GATE-1993

PART - A Section-I (Choose The Correct Answer)

1. Multiple choice question

i. Triamcinolone is
(a) 9 a-Fluoro-16 a-hydroxyprednisolone
(b) 9 B-Fluoro-16 a-hydroxyprednisolone
(c) 9 a-Fluoro 16 l-hydroxyprednisolone
(d) 9 a-Bromo-16 a-hydroxyprednisolone

i. Surfactants are characterized by the presence of
(a) Water solubilising groups alone
(b) Fat solubilizing groups alone
(c) Water and fat solubilising groups in the same molecule
(d) Groups with positive charge

i. Gamma-globulin is separated from serum by
(a) Agglutination (b) Dialysis
(c) Centrifugation (d) Salting out

i. The stationary phase in Thin-kayer chromatography is
(a) Liquid held between glasses (b) Silica gel
(c) Glass Plate (d) None of the above

i. Benzoyl peroxide is
(a) An astringent (b) An emollient
(c) A preservative (d) A keratolytic

i. Water for injection differs from sterile distilled water as it is free from
(a) Carbon dioxide (b) Pyrogens
(c) Preservatives (d) Antioxidant

i. The correct equivalent for-10°C is
(a) -10°F (b) +22°F (c) -18°F (d) +14°F

i. The active metabolite of anti-cancer cyclophosphamide is
(a) N-hydroxyl cyclophosphamide
(b) N-methyl cyclophosphamide
(c) 4-hydroxyl cyclophosphamide
(d) N-acetyl cyclophosphamide

i. Mebandazole, an anthelmintic drug, has one group at 5-position in the Benz imidazole structure. It is
(a)-S-CH2-CH2-CH, (b)-S-Ph
(c) Ph-SO_2- (d) Ph-CO-

i. Sedative action of barbiturates is due to substituents at C, It is due to
(a) High lipophilicity of groups at C, position
(b) Electronic withdrawing effect
(c) Steric effect
(d) Metal chelation

i. Monoamine oxidase (MAO) Inhibitors have serious side effects and boxicities. The Alternate drugs of choice are
(a) Tricyclic antidepressants (b) Hallucinogens
(c) Amphetamines (d) Xanthine alkaloids

i. Sterility test for the materials meant for surgical suture requires incubation for
(a) 7 days (b) 14 days (c) 21 days (d) 28 days

i. Silver-Silver chloride electrode consists of
(a) Silver wire coated with calomel
(b) Silver wire coated with potassium chloride
(c) Silver wire coated with silver chloride
(d) Platinum wire coated with silver chloride

i. Extinction E=
(a) Log (I_0/I_t) (b) Log T
(c) It/I0 (d) $I010^{-ct}$

i. Senna leaf LP. Consists of
(a) Dried leaflets of Cassia acutifolia and Cassia angustifolia
(b) Dried leaflets of Cassia indica
(c) Dried leaflets of Cassia carpinifolia
(d) Dried leaflets of Cassia carpinifolia and Cassia acutifolia

i. Conformational isomerism is
(a) Cis-trans isomerism
(b) Optical isomerism
(c) Dextro-and levo-rotatory
(d) Non-Identical spatial arrangement of atoms in molecules resulting from rotation about one or more simple bonds

i. According to pH partition theory, a weakly acidic drug will most likely be absorbed from the stomach because the drug which exist primarily in the
(a) Un-ionised, more lipid soluble form
(b) Lonised, more water soluble form
(c) Form of weak acid and more soluble in acid media
(d) Lonic form of the drug which facilitates diffusion

i. Blood flow through a capillary is described by one of the following equations. Choose the correct one
(a) Langmuir (b) Noyes Whitney
(c) Hildebrand (d) Stokes

i. Ionic mobility is denoted by
(a) cm/sec (b) Degree celcius/sec
(c) mg/sec (d) None of these

i. A mixture of hydrochloric acid and acetic acid can be titrated satisfactorily by
(a) Potentiometry (b) Conductometry
(c) Amperumetry (d) Spectrophotometry

SECTION-II (MATCH THE FOLLOWING)

