

**PHARMACEUTICAL SCIENCE**

**Time : 3 hours**

**Maximum Marks : 200**

**Read the following instruction carefully.**

1. Write all the answer in the answer-book.
2. This question paper consists of two sections : A and B.
3. Section A has NINE question. Answer all questions in this section.
4. Section B has TWENTY question. Answer any TEN questions from this section. Strike off the answer which are not to be evaluated; else only the first ten answers will be considered. Answers to this section should start on a fresh page and should not be mixed with answers to Section A.
5. Answers to questions and answers to the parts of a questions should appear together in the same sequence in which they appear in the question paper.
6. In all question of 5 marks. write clearly the important steps in your answer, These steps carry partial credit.
7. There will be no negative marking.

**SECTION - I**

**R1.** For each question given below four answers are provided, out of which only one is correct. Write the correct answer on the answer book by writing A, B, C or D against the corresponding subquestion.

**1.1.** One of the drug is excreted primarily by renal tubular sections. Identify.

- |                  |                   |
|------------------|-------------------|
| (a) Gentamycin   | (b) Kanamycin     |
| (c) Tetracycline | (d) Carbenicillin |

**1.2.** Identify one of the cancer chemotherapeutic agent which is an antimetabolite?

- |                      |                      |
|----------------------|----------------------|
| (a) Flurouracil      | (b) Nitrogen mustard |
| (c) Cyclophosphanide | (d) Chlorambucil     |

**1.3.** Agents useful in the treatment of bronchial asthma usually

- |  |
|--|
| (a) Block both alpha and beta adrenergic receptors     |
| (b) Stimulate alpha receptors but block beta receptors |

- (c) Stimulate beta receptors but block alpha receptors
- (d) Stimulate alpha and/or beta receptors

**1.4. The antiarrhythmic drug Quinidine is:**

- (a) (+) Stereoisomer of Quinine
- (b) (-) Stereoisomer of Quinine
- (c) (+) Racemic mixture of Quinine
- (d) None of the above

**1.5. Beta-Carboline ring system is present in**

- (a) Emetine alkaloid
- (b) Cortisone acetate
- (c) Deserpidine molecule
- (d) Atropine alkaloid

**1.6. Licence for wholesale of drugs specified in schedule C and C<sub>1</sub> are issued in form**

- (a) 20 A
- (b) 20 B
- (c) 21 B
- (d) 22 A

**1.7. The principal constituents Anethole (50-60%) and Fenchone (18-20%) are present in the volatile oil obtained from**

- (a) Fruits of *Ammi visnaga-Linn*
- (b) Fruits of *Foeniculum capillaceum G (F. vulgare)*
- (c) Fruits of *Carum carvi-Linn*
- (d) Fruits of *Anethoum graveolens-Linn*

**1.8. Caffeine on oxidation with KClO<sub>3</sub>/HCl gives :-**

- (a) Trimethylalloxan and urea
- (b) Methylalloxan and dimethyl urea
- (c) Diemthylalloxan and methyl urea
- (d) None of the above

**1.9. One of the following types of adverse drug reactions is not believed to be dose related phenomena**

- (a) Side effects and toxic reactions
- (b) Toxic reactions and hypersensitivity
- (c) Side effects and hypersensitivity
- (d) Hypersensitivity and idiosyncrasy

**1.10. Green bones are used for the preparation of a gelatin of the type**

- (a) A
- (b) B
- (c) C
- (d) A and B

**1.11. In capsules, ROTOFIL is used for filling:**

- (a) Powders
- (b) Pellets
- (c) Liquids
- (d) Corrosive liquids

**1.12. Gelatin and glycerin are used for the preparation of lamellae in a specified ratio. Identify the correct ratio**

- (a) 1 : 1
- (b) 5 : 1
- (c) 9 : 1
- (d) 10 : 1

**1.13. The Shick test is used to determine susceptibility to**

- (a) Measles
- (b) Diphtheria
- (c) Polio
- (d) Typhoid

**1.14. One of the following general characteristics is not true for alkaloids?**

- (a) Nitrogen in the hetrocyclic nucleus
- (b) Good solubility in organic solvents
- (c) pK<sub>a</sub> S less than 7
- (d) Exhibit optical activity

**1.15. Silver/Silver chloride electrode consists of**

- (a) Metallic silver coated with a layer of silver chloride

- (b) Polished platinum wire coated with silver chloride
- (c) Silver wire dipped in a saturated solution of silver chloride
- (d) Two electrodes one of silver and other of silver chloride

