

**GATE PY - 2002**

**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 Volatile oil from Lemon peels contains d-limonene which is**

- (a) Phenyl propane derivative
- (b) Bicyclic monoterpene derivative
- (c) Monocyclic monoterpene derivative
- (d) Acyclic sesquiterpene derivative

**1.2 In case of Digitalis purpurea, the cardiac activity is maximum with**

- (a) Odoroside-H
- (b) Digoxin
- (c) Digitoxin
- (d) Pupurea glycoside A

**1.3 Dragendorff's reagent does not give a positive test with**

- (a) Emetine
- (b) Morphine
- (c) Caffeine
- (d) Codeine

**1.4 The instrument used to measure particle volume is**

- (a) Coulter Counter
- (b) Microscope
- (c) Hempel Burette
- (d) Helium Densitometer

**1.5 The purpose of seal coating in sugar coating process for tablets is**

- (a) To prevent moisture penetration into the tablet core
- (b) To round the edges and build up the tablet weight
- (c) To impart the desired colour to the tablet
- (d) To give luster to the tablet

**1.6 The phenomenon of increasing the solubility of weak electrolytes and non-polar molecules by the addition of a water miscible solvent in which the drug has good solubility is called**

- (a) Complexation
- (b) Cosolvency
- (c) Solubilization
- (d) Hydrotrophy

**1.7 HLB system is used to classify**

- (a) Surfactants

- (b) Preservatives
- (c) Antioxidants
- (d) Sequestering agents

**1.8 The statement "Store in a cool place" as per I.P. means**

- (a) Store at room temperature
- (b) Store between 2° to 8°C
- (c) Store at any temperature between 8° to 25°C
- (d) Store at 0°C

**1.9 Durability of a tablet to combined effects of shock and abrasion is evaluated by using**

- (a) Hardness tester
- (b) Disintegration test apparatus
- (c) Friabilator
- (d) Screw Gauge

**1.10 Ion exchange capacity of a resin is dependent on**

- (a) The total molecular weight of the resin
- (b) The total number of ion active groups
- (c) Length of the ion exchange resin
- (d) Solubility of the ion exchange resin

**1.11 In mass spectra, the most intense peak is the**

- (a) Base peak
- (b) Metastable ion peak
- (c) Fragment ion peak
- (d) Rearrangement ion peak

**1.12 Chemical shift is expressed in one of the following units**

- (a) cm<sup>-1</sup>
- (b) Amperes
- (c) parts per million
- (d) mm I ml

**1.13 Xenon arc lamp is the source of light in**

- (a) Spectrofluorimeter
- (b) IR Spectrophotometer
- (c) Flame photometer
- (d) Calorimeter

**1.14 Which of the following pairs has an interaction beneficial for routine clinical use**

- (a) Pseudoephedrine and Aluminium hydroxide gel
- (b) Tetracycline and Milk of Magnesia
- (c) MAO inhibitors and Tyramine
- (d) Chloramphenicol and Tolubutamide

**1.15 Measurement of which of the following two constituents of human plasma is of great value in the differential diagnosis of rheumatoid diseases**

- (a) Rheumatoid factor and immunoglobulin G
- (b) Rheumatoid factor and C-reactive protein

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- (c) HL-A antigen and C-reactive protein
- (d) Immunoglobulin and bradykinin

**1.16 Which of the following is a valid comparison of live attenuated vaccines versus killed inactivated vaccines**

- (a) Hypersensitivity reactions are uncommon among inactivated vaccines
- (b) Live attenuated vaccines are more effective in children
- (c) Live attenuated vaccines are not suitable for pediatric use
- (d) Replication of the organisms in a live attenuated vaccine increases the stimulation of the immune system thereby requiring a lower dose

**1.17 An antineoplastic agent acting by folate antagonism and having a pteridine ring is:**

- (a) Trimethoprim
- (b) Mercaptopurine
- (c) Methotrexate
- (d) Folic Acid

**1.18 One of the following drugs has 1, 4-dihydropyridine structure, a tertiary amino group in the side chain and Ca channel antagonist action**

- (a) Nitrodiopine
- (b) Nicardipine
- (c) Verapamil
- (d) Captopril

**1.19. JUPAC name for one of the steroidal anti-inflammatory agents is 9c-Fluoro-11 $\beta$ ,17 $\alpha$ ,21-dihydroxy-1,4-pregnadiene-3,20-dione**

- (a) Prednisolone
- (b) Betamethasone
- (c) Triamcinolone
- (d) Dexamethasone

**1.20. CLOFAZIMINE belongs to a class of**

- (a) Rhiminophenazines
- (b) Aryl piperazines
- (c) Phenothiazines
- (d) Benzyl piperazines