2. Match of the following

i. The drugs and their mechanism of action are listed below. Match them

1. Ca^{2+} channel blockers	[P] Terbutaline
2. B selective bronchodilators	[Q] Ditiazem
3. 5-HT antagonist	[R] Ranitidine
4. H, receptor antagonist	[S] Cyproheptadine
	[T] Omeprazole

(a) 1-[Q], 2-[P], 3-[S], 4-[R]
(b) 1 [P], 2-[S], 3-[R], 4-[Q]
(c) 1-[P], 2-[Q], 3-[S], 4-[R]
(d) 1-[Q], 2-[P], 3-[R], 4-[S]

i. The injections mentioned below are usually sterilized by the process of [P] to [T]. Match them

1. Hydrocortisone acetate injection	[P] Sterilization by dry heat
2. Morphine injection	[Q] Sterilization by moist heat
3. Parallehyde injection	[R] Sterilization by filtration
4. Phenol and Glycerine injection	[S] Sterilization by heating with bactericide
	[T] Asceptic operation

(a) 1-[Q], 2-[P], 3-[S], 4-[R]
(b) 1-[Q], 2-[P], 3-[R], 4-[S]
(c) 1-[T], 2-[S], 3-[R], 4-[P]
(d) 1 [P], 2-[R], 3-[Q], 4-[S]

i. The side chain structure for the following drugs are given from [P] to [T]. Match them

1. Primaquine [P]-O-CH_2-CH (OH)-CH_2-NHCH $(CH_3)_2$
2. Chlorpromazine [Q] -CH_2-CH_2-CH_2-N $(CH_3)_2$
3. Propranolol [R] -NH-CH - (CH_2) NH_2 (with CH_3 branch)
4. Tinidazole [S] -CH_2-CH_2-SO_2-C_2H_5
   [T] -NH-CH $(CH_2)_5N$ $(C_2H_3)_2$ (with CH_3 branch)

(a) 1-[Q], 2-[P], 3-[S], 4-[R]
(b) 1-[R], 2-[Q], 3-[P], 4-[S]
(c) 1-[T], 2-[Q], 3-[P], 4-[S]
(d) 1-[R], 2-[S], 3-[P], 4-[Q]

i. The drugs mentioned below are assayed by the methods mentioned [P] to [T]. Match them correctly

1. Sulphadiazine Tablets L.P	[P] Non-aqueous titration with 0.1 N per chloric Acid using oracet blue B Indicator
2. Salbutamol Sulphate L.P.	[Q] By measuring the extinction at 444 nm
3. Riboflavine Tablets LP	[R] A dilute sulphuric acid solution is titrated With 0.1 N ceric ammonium sulphate using ferroin Solution as indicator
4. Ascrobic acid Tablets L.P.	[S] Titrated with 0.5 N NaOH using phenol red as Indicator
	[T] Acidification with HCI and titration with 0.1 M sodium nitrite

(a) 1-[Q], 2-[P], 3-[S], 4-[R]
(b) 1-[T], 2-[P], 3-[Q], 4-[R]
(c) 1-[P], 2-[T], 3-[R], 4-[S]
(d) 1-[P], 2-[T], 3-[Q], 4-[S]

i. The starting material for the synthesis of drug 1 to 4 are mentioned from [P] to [T]. Match them correctly

1. L-tyrosine	[P] 3-chloroacetyl phenol
2. Phenylephrine	[Q] 4-chloroacetyl catechol
3. Isoprenaline	[R] Catechol
4. Adrenaline	[S] Thyroxine
	[T] Resorcinol

(a) 1-[Q], 2-[P], 3-[S], 4-[R]
(b) 1-[P], 2-[Q], 3-[R], 4-[S]
(c) 1-[P], 2-[R], 3-[Q], 4-[T]
(d) 1-[S], 2-[P], 3 [Q], 4-[R]

i. Following are the test organism's antibiotics. Match them correctly. used for the I.P. microbiological assay of

1. Rifampicin	[P] Escherichia coli
2. Tetracycline	[Q] Klebsiella pneumonia
3. Streptomycin	[R] Micrococcus luteus
4. Chloramphenicol	[S] Bacillus subtilis
	[T] Bacillus cereus