1.16. In gel permeation chromatography molecules are separated on the basis of their

- (a) Chemical nature
- (b) Size and shape
- (c) Adsorptive properties
- (d) Partition coefficient

1.17. According to Pauli exclusion principle, spins of two electrons in the same orbital are

- (a) Parallel to one another
- (b) Perpendicular to one another
- (c) Opposite to one another
- (d) Supporting one another

1.18. Vaccines and toxoids are precipitated and absorbed on to aluminium hydroxide or other suitable media. This process results in a dosage form that in comparison to fluid forms

- (a) More effective orally
- (b) Absorbed slowly
- (c) Stability is increased
- (d) Irritation is lost

1.19. In order to produce characteristic pharmacological action, a drug must always

- (a) Reach high blood vessels
- (b) Absorbed from GIT readily
- (c) Achieve adequate concentration at the site of action
- (d) Excrete unchanged in urine.

1.20. The Wurster process can be used to

- (a) Coat tablets
- (b) Determine the disintegration time
- (c) Gas sterilize parenteral solutions
- (d) Automatic filling of capsules

**SECTION - II**

**FILL IN THE BLANKS**

**Model Question**

- 2.1. In multistation process, the portions of the head that hold the upper and lower punches are called the upper and lower \_\_\_\_\_ (1) \_\_\_\_\_ respectively.
- 2.2. In tablet disintegration test, the wire mesh of the tube at its lowest point is at least \_\_\_\_\_ (2) \_\_\_\_\_ mm above the bottom of the beaker.
- 2.3. Roller compactor is used in large scale \_\_\_\_\_ (3) \_\_\_\_\_ granulation.
- 2.4. Chemical name of Propellant 114 is \_\_\_\_\_ (4) \_\_\_\_\_ .
- 2.5. In non-aqueous injection, Sesame oil and \_\_\_\_\_ (5) \_\_\_\_\_ oil are used as solvents.

- 2.6. 1-(p-chlorobenzoyl) 5-methoxy-2-methyl indole-3-acetic acid is commonly known as \_\_\_\_\_ (6) \_\_\_\_\_ .
- 2.7. Rubidium chloride injection (contains Rb-86) is used to determine \_\_\_\_\_ (7) \_\_\_\_\_ blood flow.
- 2.8. Benzil on treatment with urea gives \_\_\_\_\_ (8) \_\_\_\_\_ which is an anticonvulsant
- 2.9. Why Phenyl Malonamide on condensation with Formamide gives \_\_\_\_\_ (9) \_\_\_\_\_ .
- 2.10. In the outer part of the \_\_\_\_\_ (10) \_\_\_\_\_ numerous ovoid Schizo-lyigenous oil glands are present in clove bud
- 2.11. The brown seed of Nutmeg is surrounded by a crimson reticulate \_\_\_\_\_ (11) \_\_\_\_\_ which is stripped off and dried to form mace.
- 2.12. Terbutaline sulphate is a \_\_\_\_\_ (12) \_\_\_\_\_ agonist.
- 2.13. Salicylates and other anti-inflammatory drugs irreversibly inactivate the enzyme \_\_\_\_\_ (13) \_\_\_\_\_ responsible for the conversion of arachidonic acid to prostagladin.
- 2.14. The temperature above which cloudiness suddenly appears for non-ionic surfactant in solution is known as \_\_\_\_\_ (14) \_\_\_\_\_.
- 2.15. Dragendorff's reagent used in testing alkaloids is chemically \_\_\_\_\_ (15) \_\_\_\_\_.
- 2.16. IR absorption spectra of aldehydes, ketones, carboxylic acids and their derivatives contain one absorption peak common due to \_\_\_\_\_ (16) \_\_\_\_\_.
- 2.17. When the molecular weight of a substances is unknown, the intensity of absorption is expressed as \_\_\_\_\_ (17) \_\_\_\_\_.
- 2.18. The frequency of rotating magnetic field and the frequency of the processing molecules become equal, they are said to be in \_\_\_\_\_ (18) \_\_\_\_\_.
- 2.19. A rod of silicone carbide 6-8 mm in diameter and 50 mm in length heated to a temperature of 1300°C gives \_\_\_\_\_ (19) \_\_\_\_\_ radiation.
- 2.20. Osmotic pellets are extensively used as \_\_\_\_\_ (20) \_\_\_\_\_.

**PART - B**

**STATE WHETHER THE FOLLOWINGS ARE TRUE OR FALSE**

- 3.1. The chloro group in Chlorotetracyclin is in the 8<sup>th</sup> position.
- 3.2. Ethacrynic acid is a high ceiling (loop) diuretic which inhibits electrolytic re-absorption in the thick ascending limb of the loop of Henle
- 3.3. Pharmaceutical Pectin differs from commercial Pectin because it does not contain sugar or organic acid.

