

## SECTION - A

1. This question consists of TWENTY-FIVE sub-questions (1.1 – 1.25) of ONE marks each. For each of these sub-questions, four possible alternatives (A, B, C and D) are given, out of which ONLY ONE is correct. Indicate the correct answer by darkening the appropriate bubble against the question number on the left hand side of the Objective Response Sheet (ORS). You may use the answer book provided for any rough work, if needed.
- 1.1 Starting material used for the synthesis of L-Thyroxine is:  
 (a) 2 amino-5-chloro acetophenone (b) phenyl alanine  
 (c) 2 amino-5-chloro benzophenone (d) L-tyrosine
- 1.2 One of the following antianxiety agent is an azaspirodecanedione derivative.  
 (a) Lorazepam (b) Cycloheptadiene  
 (c) Meprobamate (d) Buspirone
- 1.3 Include the following drug under proper classification. NIFEDIPINE.  
 (a) Quinoline derivative (b) Aryl piperidines  
 (c) Iso Quinoline derivative (d) Pyridine derivative
- 1.4 Acetazolamide can be synthesized from one of the following intermediates.  
 (a) 5 amino-2-mercapto-1, 3-thiazole  
 (b) 5 amino-2-mercapto-1, 3, 4-thiadiazole  
 (c) 5 amino-2-mercapto-1, 2, 3-thiadazole  
 (d) 5 amino-2-mercapto-1, 3, 4-tetrazole
- 1.5 Choose the correct trichomes of Digitalis purpurea.  
 (a) Numerous covering trichomes and a few glandular trichomes  
 (b) Few covering trichomes  
 (c) Few glandular trichomes and few covering trichomes  
 (d) Few glandular trichomes
- 1.6 PANAXADIOL is a constituent of  
 (a) Ginger (b) Jatamanst (c) Ginseng (d) Pepper
- 1.7 The plant hormone which shows specific effect on the cell division is:  
 (a) Auxins (b) Abscisic Acid (c) Cytokinins (d) Ethylene
- 1.8 One of the following condition is maintained in programmed temperature gas chromatography.  
 (a) Temperature of the whole column is raised during analysis  
 (b) Temperature at the sample injection system is raised  
 (c) Temperature at the detector is gradually raised  
 (d) Temperature at the recorder alone is raised
- 1.9 A BOLOMETER consists of  
 (a) two metals welded together  
 (b) a thin blackened platinum strip in an evacuated vessel  
 (c) deuterated triglycine sulphate  
 (d) tungsten wire
- 1.10 Choose the correct excipient for enhancing solubility in Tablet manufacture.  
 (a) PEG (b) Microcrystalline cellulose  
 (c) Talc (d) Lactose
- 1.11 Two or more ions present together can be determined successfully by polarograph even if their half wave potentials overlap or interfere by  
 (a) titration (b) complexation (c) filtration (d) heating
- 1.12 One of the following is a selective. SEROTONIN reuptake inhibitor  
 (a) Desipramine (b) Fluoxetine (c) Buspropion (d) Maprotiline
- 1.13 Plasmodial resistance of CHLOROQUINE is due to  
 (a) induction of inactivating enzymes  
 (b) change in receptor structure