(a) 1-[S], 2-[T], 3-[Q], 4-[P]
(b) 1-[T], 2-[Q], 3-[P], 4-[S]
(c) 1-[P], 2-[T], 3-[R], 4-[S]
(d) 1-[P], 2-[R], 3-[T], 4-[S]

i. The following are the test animals or substances used for the biological assay of the preparations listed in [P] to [S]. Match them

1. Mice	[P] Vasopressin
2. Albino rats	[Q] Diphtheria antitoxin
3. Guinea pigs	[R] Insulin
4. Sheep plasma	[S] Human antihaemophyllic fraction

(a) 1-[Q], 2-[P], 3-[S], 4-[R]
(b) 1-[S], 2-[Q] 3-[S], 4-[R]
(c) 1-[Q], 2-[P], 3-[R], 4-[S]
(d) 1-[R], 2-[P], 3-[Q], 4 [S]

i. The active form of the enantiomer for the following drugs are given in [P] [T] Match them

1. Ibuprofen	[P] S-isomer
2. Ephedrine	[Q] D-isomer
3. Propranolol	[R] cis-isomer
4. Ethambutol	[S] L-isomer
	[T] R-isomer

(a) 1-[Q], 2-[T], 3-[S], 4-[R]
(b) 1-[P], 2-[S], 3-[T], 4-[Q]
(c) 1-[P], 2-[Q], 3-[T], 4-[S]
(d) 1-[S], 2-[Q], 3-[T], 4-[P]

i. The Ingredients mentioned in [P] to [T] are use of various stages of sugar coating of Tablets, Match them

1. Seal coating	[P] Gelatin
2. Sub coating	[Q] Carnauba wax
3. Syrup coating	[R] Methanol
4. Polishing	[S] PEG 4000
	[T] Cane sugar

(a) 1-[S], 2-[P], 3-[T], 4-[Q]
(b) 1-[P], 2-[R], 3-[T], 4-[S]
(c) 1-[P], 2-[Q], 3-[T], 4-[R]
(d) 1-[S], 2-[R], 3-[T], 4-[P]

i. **The drugs [P] to [T] are used as diuretics. Match them to their classes X**

1. Osmotic diuretic	[P] Spironolactone
2. Loop diuretic	[Q] Isosorbide
3. Potassium sparing diuretic	[R] Merasalyl Theophylline
4. Organomercurial diuretic	[S] Furosemide
	[T] Probenecid

(a) 1-[Q], 2-[P], 3-[S], 4-[R]
(b) 1-[Q], 2-[S], 3-[P], 4-[R]
(c) 1-[R], 2-[Q], 3-[P], 4-[S]
(d) 1-[P], 2-[S], 3-[R], 4-[Q]

i. **The following bacteria are classified based on their staining [P] to [T]. Match them**

1. Clostridium tetani	[P] Gram-positive cocci
2. Escherichia coli	[Q] Gram-positive bacilli
3. Neisseria gonorrhoeae	[R] Gram-negative cocci
4. Streptococcus pyogenes	[S] Gram-negative bacilli
	[T] Gram-positive sprirrilla

(a) 1-[Q], 2-[P], 3-[S], 4-[R]
(b) 1-[P], 2-[S], 3-[R], 4-[Q]
(c) 1-[S], 2-[P], 3-[R], 4-[Q]
(d) 1-[Q], 2-[S], 3-[R], 4-[P]

i. **The following prefixes are to identify the characteristics listed in [F] to [T]. Match them**

1. Hetero	[P] Neighbouring positions in the benzene ring
2. Levo	[Q] Rotates the polarized light to the left
3. Ortho	[S] Not all the same atoms in the ring
4. Poly	[R] several identical molecules linked together
	[T] Water is removed from the compound

(a) 1-[Q], 2-[P], 3-[5], 4-[R]
(b) 1-[P], 2-[S], 3-[Q], 4-[R]
(c) 1-[P], 2-[R], 3-[Q], 4-[S]
(d) 1-[S], 2-[Q], 3-[P], 4-[R]

i. **The following Umbelliferous fruits are obtained from the plants mentioned in [P] to [T] Match them**