- 3.4. Antihistamines stimulates the metabolism of endogenous histamine
- 3.5. Vitamin K appears to be compatible with mineral supplement such as Calcium and Iron.
- 3.6. Hepatic clearance is the sum of hepatic metabolic clearance and the biliary clearance.
- 3.7. The efficiency of a tumbling mixer is highly dependent on the speed of rotation.
- 3.8. Liquid glucose is obtained by complete hydrolysis of starch.
- 3.9. Ethylene oxide sterilization is suitable for rubber closures.
- 3.10. Samples can be handled in the form of solid, liquid or gas in mass spectrometry.
- 3.11. A photo cathode operates on the principle that electrons are emitted from certain material in direct proportion to the number of light quanta striking on the surface of the material
- 3.12. Purine occurs free in nature.
- 3.13. A guard column is used in HPLC to presaturate the mobile phase with the stationary phase.
- 3.14. Balsams are resinous mixtures that contain large proportions of Benzoic acid, Cinnamic acid, Salicylic acid or esters of these acids.
- 3.15. The State Pharmacy Council is established by the State Drugs Controller.

**4. MATCH THE FOLLOWING :**

- 4.1. Match the following descriptions given in (A) to (F) with the products mentioned below:

- |                        |  |
|------------------------|--|
| (1) Agar               | (A) Chief carbohydrate from <i>macrocystis pyrifera</i>                |
| (2) Carageenan         | (B) Dried exudates from <i>Astragalus gummifera</i>                    |
| (3) Tragacanth         | (C) Closely related hydrocolloids from <i>Chondrus crispus</i>         |
| (4) Algin              | (D) Hydrophilic collid from <i>Geledium cartilagenum</i>               |
|                        | (E) Powdered endosperm of the seeds of <i>Cyamopsis tetragonolobus</i> |
|                        | (F) Carbohydrates from the Rhizomes of <i>Zingiber sps.</i>            |
| (a) 1-D, 2-C, 3-B, 4-A | (b) 1-A, 2-C, 3-D, 4-E   |
| (c) 1-A, 2-C, 3-E, 4-D | (d) 1-A, 2-B, 3-C, 4-F   |

- 4.2. Listed are drugs 1 to 4. Their appropriate antihypertensive mechanisms are given in (A) to (F). Match them correctly.

- |              |                 |
|--------------|-----------------|
| (1) Pindalol | (A) Vasodilator |
|--------------|-----------------|

- (2) Minoxidil
- (3) Captopril
- (4) Amiloride

- (B) Angiotensin converting enzyme inhibitor
- (C) Diuretic
- (D)  $\beta$ -blocker
- (E) Centrally acting alpha adrenoceptor agonist
- (F) Potassium induction

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

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

4.3. Listed below are substances which are assayed by organisms mentioned in (A) to (E). Match them correctly.

- (1) Crystal Violet I.P.
- (2) Ampicillin I.P.
- (3) Plague Vaccine I.P.
- (4) Rifampicin I.P.

- (A) Pasteurella pestis
- (B) Bacillus cerus
- (C) Micrococcus luteus
- (D) Staphylococcus aureus
- (E) Lactobacillus aureus
- (F) Bacillus subtilis

- (a) 1-D, 2-C, 3-A, 4-F
- (c) 1-A, 2-C, 3-E, 4-D

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

4.4. Important Psychoactive Phenothiazines listed below have the following side chains at position 10, which are given in (A) to (F). Match them correctly.

- (1) Chlorpromazine
- (2) Prochlorperazine
- (3) Thioridazine
- (4) Perphenazine

- (a) 3-[4-methyl Piperazine 1-yl] Propyl
- (B) 2-[1 methyl Piperid 2-yl] ethyl
- (C) 3-[4-(2 hydroxy ethyl) Piperazine 1-yl] propyl
- (D) Dimethyl amino ethyl
- (E) Dimethyl amino propyl
- (F) Dimethyl amino butyl

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

- (b) 1-E, 2-A, 3-B, 4-C
- (d) 1-A, 2-B, 3-C, 4-F

4.5. Listed below are the physical forms of the medicaments which normally show the rheological properties given in (A) to (F). Match them correctly.