- (c) increase in the activity of DNA repair mechanism  
 (d) decreased carrier mediated drug transport
- 1.14 One of the following actions of opioid analgesics is mediated via kappa receptors  
 (a) Cerebral vascular dilation (b) Euphoria  
 (c) Spinal analgesia (d) Physical dependence
- 1.15 One of the following drugs has activity against Herpes simplex virus type I and is used topically. Systematic administration of the same results in bone marrow depression, hepatic dysfunction and nephrotoxicity.  
 (a) Acyclovir (b) Amantadine (c) Vidarabine (d) Idoxuridine
- 1.16 A woman has to be treated for upper respiratory tract infection. Six years back she was found hypersensitive to Penicillin V. The cultures now reveal a strain of Streptococcus pneumoniae that is sensitive to all of the following drugs. Which one would be the best choice for the patient?  
 (a) Amoxicillin (b) Erythromycin (c) Cefaclor (d) Cycloacillin
- 1.17 The units of measurement for conductance is:  
 (a) Ohms (b) Amperes (c) Mhos (d) Milli volts
- 1.18 The shells of soft gelatin capsules may be made elastic or plastic like, by the addition of  
 (a) Sorbitol (b) Povidone (c) PEG (d) HPMC
- 1.19. The rate of drug bioavailability is most rapid when the drug is formulated as a  
 (a) controlled released product (b) hard gelatin capsule  
 (c) tablet (d) solution
- 1.20. The loading dose of a drug is usually based on  
 (a) total body clearance of the drug  
 (b) percentage of drug bound to plasma proteins  
 (c) fraction of drug excreted unchanged in urine  
 (d) apparent volume of distribution and desired drug concentration in plasma
- 1.21. BROWNE's tubes are the most commonly used chemical indicator for  
 (a) Ethylene oxide sterilization (b) Radiation sterilization  
 (c) Heat process sterilization (d) Filtration sterilization
- 1.22. A specimen obtained from a patient's cerebrospinal fluid, cultured in specialized media for about five weeks showed the presence of bent rods and tested positive with Ziehl-Neelsen reagent. Identify the organism.  
 (a) Neisseria meningitidis (b) Mycobacterium tuberculosis  
 (c) Bacteroides fragilis (d) Leptospira interrogans
- 1.23. Staphylococcus aureus is used for the I.P. assay of  
 (a) Doxycycline (b) Bleomycin (c) Kanamycin (d) Carbenicillin
- 1.24. State Pharmacy Council should have the following number of elected members  
 (a) Six (b) Nine (c) Five (d) Seven
- 1.25 Drug combination WARFARIN/VITAMIN-K results in a specific interaction. Identify.  
 (a) Antagonistic (b) Increased sedation  
 (c) No known interaction (d) Harmful only in the presence of oxidizing agent
2. This question consists of TWENTY-FIVE sub-questions (2.1 - 2.25) of TWO marks each. For each of these sub-questions, four possible alternatives (A, B, C and D) are given, out of which ONLY ONE is correct. Indicate the correct answer by darkening the appropriate bubble against the question number on the left hand side of the Objective Response Sheet (ORS). You may use the answer book provided for any rough work, if needed.
- 2.1 In the glucuronidation reaction of OXAZEPAM - the functional group responsible is:  
 (a) —OH (b) —COOH (c) —SH (d) —NH<sub>2</sub>