1. Anise seed	[P] Anethum grave lens
2. Caraway	[Q] Foeniculum vulgare
3. Coriander	[R] Carum carvi
4. Dill	[S] Pimpinella anisum
	[T] Coriandrum sativum

(a) 1-[Q], 2-[T], 3-[S], 4-[R]
(b) 1-[T], 2-[Q], 3-[P], 4-[S]
(c) 1-[S], 2-[R], 3-[T], 4-[P]
(d) 1-[P], 2-[Q], 3-[T], 4-[S]

i. **The drugs listed from 1 to 4 are having the antihypertensive mechanism listed in [P] to [T]. Match them correctly**

1. Pindolol	**[P] Vasodilator**
2. Minoxidil	**[Q] centrally acting a, -adrenoreceptor agonist**
3. Captopril	**[R] Diuretic**
4. Amiloride	**[S] Beta-blocker**
	[T] Angiotensin converting enzyme inhibitor

(a) 1-[Q], 2-[R], 3-[S], 4-[T]
(b) 1-[S], 2-[P], 3-[T], 4-[R]
(c) 1-[R], 2-[Q], 3-[T], 4-[S]
(d) 1-[T], 2-[Q], 3-[R], 4-[P]

i. **A drug is deemed to be as indicated in 1 to 4 and the corresponding definitions are given in [P] to [T]. Match with the correct ones**

1. Misbranded drug	[P] If it is marketed without prescription
2. Adulterated drug	[Q] If it is imported under a name which belongs To another drug
3. Spurious drug	[R] If it is not labeled in the prescribed manner
4. Drug of abuse	[S] If it contains any harmful or toxic substance
	[T] If it develops addiction

(a) 1-[Q], 2-[P], 3-[S], 4-[R]
(b) 1-[R], 2-[Q], 3-[T], 4-[R]
(c) 1-[R], 2-[S], 3-[Q], 4-[T]
(d) 1-[T], 2-[Q], 3-[P], 4-[R]

SECTION - III (FILL IN THE BLANKS)

i. **Fill in the blanks with proper answers**

[P] Synthetic camphor is optically.....1. And is prepared from 2..... Whereas Natural camphor is optically.....3..... And is obtained from .....4.....

[Q] Alkaloids of ergot exist in stereoisomeric pairs and they are derived from optically isomeric forms. They are known as .....5.....and.....6..... Which differ only in configuration at the asymmetric carbon atom which carries _____group?

[R] In asceptic area the personnel are provided with uniforms made by .....8..... or by ……9……

[S].....10..... is used as an…….11…….. Indicator in .....12..... Titrations, because the florescence changes with.....13.....

[T] Polypropylene glycol is usually included in topical formulations.....14..... And/or as a…….15……..

(F) Transfer of most drugs across biologic membranes occurs by ..... diffusion region of .....17..... Concentration to one of .....18 concentrations.

(G) Biologic half-life of a drug that is eliminated by the first-order kinetics is mathematically represented by……19……..

(H) In Quillaia bark, the dark patches often found on the outer surface are known as…….20…….

PART - B

i. **[P] Complete the following reactions - Name the products 1 and 2 give the Hydrolysis structure of reactants and products.**
Benzyl cyanide + Di [2 Chloroethylmethylamine] →

1 —(Hydrolysis / esterify with ethyl alcohol)— 2

Complete with balanced equation
[Q] What happens when? Complete with balanced equation
(i) Tropine is treated with Mandelic acid
(ii) Estrone is treated with Potassium acetylide in liquid ammonia

i. **What inferences you draw from the following observations.**
(i) A sample of cloves floats when they are placed in freshly boiled and cooled water.
(ii) A sample of cinnamon leaf oil gives intensive blue colour when an alcoholic solution is treated with ferric chloride, whereas the cinnamon bark gives a mild colour.
(iii) A sample of ginger is boiled with 2% KOH, when the pungency of the sample is lost

i. **[P] Define in not more than 3 sentences**
(i) Multiple emulsions
(ii) Levigation
[Q] Important factors that affect absorption of a drug are
1……. 2…….
3……. 4…….
5……. 6…….

i. **[P] Tablets are evaluated by the following techniques. They are**
1……. 2…….
3……. 4…….
5……. 6…….
[Q] What are the functions of -
(i) Protective/sorbents
(ii) Antidusting agents in the manufacture of capsules.