- (1) Viscous oils
- (2) Gellies
- (3) Colloids
- (4) Concentrated solid suspension

- (A) Dilatant flow
- (B) Plug flow
- (C) Newtonian flow
- (D) Plastic flow
- (E) Pseudoplastic flow

- (a) 1-C, 2-E, 3-F, 4-D  
(c) 1-A, 2-C, 3-E, 4-D
- (F) Non-Newtonian flow  
(b) 1-A, 2-C, 3-D, 4-E  
(d) 1-A, 2-B, 3-C, 4-F
5. Complete the following reactions. Give the structural formula of the facts (In the answer book write the relevant products and their natural formula against each bold digit).
- (i) Ethyl p-amino benzoate + 2 diethyl amino ethanol  $\xrightarrow{\text{NaOC}_2\text{H}_5}$  1. \_\_\_\_\_
- (ii) 2-Amino-5-chloro benzophenone + Ethyl glycinate  $\xrightarrow{\text{Pyridine}}$  2. \_\_\_\_\_  $\xrightarrow{\frac{\text{NaOCH}_3}{(\text{CH}_3\text{CO})_2\text{SO}_2}}$  3. \_\_\_\_\_
- (iii) 5-Methyl-iso oxazol 3 ethyl carboxylate + Benzyl hydrazine  $\xrightarrow{-\text{C}_2\text{H}_5\text{OH}}$  4. ....
- (iv) 10, 11 Dihydro-5H dibenz (b-f) azepine +  $\text{Cl}\cdot\text{CH}_2\text{-CH}_2\text{-CH}_2\text{-N}\begin{matrix} \text{CH}_3 \\ \text{CH}_3 \end{matrix}$   $\xrightarrow{\text{NaNH}_2}$  5. \_\_\_\_\_
6. Draw the structural formulae of the following:
- (i) A dibenzazepine derivative which is an anticonvulsant  
(ii) A piperdine derivative which is an opioid analgesic  
(iii) A naphthaquinone derivative which is an vitamin  
(iv) Abenzomorphan derivative which is an analgesic.  
(v) Quinoline and pyrrole moieties in the structure, which is an anthelmintic.
7. List five important requirements in the formulation of controlled release parenterals. Each requirement should be written in one sentence only.
8. (i) Ergot alkaloids are obtained on a commercial scale by two different methods. What are they?  
(ii) What reagent is used for colorimetric assay of Ergot alkaloids?  
(iii) Given one specific test to detect the presence of:  
(1) Anthraquinone glycosides in Senna leaves  
(2) Caffeine in tea leaves
9. Write only the equations for the various steps involved in the assay of:  
(i) Ethosuximide I.P. (ii) Mephensin I.P.
10. Listed below are some important plant constituents. Give their chemical class and plant source.  
(i) Camphor (ii) Digitoxigenin  
(iii) Hyoscine (iv) Xanthine  
(v) Pilocarpine

11. What reaction/test you would perform to prove the following:
- Nature and size of the ring of an alkaloid containing Pyridine nucleus
  - Steroidal ring in Cholesterol
  - Alpha, beta unsaturated lactone ring in Digitalis glycosides
  - 7-CH<sub>3</sub> group in caffeine molecule
12. Starting from the following, outline the synthesis of:
- Mepyramine maleate from 4-Methoxy benzaldehyde
  - Cyproheptadine from 4-Chloro-1-methyl piperidine
- Use any other reagent if needed.
13. Prepare a specimen label as per D and C act and rules for 0.5 mg BUSULPHAN tablets I.P. 10 × 10 Tablets - Dose 2 to 4 mg daily.
14. Draw the structures of the important metabolic products giving names of the transformation reaction.
- Tolubutamide
  - Phenobarbital
  - Chlorpromazine
  - Imipramine
  - Salicylic acid
15. Draw the heterocyclic system present in the following drugs:
- Clonidine
  - Cephalexin
  - Methaqualone
  - Thiotepa
  - Thiamine
16. Among the microscopical characteristics, the presence of different types of Calcium Oxalate crystals is an important diagnostic feature. Identify the correct type of Calcium Oxalate crystals present in the following drugs.
- Coca leaves*
  - Atropa belladonna leaves*
  - Mesophyls of *Urgineamaritima*
  - Daturastramonium leaves*
  - Ailanthus glandulosa*
17. Show the structural alteration in the compounds mentioned below and state what is the change in their activity?
- Introduction of F atom in the 5, position of URACIL
  - Introduction of a mercapto group in HYPOXANTHINE
  - Conversion of ISONIAZID to 2, 2 dimethyl hydrazide
  - Preparation of a heterocyclic analog of NICOTINAMIDE
  - One of the H atoms of the amino group of epinephrine is substituted by CH<sub>3</sub>CHCH<sub>3</sub>