**1.21. One of the drugs is an odd one in terms of its biological action**

- (a) Diethyl Stilbestrol
- (b) Tamoxifen
- (c) Ethynyl Estradiol
- (d) Mestranol

**1.22. The key intermediates for the synthesis of TIMOLOL are**

- (a) 3, 4-dichloro-1, 2, 5-thiadiazole and morpholine
- (b) 3, 4-dichloro-1, 2, 5-thiadiazole and piperazine
- (c) 3, 4-dibromo-1, 2, 5-thiadiazole and piperazine
- (d) 3-Chloro-1, 2, 5-thiadiazole and morpholine

**1.23. One of the following drugs interrupts the synthesis of thyroid hormones by preventing iodine incorporation into the tyrosyl residue of thyroglobulin**

- (a) Levothyroxine
- (b) Liothyronine
- (c) Propyl thiouracil
- (d) Triiodo thyronine

**1.24. Macrolide antibiotics exert their action by**

- (a) Inhibiting transcription
- (b) Altering the genetic code
- (c) Terminating protein synthesis prematurely
- (d) Post-translational modification

**1.25 One of the following is a selective  $\beta_2$  stimulant**

- (a) Caffeine
- (b) Salbutamol
- (c) Propranolol
- (d) Betahistine

**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 Cascoride A is an example of**

- (a) O-Glycoside
- (b) C-Glycoside
- (c) N- and 5- Glycoside
- (d) O- and C- Glycoside

**2.2. Precursor for the biosynthesis of Tropane group of alkaloids is**

- (a) Leucine
- (b) Lysine
- (c) Ornithine
- (d) Tyrosine

**2.3. The extraction of steroidal saponins on commercial scale is from**

- (a) Dioscorea
- (b) Digitalis
- (c) Datura
- (d) Trigonella

**2.4. Rauwolfia serpentine Benth., can be distinguished from other adulterants/substitutes of Rauwolfia spp. by**

- (a) presence of starch grains
- (b) Presence of calcium oxalate crystals

- (c) Presence of trichomes
- (d) Presence of sclereids

**2.5. Schedule FF contains the list of the following**

- (a) Drugs which can be marked under generic names only
- (b) Drugs which are habit forming
- (c) Standards for ophthalmic preparation
- (d) Drugs which are exempt from certain provisions applicable to manufacturing

**2.6. One of the following equation is used to predict the stability of a drug product at room temperature from experiments at accelerated temperature**

- (a) Stokes equation
- (b) Arrhenius equation
- (c) Yong equation
- (d) Michaelis-Menten equation

**2.7. One of the following apparatus is used to determine the particle size by the gravity sedimentation method**

- (a) Pyknometer
- (b) Ostwald viscometer
- (c) Andreasen apparatus
- (d) Friabilator

**2.8. One of the following mills works on both the principles of attrition and impact**

- (a) Cutter mill
- (b) Hammer mill
- (c) Roller mill
- (d) Fluid energy mill

**2.9. A commonly used antioxidant for oil system is**

- (a) Butylated hydroxyl toluene
- (b) Ascorbic acid
- (c) Sodium metabisulfite
- (d) Thioglycol

**2.10. In Digitalis glycoside c7 position of the steroidal ring is substituted by**

- (a) c-13 unsaturated five membered lactone ring
- (b) c-13 unsaturated six membered lactone ring
- (c) c-13 unsaturated six membered ring
- (d) c-13 unsaturated five membered lactam ring

**2.11. Metoprolol is sometimes preferred to Propranolol because**

- (a) It has both  $\alpha$  and  $\beta$  adrenergic blockade
- (b) It has both vasodilatory properties and  $\beta$  adrenergic blockade
- (c) It has a  $\beta_1$  selective antagonist and it does not enter the brain
- (d) It is a  $\beta_2$  selective antagonist

**2.12. The major product formed by the condensation of 2-trifluoro methyl phenothiazine with sodamide and 1-(3-chloropropyl-4-methyl piperazine).**

- (a) Trifluoperidol

- (b) Trifluoperazine
- (c) Trifluopromazine
- (d) Trifluophenothiazine

**2.13. One of the following statements is characteristic for natural estrogens**

- (a) Aromatic ring with phenolic group and an estrane nucleus
- (b) Aromatic ring with an alcoholic group and a pregnane nucleus
- (c) Reduced ring system belonging to the class estrane
- (d) Reduced ring system belonging to the class pregnane