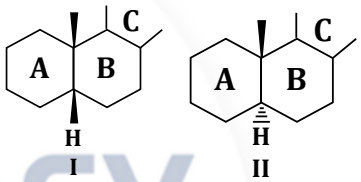
i. **Give reasons for the following:**
(i) Mercuric acetate is added in the assay of ephedrine hydrochloride.
(ii) Acetic anhydride is added in the preparation of acetous perchloric acid and kept overnight
(iii) Secondary filter is kept at right angles to the incident light in flourimeter.

i. **Give one test each to detect the presence of Karaya gum and Sterculia gum in Tragacanth I.P.**

i. **Given below are the systematic names of certain natural substances. Give their conventional names, sources and structural formulae.**
(i) Methyl-11, 17 a-dimethoxy, 18 ß-(3, 4, 5,-trimethoxybenzoyloxy) 3 ß, 20 a-yohimbane, 16 ß-carboxylate
(ii) 1, 3-Dimethyl 2, 6-(1H, 3H)-purinedione
(iii) 4-Hydroxy-3-methoxybenzaldehyde
(iv) (1R.3r, 5S)-3-tropyloxytropanium sulphate

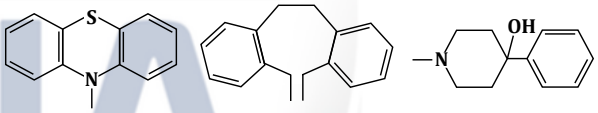
i. **A compound of molecular formula C6H9 NO exhibits spectral characteristics as followings I.R. (KBr): 3200, 1650, 2150, 1500, 1550, cm-1**
UV_{max} = 280 nm.
NMR ($CDCl_3$) = δ_{ppm} 2.8 (s, 3H)
= δ_{ppm} 5.8 (b, 1H)
6.8-7.6 (m, 5H)
Mass = m^+/e, 135 (parent ion)
What is the structural formula of the compound?

i. **[P] Molecular weights of Cimetidine, Ranitidine and Famotidine are 252, 314 and 273. Oral bioavailabilities and elimination half-life in man are almost similar. Which of these drugs could be more acceptable and why**
[Q] What is the most essential structural feature, an antihistaminic should have?
[R] Following representations in case of steroids are often used for denoting their stereochemistry. What does it indicate?

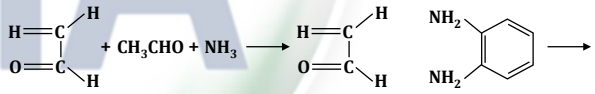


I II

i. **[P] Following ring structures are present in well-known drugs. Complete the structural formulae by introducing the required groups**



[Q] Complete the following synthesis



i. **[P] in aerosol technology, what is the significance for the following**
(i) Determination of the particle size
(ii) Discharge rate of aerosol valve
[Q] How much water is to be added to convert 50 ml of 1 in 2000 solution of atropine sulphate into 1 in 5000 solution?

i. **In tablet manufacturing technology some of the problems faced are**
(i) Soft tablets
(ii) Removal of air
(iii) Protected disintegration
How do the three problems occur? Mention how they can be corrected

i. [P] Tetracycline undergoes ionization and exhibits three pka values at 3.3, 7.7 and 9.5. Write the structure and indicate the groups undergoing ionization
[Q] Omeprazole is an inhibitor of gastric acid secretion. Explain the mechanism of inhibition.

i. **What are the two important tests carried out in the evaluation of chemical resistance of glass containers? Explain.**

i. **Briefly explain the mechanisms of action of the following drugs**
(i) Nifedipine
(ii) Atenolol
(iii) Diclofenac-Na

i. **[P] How many 250 mg capsules of Ampicillin are required to provide 30mg/kg/day for a week for a man weighing 165 pounds**
[Q] Natural group of purgative drugs showed the presence of anthraquinones and its reduced derivatives and compounds formed by the union of two anthrone molecules. They are
1. _____2. _____3. _____
4. _____ Give their structural

i. **[P] 1.59 gm of pure Na2CO3 is neutralized by 50 ml of HCl solution. Find out the Norma of the acid solution. [Na = 23, C = 12, 0 = 16]**
[Q] As per the Pharmacopoeia, the terms used in the description of powders are
1. _____2. _____3. _____ 4. _____ 5_____

i. **[P] Important methods of sterilization as per I.P are**
1. _____2. _____3. _____
4. _____5_____6. _____
[Q] How many ml of oil (specific gravity 0.975) is required to prepare 78 Gms of spirit which is 15% w/w solution of the oil?