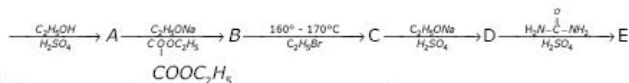
- 2.2. Benzhydryl bromide when treated with 2-dimethyl amino ethanol in presence of  $K_2CO_3$  gives one of the following.
- 2-diphenyl ethoxy-N, N-dimethyl ethylamine
  - 2-diphenyl methoxy-N, N-diethyl ethylamine
  - 2-diphenyl methoxy-N, N dimethyl ethylamine
  - 2-diphenyl methoxy-N, N-diethyl-methylamine
- 2.3. DEMECLOCYCLINE differs from CHLORTETRACYCLINE only by
- absence of  $-CH_3$  group on carbon 6
  - presence of  $-OH$  group on carbon 6
  - absence of  $-N \begin{array}{l} / CH_3 \\ \backslash CH_3 \end{array}$  group on carbon 4
  - absence of  $-OH$  group on carbon 3
- 2.4. Choose the IUPAC name for CARBAMAZEPINE.
- 5 [3-(dimethylamino) ethyl] 10-11 dihydro-5H dibenz [b, f] azepine
  - 5 H dibenz [b, f] azepine-5-carboxamide
  - 5 H dibenz [b, f] azepine-5-acid chloride
  - 5 [3-dimethylamino) propyl] 10-11 dihydro-5H dibenz [b, f] azepine
- 2.5. RESERPINE is derived from
- Squalene
  - Homoserine
  - Tryptophan and Tryptamine
  - Asparagine
- 2.6. An alkaloid from *Atropa belladonna* having the molecular formula  $C_{17}H_{23}O_3N$  having  $\alpha D-22^\circ$  when warmed with ethanolic alkaline solution is converted into
- (-) Hyoscyamine
  - (±) Hyoscyamine
  - (+) Hyosamine
  - (±) Hyosine
- 2.7. Choose the appropriate description for ERGOT.
- Loosely arranged or in small more or less agglutinated angular masses
  - A pseudoparenchyma formed by the interwoven closely appressed compact septate hyphae.
  - The cryptocarps have fallen out leaving corresponding oval perforations in the ramuli.
  - Colourless septate hyphae about one quarter the width of a cotton trichome and they become twisted together.
- 2.8. Characteristic bands observed in the IR spectra of alcohols result from
- $-OH$  and  $C-O$  stretching
  - $-OH$  stretching
  - $C-O$  stretching only
  - $C-H$  bending only
- 2.9. Bulking agent used for parenteral preparation is:
- Sodium metabisulphite
  - Benzyl alcohol
  - Carbolic acid
  - Sorbitol
- 2.10. Identify the correct Non-flammable propellant.
- Trichloro monofluoromethane
  - Dichloro monofluoromethane
  - Dimethyl ether
  - Difluoromethane
- 2.11. Elastomer used in rubber stopper formulation is:
- Polybutadene
  - Butyl stearate
  - Titanium dioxide
  - Butylated hydroxyl toluene
- 2.12. Schedule D as per D and C Act is concerned with
- list of drugs exempted from the provision of import of drugs
  - diseases or ailments which a drug may not purport to prevent or cure
  - requirements of factory premises
  - list of prescription drugs

- 2.13. Official method for the analysis of CIPROFLOXACIN is by  
 (a) Potentiometry (b) HPLC  
 (c) Gas chromatography (d) Non-aqueous titration
- 2.14. The radio frequency radiation is associated with  
 (a) Light consisting of one colour only (b) Nuclear magnetic Resonance  
 (c) Mass Spectrometry (d) E.S.R.
- 2.15. How many gms of a drug should be used in preparing 500 ml of a 1 : 2500 solution?  
 (a) 0.2 (b) 0.02 (c) 0.4 (d) 1.25
- 2.16. The pyroelectric detector converts electromagnetic radiation into  
 (a) electrical signal (b) fluorescence (c) electrons (d) visible light
- 2.17. The mechanism of action of DIGITALIS is  
 (a) decreases intracellular sodium concentration  
 (b) inhibits sodium potassium ATPase  
 (c) activates adenyl cyclase which produces cAMP  
 (d) decreases release of calcium from sarcoplasmic reticulum
- 2.18. The mechanism of action of DACTINOMYCIN is:  
 (a) Inhibits topoisomerase II (b) Cross links DNA  
 (c) Inhibition function of microtubules (d) Inhibits DNA polymerase
- 2.19. One of the drugs when co-administered with TERFENADINE may lead to life threatening cardiac dysrhythmia.  
 (a) Lomefloxacin (b) Clofazimine (c) Itraconazole (d) Neomycin
- 2.20. Adverse effects of one of the drugs include amenorrhea, bone marrow depression, gastrointestinal distress and haemorrhagic distress, identify.  
 (a) Cyclizine (b) Pyroxicam (c) Cyclophosphamide (d) Cimetidine
- 2.21. Varicella zoster is the causative organism for  
 (a) small pox (b) dermatophytosis  
 (c) herpes (d) infectious mononucleosis
- 2.22. One of the following is confirmed by DNA diagnosis test.  
 (a) Hyperuricaemia (b) Cystic fibrosis  
 (c) Acute pancreatitis (d) Hyper lipidaemia
- 2.23. The conversion of Fructose-1, 6-biphosphate to Glyceraldehyde-3-phosphate is catalysed by  
 (a) Phospho-glycerate kinase (b) Enolase  
 (c) Aldolase (d) Triose phosphate isomerase
- 2.24. MORPHINE undergoes microsomal oxidation by  
 (a) N-dealkylation (b) Aromatic hydroxylation  
 (c) Oxidative deamination (d) O-dealkylation
- 2.25. SULFASALAZINE is a prodrug that is activated in the intestine by bacterial enzymes. The enzyme responsible is:  
 (a) Azoreductase (b) Choline esterase  
 (c) Glucuronyl transferase (d) Amylase