**2.14. One of the following opioid peptides is released from pro-opiomelanocortin (POMC)**

- (a) Somatostatin
- (b) Beta-endorphin
- (c) Leu-enkephalin
- (d) Dynorphin

**2.15. The ultra short-acting barbiturates have brief duration of action due to**

- (a) High degree of binding to plasma proteins
- (b) Low lipid solubility resulting in a minimal concentration in the brain
- (c) Metabolism is slow in the liver
- (d) Rapid rate of redistribution from the brain due to its high liposolubility

**2.16. Derivatisation is done in GC**

- (a) To convert a less polar compound to a more polar compound
- (b) To make the compound non-volatile
- (c) To convert a polar compound to a less polar compound
- (d) To liquify a solid

**2.17. Qualitative analysis by polarography is based on**

- (a) Electrode potential
- (b) Half wave potential
- (c) Migration current
- (d) Limiting current

**2.18. The stationary phase used in gel permeation chromatography is**

- (a) Alumina
- (b) Charcoal
- (c) Squalene
- (d) Styrene divinyl benzyl co-polymer

**2.19. A conductivity cell consists of**

- (a) Two platinised-platinum electrodes
- (b) A platinum-calomel electrode system
- (c) A platinum-tungsten electrode system
- (d) A glass-calomel electrode system

**2.20. A typical example of exotoxin is**

- (a) Lipid - A

- (b) Cytokine
- (c) Tetanospasmin
- (d) Tuberculin

**2.21. A specimen isolated from a patient suffering from septicemia was found to be a strict aerobe. Its culture vial had a characteristic grape like odour and it was susceptible to carbenicillin. Identify the organism.**

- (a) Pseudomonas fluorescens
- (b) Salmonella typhi
- (c) Staphylococcus aureus
- (d) Pseudomonas aeruginosa

**2.22. The pKa of lidocaine is 7.9. If the pH of the infected tissue is 8.9, the fraction of the drug in the ionized form will be**

- (a) 1%
- (b) 10%
- (c) 90%
- (d) 99%

**2.23. The drug regimen useful in the treatment of both intestinal and extra-intestinal symptoms of amoebiasis orally is**

- (a) Diloxanide and Iodoquinol
- (b) Paramomycin and Mefloquine
- (c) Metronidazole and Diloxanide
- (d) Chloroquine alone

**2.24. The drug NIFEDIPINE can be synthesized from**

- (a) o-nitro benzaldehyde, methyl acetoacetate and ammonia
- (b) p-nitro benzaldehyde, methyl acetoacetate and ammonia
- (c) o-nitro benzaldehyde, ethyl acetoacetate and methylamine
- (d) p-nitro benzaldehyde, methyl acetoacetate and methylamine

**2.25. Methyl malonyl CoA mutase which catalyzes the conversion of propionyl CoA to succinyl CoA utilizes the prosthetic group derived from**

- (a) Cyanocobalamine
- (b) Pyridoxine
- (c) Thiamine
- (d) Nicotinamide

#### **SECTION - B**

This section consists of **TWENTY** questions (**EC3-EC22**) 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. Write your inferences in one or two words only**

- (a) Two different samples of aloes are dissolved separately in water. 2 ml of the above solutions are treated separately with 2 ml Bromine water
  - (i) A pale yellow precipitate with violet supernatant liquid is seen



- (ii) A pale yellow precipitate with no violet supernatant liquid is seen
- (b) A crude drug sample consisting of dried leaflets gave a positive Borntrager's test
- (c) When an air-dried latex is dissolved in water and treated with ferric chloride solution — a red colour develops.

**4. In a comparative chemical study of Morphine, Codeine and Thebaine, the following observations are noted. Give your inferences**

- (a) Morphine forms dibenzoate, Codeine forms a monobenzoate
- (b) Morphine gives a positive ferric chloride test and others do not
- (c) Codeine gives one molecule of  $\text{CH}_3\text{I}$  when heated with HI where as thebaine gives two molecules  $\text{CH}_3\text{I}$
- (d) Morphine on treatment with halogenoacid gives a monohalogen derivative
- (e) All the three alkaloids combine with  $\text{CH}_3\text{I}$  to form methiodide

**5. With respect to Ceylon Cinnamon, give**

- (a) Botanical source with family
- (b) Main active constituent with its chemical nature
- (c) Chemical structure of the main active constituent

**6. Assign the bands in the JR spectrum for appropriate groups given below:**

- $>\text{C}=\text{O}$ , aromatic compounds,  $-\text{OH}$ ,  $>\text{C}=\text{C}<$ ,  $-\text{CC}$  (a) 3700 — 3500  $\text{cm}^{-1}$  (b) 1740 — 1720  $\text{cm}^{-1}$   
(c) 1667 — 1640  $\text{cm}^{-1}$  (d) 2260 — 2100  $\text{cm}^{-1}$   
(e) 900 — 675  $\text{cm}^{-1}$

**7. In the microbiological assay of ERYTHROMYCIN, I.P.**

- (a) Name the organism used (b) Name the solvent used
- (c) What is the buffer used?
- (d) In what pH is the experiment done?
- (e) What is the incubation temperature?