Answer Key

PART (SECTION - I)

i - a	ii - c	iii - b	iv - b	v - d	vi - b	vii - d	viii - c	ix - d	x - a
xi - a	xii - b	xiii - c	xiv - a	xv - a	xvi - d	xvii - a	xviii - d	xix - a	xx - b

PART (SECTION - II)

i - a	ii - c	iii - c	iv - b	v - d	vi - a	vii - d	viii - b	ix - a	x - b
xi - d	xii - d	xiii - c	xiv - b	xv - c					

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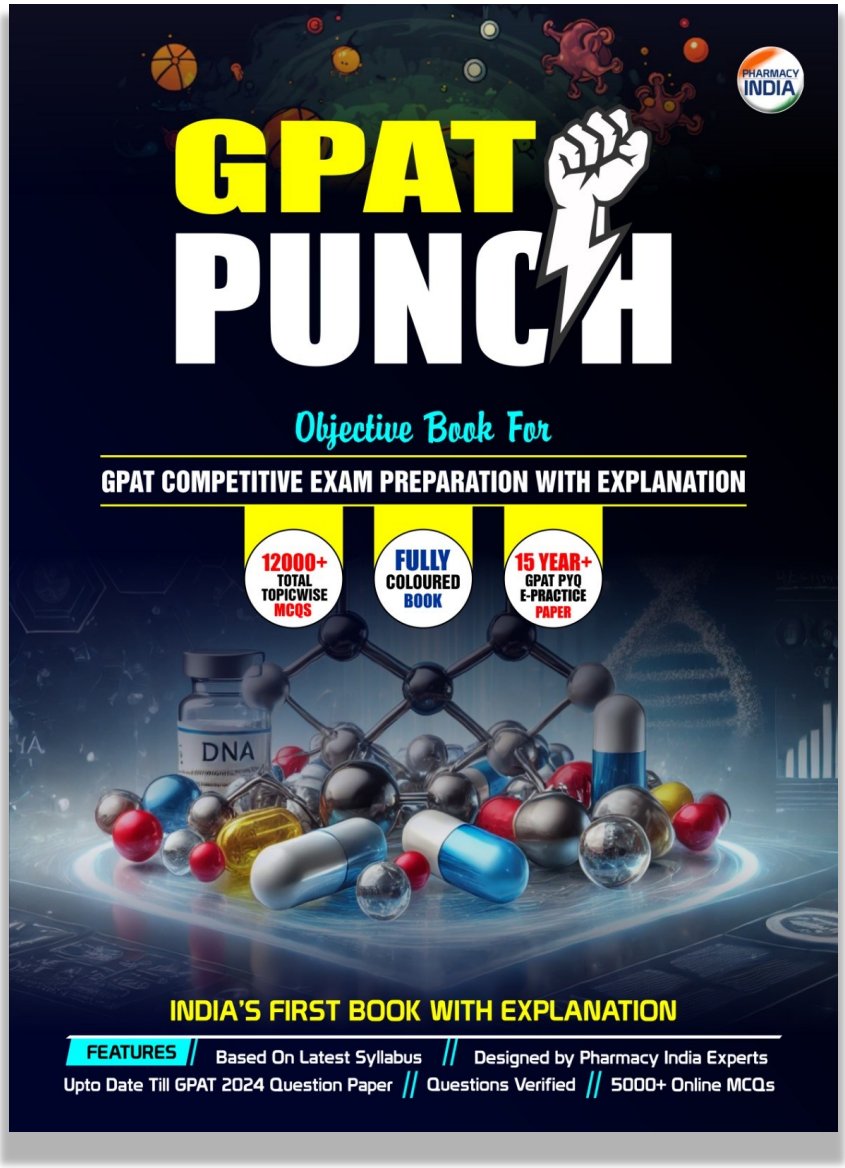