**SECTION – B**  
 This section consists of TWENTY questions of FIVE marks each. Attempt ANY FIFTEEN questions. Answers must be given in the answer book provided. Answer for each question must start on a fresh page and must appear at one place only. (Answers to all parts of a question must appear together).

3. (a) Which is the active isomer of dimethyl stilbestrol?  
 (b) Inhibition or decreased enzyme activity can result from different types of interaction namely:  
 (i) Non-covalent interaction between the enzyme and drug.  
 (ii) Covalent interaction between the enzyme and drug.  
 (iii) Mutually exclusive binding of the substrate and inhibitor.  
 (iv) Binding on an allosteric site on the enzyme.

4. Complete the following reactions by giving appropriate structures:  
 (a) 2, 6-dimethyl aniline is treated with chloroacetyl chloride  
 (b) Product at (a) is treated with dimethylamine to get the final product.  
 (c) What is the generic name of the final product?
5. Complete the following by giving appropriate structures at A, B, C, D, E.



6. Following modifications of the prototypes of HYDROCORTISONE represent attempts to increase glucocorticoid activity while decreasing mineralocorticoid activity:
- Introduction of double bond at  $C_1$  and  $C_2$ .
  - Fluorination at  $C_9$ .
  - Introduction of double bond at  $C_1$  and  $C_2$  with fluorination at  $C_9$ .
  - Double bond  $C_1$  and  $C_2$ , fluorination at  $C_9$  and a hydroxyl at  $C_{16}$ .
  - Double bond at  $C_1$  and  $C_2$ , fluorination at  $C_9$ , a methyl at  $C_{16}$ .
- Give the generic names of the products formed.
7. (a) Name the part of *Syzygium aromaticum* which is used officially as the drug.  
 (b) Where does the ovary situated in the above drug.  
 (c) Which type of typical stomata is present in the above drug.  
 (d) The G.C. analysis of the volatile oil from the above drug gives two characteristic major peaks. Name the probable constituents.
8. PAPAVERINE an alkaloid of molecular formula  $C_{20}H_{21}O_4N$  undergoes degradation reactions. Give only the structural formulae of the products formed in the following reactions.  
 (a) With hot concentrated Potassium permanganate  
 (b) With cold dilute Potassium permanganate
9. Following statements are characteristic for particular terms used. Identify and name the terms:
- In plant breeding it is a ~~possible~~ means of combining in a single variety the desirable characters of two or more lines, variety or species and occasionally of producing new and desirable characters not found in either parent.
  - Changes in the genetic make up of the plant.
  - Chromosomes can be grouped not in pairs, but in threes, fours or higher numbers.
  - Plants occur with one or more chromosomes extra to the somatic number
  - Plant protoplasts which can be maintained in culture and can be induced to fuse either with others of the same or different species.
10. List the five important components in mass spectrometer.
11. In the assay of PYRIDOXINE HYDROCHLORIDE I.P.  
 (a) Name the solvent used for dissolution of sample  
 (b) Name the inorganic reagent which is added subsequently  
 (c) What is the reason for its addition?  
 (d) Name the tirant used.  
 (e) Give the structure of the final product.
12. (a) Give the number of NMR signals given by the following compounds:
- |   |  |
|---|--|
| $\text{CH}_3 - \overset{\text{O}}{\parallel}{\text{C}} - \text{CH}_3$ | $\text{CH}_3 - \overset{\text{OH}}{\text{CH}} - \text{CH}_3$ |
| (i)   | (ii)   |
- Why a solvent free of proton should be used for conventional NMR spectroscopy. (d) Why the signals in NMR are split? Answer in one sentence only.
  - Name the reference material used for proton spectro in non-aqueous