18. Suggest specific mechanism of action of the following. Answer should be in one sentence only.
- (i) Erythromycin (ii) Rifampin  
 (iii) Oxacillin (iv) Nystatin  
 (v) Cyclophosphamide
19. (i) Give the structural formulae of two stereoisomeric estradiols. Which is more potent?  
 (ii) What do you infer from the following observation? Answer in one sentence. In the lycopodium method for the determination of total length of fibres in a sample of Cinnamon bark powder gave 27 to 40 to 50 m per gm of air dried powder.  
 (iii) Two different Senna leaf samples A and B gave the following values. Include the sample to the appropriate variety of Senna.
- |                                   | A            | B            |
|-----------------------------------|--------------|--------------|
| Stomatal index<br>(both surfaces) | 17.1 to 18.7 | 11.4 to 12.2 |
| Vein islet number                 | 19 to 23     | 25 to 30     |
20. Give reasons for the following:
- (i) A supporting electrolyte is added to a polarographic cell during analysis.  
 (ii) Conductivity of a solution is temperature dependent  
 (iii) In the assay of alkali metal salts of Carboxylic acid, Platinum crucibles are used and not porcelain crucibles.  
 (iv) Gas Chromatographic technique for pesticides, halogenated anesthetics etc., use an electron capture detector.  
 (v) Flavones on boiling with KOH and treating with  $\text{FeCl}_3$  gives a violet colour.
21. (i) In aerosol technology, certain specialized equipments are used to identify the factors mentioned below. Name them.
- (a) To determine the particle size  
 (b) To determine the flash point  
 (c) To identify the propellant
- (ii) A powder has volume of  $75 \text{ cm}^3$  and a bulk volume of  $125 \text{ cm}^3$ . Calculate its percentage porosity.
22. (i) The following Pharmaceutical aids have distinct disadvantages in their use. Name them in one or two sentences for each.
- (a) Parabens  
 (b) Cocoa butter  
 (c) Polyamide

- (ii) 10 ml ampoule of Potassium Chloride injection is available with labeled strength of 22.5 mEq/ml. But actual requirement is **175 ml** of 1 mEq/ml. How will you reconstitute?
23. Explain the following words and mention their significance in not more than two sentences for each.
- (i) Caramalisation (ii) Phase inversion temperature  
(iii) Solid fat index (iv) Ferrule  
(v) Case hardening
24. Give the principal function of the following equipments used in Pharmaceutical industry.
- (i) Pohlman whistle (ii) Pycnometer  
(iii) Monsanto tester (iv) Breaking tester  
(v) Oscillating granulator
25. During the manufacturing of the tablets, the following defects were noticed. Give reasons for these defects in one sentence for each.
- (i) Rat holing (ii) Blistering (iii) Hazing  
(iv) Picking (v) Double impression
26. Assign the main structural features of the compound  $C_8H_8O$  from the following IR absorption data:  $1450\text{ cm}^{-1}$ ,  $1265\text{ cm}^{-1}$ ,  $750\text{ cm}^{-1}$ ,  $1360\text{ cm}^{-1}$  and  $1680\text{ cm}^{-1}$ .
27. A Pharmaceutical formulation contains Zn, Mg and Cu ions. Suggest a suitable method to determine them without separation.
28. What will be the adverse reactions, if the following drugs are administered together:
- (i) Rifampin and oral contraceptive (ii) Tolbutamide and Sulphonamide  
(iii) Levodopa and Vitamin B (iv) Chloramphenicol and Phenobarbitone  
(v) Erythromycin and Carbamazepine
29. Give answers in one or two sentences only.
- (i) Nalaxone is N-allyl derivative of Oxymorphone. How does it exert its action?  
(ii) What is positive inotropic effect?  
(iii) How does Verapamil, Nifedipine etc. act as a Calcium channel blocker?  
(iv) How does Vinca alkaloids exert anticancer effects?  
(v) What way the sulphonyl urea s exert their hypoglycemic effect?

**End of paper**

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**ANSWER KEY GPAT 1995**

**Section - I**

1.1	a	1.2	a	1.3	d	1.4	a
1.5	c	1.6	c	1.7	b	1.8	c
1.9	d	1.10	b	1.11	b	1.12	a
1.13	b	1.14	c	1.15	a	1.16	b
1.17	c	1.18	b	1.19	c	1.20	a

**Section - IV**

4.1	a	4.2	d	4.3	a	4.4	b
4.5	a						


  
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