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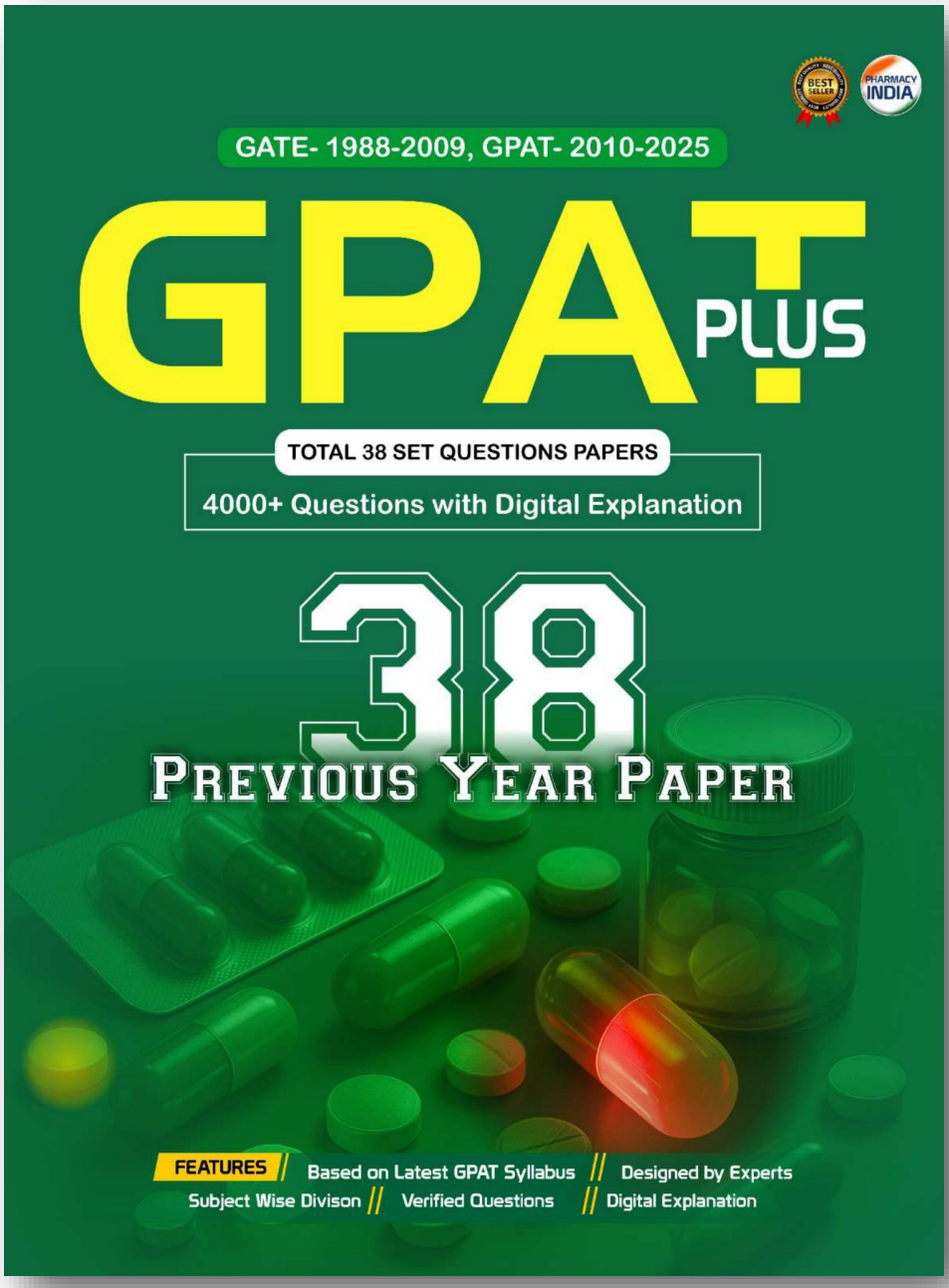

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