8. (a) 0.25 g of a compound  $\text{C}_{10}\text{H}_{15}\text{NO}$  was titrated with 0.1 M  $\text{HClO}_4$ . It consumed 12.5 ml of the titrant.

- (i) What is the stoichiometric factor used for the calculation of percentage purity?
- (ii) Calculate the percentage purity
- (b) Write the formula used and calculate the absorbance of a solution of a compound having  $E_{\text{max}}$  6200, when 0.05 mM solution is measured in a 1 cm cell.

9. (a) Complete the following reactions giving appropriate structures.

0-toluidine is treated with 2-Bromo propionyl bromide, the resulting product is treated with propylamine to get the drug.

- (b) To which therapeutic category does the drug belong?

10. 2-amino-4, 5-dimethoxy benzoic acid ( $\text{NaOCN}$ ) A  
 $\text{PC13}$  /  $\text{PC15}$  B  $\text{NH}_3$  C 1 (2 Furoyl piperazine) D

- (a) Write the products at A, B, C, D.
- (b) To which therapeutic category does the drug D belong?

11. 2H — 1,2,4 — Benzothiadiazine — 7 — sulfonamide — 6 — chloro-1, 1-dioxide, can be modified to change biological properties. Comment on the effect of the following modifications

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to the structure.

- (a) Saturation of 3,4-double bond
- (b) Substitution of 6-chloro by  $-\text{CF}_3$
- (c) Insertion of a benzyl group at position 5
- (d) Insertion of a methyl group at position 2
- (e) Saturation of 3, 4-double bond, insertion of a benzyl group at position 3, and substitution of 6-Cl by  $-\text{CF}_3$

**12. Draw the structures of the following**

- (a) Dimethyl-[3-phenyl-3-(2-pyridyl)-propyl]-amine
- (b) 4-amino-N-(2-diethyl-aminoethyl) benzamide
- (c) N1-(5-methyl iso oxazol-3-yl)-u1Ifanilamide
- (d) 2-(2-fluoro biphenyl-4-yl) propionic acid
- (e) (E)-2-(3-pyrrolidin-1-yl-1-(4-tolyl)prop-1-enyl)pyridine

**13. Draw the structures of the major first phase metabolic products of the following drugs by the given route.**

- (a) Phenobarbitone-by aromatic hydroxylation
- (b) Procaine — by hydrolysis
- (c) Imipramine — by N-mono dealkylation
- (d) Nor-epinephrine- by oxidative deamination
- (e) 6-mercaptopurine — by oxidation

**14. Name the enzymes that catalyze the following reactions**

- (a) Acetoacetyl CoA - Acetyl CoA
- (b) Oxaloacetate - Malate
- (c) Riboflavin - Flavin mononucleotide
- (d) HMG — CoA - Mevalonate
- (e) Glutamate - GABA

**15. For the following drugs name the type of interaction and the molecule involved in exerting their pharmacological response**

- (a) Captopril (b) Diltiazem (c) Diazepam (d) Rifampicin
- (e) Haloperidol

**16. Name five components of an aerosol package**

**17. A drug solution has an initial potency of 125 mg / 5 ml. After storing for 30 days in a refrigerator, the potency is found to be 100 mg / 5 ml. what is the half life of the drug solution under these conditions? The drug undergoes first order kinetics. Give the equations and steps involved.**

**18. Name the five forces that can act between solid particles in Tablet manufacture.**

**19. (a) Give four reasons for pH adjustment in parenteral preparations**

**(b) In which year was the Pharmacy Council of India first constituted by the Central Government?**

**20. In five different patients, deficiency of vitamins were diagnosed. The diagnosis were**

- (a) Scurvy

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- (b) Wet or dry Beriberi
- (c) Inflamed tongue, glossitis
- (d) Pernicious anemia
- (e) Osteomalacia in adults

21. (a) Define Schick Test Toxin, IP.  
(b) What is its dose?  
(c) What is its pH?  
(d) Give its storage conditions  
(e) Define Schick control

22. The antibiotics VANCOMYCIN, CEFLEXIN, FUSIDIC ACID, ERYTHROMYCIN and BICYCLOMYCIN belong to one of the following classes. Include them in the appropriate class  
Cyclic dipeptide, 3-lactam, Macrolide, Tetracyclic triterpene, Glycopeptide.