. Name the three important metabolic processes for each of the following drugs.

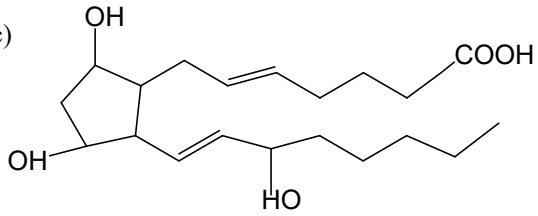
(a)



(b)



(c)



14. Give the most probable mechanism of action for each of the following (2-3 lines each)

(a) Indomethacin (anti-inflammatory) (b) Warfarin (anticoagulant)

(c) Verapamil (antiarrhythmic)

15. (a) Calculate that approximate molarity of conc. HCI (Density of conc. HCI = 1.19, conc. HCI has a concentration of about 38% by weight

(b) Convert the given values of hydromium ion concentration to pH

(i) $(H^+) = 4.5 \times 10^{-5}$ N

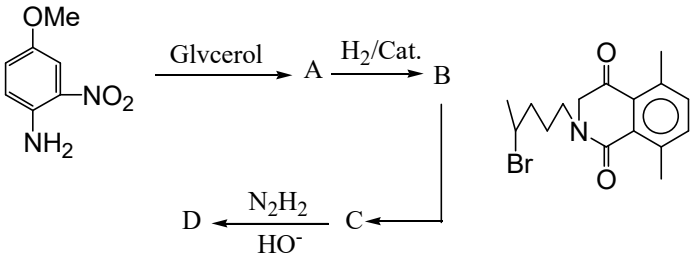
(ii) $(H_2) = 0.00143$ N

16. What do you understand from "Static Test on prepared tablets" Explain briefly

17. Write therapeutic uses of caffeine, theophylline and theobromine. How do they differ in their action on CNS diuresis and respiration

18. What is the bioavailability of drug? Mention the parameters important in evaluating the bioavailability of drugs

19. Give the principle involved in the official assay of sulfadimidine and Vit. C.



20. Synthesis of primaquine is outline below. Give the structures of A-D Mention the names of the reactions involved in this synthesis.

21. What are prodrugs ? Mention their usefulness

22. Write briefly on the role of plasticizers in capsule

23. How will you avoid 'Caramelisation' in the preparation of injection? What is 'Leaker Test'?

24. How the entry of drugs molecule into the CNS is controlled ? What are the other biological varriers

25. How do the Blister package protect the content from moisture

26. Given below are some absorption frequencies in an IR spectrum. Indicate the appropriate functional group for the same

    (a) 3500- 330 Cm^{-1} (b) 3030-3010 Cm^{-1}

    (c) 1750 Cm^{-1}

27. Give only names of the enzymes involved in the biosynthesis of epinephrine form tyrosine

End of paper

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ANSWER KEY GATE 1988

Section – I

1-d	2-c	3-b	4-a	5-d	6-a	7-b	8-c	9-b	10-a
11-c	12-d	13-b	14-b	15-a	16-c	17-d	18-b	19-b	20-c
21-a	22-d	23-c	24-b	25-c	26-b	27-a	28-c	29-b	30-c
31-b	32-a	33-b	34-a	35-b	36-b	37-c			

Section –II

2.1 - b	2.2 - a	2.3 - d	2.4 - b	2.5 - a	2.6 - a	2.7- c	2.8 - c	2.9 - d	2.10-b
2.11-a	2.12-c	2.13-d	2.14-c	2.15-b	2.16-a	2.17-d	2.18-b	2.19-a	2.20-a