13. List the five steps involved with capsule shell manufacture in an automatic process.
14. Give five advantages of loaded RBC as drug delivery system.
15. Penicillin solution has a half life of 21 days. How long will it take for the potency to drop to 80% of initial potency. Penicillin undergoes first order kinetics. Give all steps in the calculation.
16. List the five official tests which are performed for plastic containers for injectables.
17. Give the names of:
  - (a) A vasodilator that can cause hirsutism.
  - (b) An ACE inhibitor that may cause renal damage in the foetus.
  - (c) A local anaesthetic that can interfere with the action of guanethiding.
  - (d) A class of vasodilators that is useful to reduce proteinuria in diabetics.
  - (e) A receptor, blocking of which is important for neuroleptic action.
18. (a) What are the two major limitations to the general use of immuno suppressive agents? Answer in one sentence each.
  - (b) Name two main kinds of motor disturbances produced by neuroleptic drugs.
  - (c) Name the class of drug that is dangerous when the person had a meal with a high content of fermented foods.
19. (a) Give the name of a Phosphonoformate derivative which has antiviral activity.
  - (b) What is its mechanism of action? Answer in one sentence only.
  - (c) Name two major adverse effects of the drug.
20. Given below are some typical bio-chemical reactions. Write the names of the enzymes which catalyses these reactions:
  - (a)  $CH_3CH_2OH + NAD^+ \longrightarrow CH_3CHO + NADH + H^+$
  - (b) Glucose + ATP  $\longrightarrow$  Glucose-6-phosphate + ADP +  $H^+$
  - (c) Pyruvate  $\longrightarrow$  Acetaldehyde +  $CO_2$
  - (d) Glyceraldehyde-3-phosphate  $\longrightarrow$  Dihydroxy acetone phosphate
  - (e) Glutamate +  $NH_3$  + ATP  $\longrightarrow$  Glutamine + ADP + Pi
21. (a) What is the chemical nature of Glucagon?
  - (b) For which biochemical reaction is it required for?
  - (c) Give the name of the clinical condition for which it is used for.
  - (d) What type of dosage form in which it is used?
  - (e) Where is it secreted?
22. (a) In Type I and Type II hyper sensitivity reactions name the corresponding antibodies.
  - (b) Name a mood elevator which is an amphetamine analog.
  - (c) The drug at - (b) when co-administered with, which class of drug can result side effects like arrhythmia and hypertension.
  - (d) When digoxin is used with Omeprazole, Plasma levels digoxin is increased or decreased?

**ANSWER Key –GATE-2001Pharmaceutical Sciences**

1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10
D	D	D	B	A	C	C	A	B	B
1.11	1.12	1.13	1.14	1.15	1.16	1.17	1.18	1.19	1.20
A	B	D	C	C	B	C	A	D	D
1.21	1.22	1.23	1.24	1.25	2.1	2.2	2.3	2.4	2.5
C	B	A	D	A	A	B	A	B	C
2.6	2.7	2.8	2.9	2.10	2.11	2.12	2.13	2.14	2.15
B	B	A	D	A	A	A	B	B	A
2.16	2.17	2.18	2.19	2.20	2.21	2.22	2.23	2.24	2.25
A	B	B	C	C	C	B	C	A	A

Remaining question are long answer type questions.