GATE-1997

Section – I (Choose the Correct Answer)

1. For each question given below, four alternatives are provided, out of which only one is correct. Write the correct answer on the answer script by writing (a), (b), (c) or (d) against the respective sub-questions number

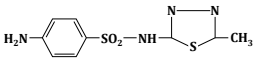
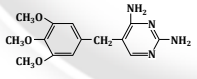
1.1 The first hydrolytic product of Streptomycin with methanolic HCl is
(a) Streptidine + Streptose + N-methyl glucosamine
(b) Streptidine + Methyl strepto-biosaminide dimethyl acetal
(c) Streptamine + Streptose + N-methyl glucosamine
(d) Streptamine + Streptose dimethyl acetal + N-methyl glucosamine

1.2 Which drug interferes with cellular metabolism, especially the synthesis of mycolic acid?
(a) Chloramphenicol (b) Pyrazinamide
(c) Isonicotinic acid hydrazide (d) Nicotinamide

1.3 A synthetic sweetening agent ≈ 200 × sweeter than sucrose and without after-taste is
(a) Saccharin (b) Aspartame
(c) Cyclamate (d) Sorbitol

1.4 In capsule production, Rotosort is used for
(a) Filling powders (b) Filling liquids
(c) Filling pellets (d) Sorting filled capsules

1.5 Shellac is used in tablet coating as a/an
(a) Polishing agent
(b) Film-coating agent
(c) Enteric-coating agent
(d) Sub-coating agent for sugar coating

1.6 Among the listed drug structures, identify the one that prevents incorporation of PABA into folic acid.
(a) 
(b) 
(c) 
(d) 

1.7 In quantitative TLC, radioactive material can be studied by —
(a) Visual comparison (b) Densitometer
(c) Gravimetry (d) Geiger counter

1.8 The ingredient that improves the flow property of granules is —
(a) Glidant (b) Emollient
(c) Lubricant (d) Surfactant

1.9 The wavelength source in an NMR spectrometer is-
(a) Goniometer (b) Radio-frequency oscillator
(c) High-voltage generator (d) Klystron oscillator

1.10 Material used for preparation of master grating —
(a) Glass (b) Iron (c) Aluminium (d) Teflon

1.11 Benzathine penicillin is —
(a) Equimolecular composition of Amoxicillin + N,N-dibenzyl ethylene diamine
(b) Molecular complexation of Benzyl penicillin + N,N-dibenzyl ethylene diamine
(c) Molecular complexation of Cloxacillin + Ethylene diamine
(d) Equimolecular proportion of Amoxicillin + Ethylene diamine

1.12 Schick test is performed to test susceptibility to —
(a) Tetanus (b) Diphtheria (c) Mumps (d) Syphilis

1.13 Which large-volume dextrose solution for IV use is isotonic —
(a) 2.5 % w/v (b) 5.0 % w/v
(c) 10 % w/v (d) 20 % w/v

1.14 The term Bioavailability refers to —
(a) Relation between physicochemical properties and absorption
(b) Measurement of rate and amount of active drug reaching systemic circulation
(c) Movement of drug into body tissues over time
(d) Dissolution of drug in GIT

1.15 Among propellants used in aerosols, which is used for topical pharmaceutical aerosols —
(a) Trichloro-monofluoro methane
(b) Dichloro-difluoro methane
(c) Dichloro-tetrafluoro ethane
(d) Propane

1.16 The principal structural component of the bacterial cell wall is —
(a) Simple protein (b) Peptidoglycan polymer
(c) Complex polysaccharide (d) Glycoprotein

1.17 Which of the following has the highest ionization in aqueous solution —
(a) Aspirin pKa = 3.5 (b) Indomethacin pKa = 4.5
(c) Warfarin pKa = 5.1 (d) Ibuprofen pKa = 5.2

1.18 Which of the following has the highest ionization in aqueous solution —
(a) It is teratogenic
(b) It may affect the bone growth of foetus
(c) It causes discolouration of mother's teeth
(d) It may cause abortion

1.19 The xenobiotic that does not cause nephrotoxicity is —
(a) Streptozocin
(b) Cisplatin
(c) Gentamycin
(d) Isoniazid

1.20 Function of μ-opioid receptor —
(a) Decrease noradrenaline release
(b) Decrease dopamine release
(c) Decrease serotonin release
(d) Decrease acetylcholine release

1.21 Therapeutic combinations of anticancer drugs are rational except —
(a) Thiotepa + Prednisone
(b) Cyclophosphamide + 6-Mercaptopurine
(c) Doxorubicin + Methotrexate
(d) Chlorambucil + Melphalan

1.22 Emission from radio-nuclide commonly used for sterilization —
(a) Gamma (b) X-ray (c) Alpha (d) Positron

1.23 Clinically available anticancer agents act mainly by —
(a) Improving body defence mechanism
(b) Inhibition of cell wall synthesis
(c) Receptor site blockade
(d) Cell growth inhibition

1.24 Which radio-nuclide is generator-produced in nuclear pharmacy —
(a) ^{201}Tl (b) ^{67}Ga (c) ^{133}Xe (d) ^{99m}Tc

1.25 Smallpox vaccine contains —
(a) Living virus Vaccinia
(b) Living culture of BCG
(c) Attenuated Staphylococcus
(d) Living virus of Hepatitis

1.26 Solution strength of Ca^{2+} in mg/L for a Ca injection containing 5 mEq per 100 mL (At.wt = 40):
(a) 150 (b) 500 (c) 750 (d) 1000

1.27 Correct intermediate for synthesis of Procainamide —
(a) p-nitro benzoyl chloride + diethyl amino ethylamine
(b) p-nitro benzoyl chloride + ethyl amino ethylamine
(c) p-nitro cinnamoyl chloride + diethyl amino ethylamine
(d) p-nitro benzene + diethyl amino ethylamine

1.28 Choose the correct name for Digitoxigenin —
(a) 3β, 14β, 16β-Trihydroxy cardenolide
(b) 3β, 12β, 14β-Trihydroxy cardenolide
(c) 3β, 14β-Dihydroxy cardenolide
(d) 1, 3, 5, 11α, 14, 19β-Hexahydroxy cardenolide

1.29 2,6-Dimethyl aniline + chloroacetyl chloride → starting materials for —
(a) Lidocaine (b) Prilocaine
(c) Bupivacaine (d) Cinchocaine

1.30 Correct chemical name for Tranylcypromine —
(a) (–) trans-2-Phenyl cyclopropylamine
(b) (+) trans-2-Phenyl cyclopropylamine
(c) (±) cis-2-Phenyl cyclopropylamine
(d) (+) trans-2-Phenyl cyclopropylamine

1.31 Intake to be avoided in patients on oral anticoagulants-
(a) Cyanocobalamin (b) Thiamine
(c) Menadione (d) Tocopherol

1.32 Ellipsoidal schizolysigenous oil glands diagnostic of —
(a) Ergot (b) Ginseng
(c) Cinnamon (d) Clove

1.33 Catecholamines act by —
(a) ↓ Glucose release into blood
(b) ↑ Glucose utilization by muscle
(c) ↑ Glucose release into blood
(d) ↓ Glucose in muscle

1.34 Hyoscyamine, an alkaloid from Atropa belladonna —
(a) Racemises to atropine with ethanolic alkali; atropine is (±) hyoscyamine
(b) Disintegrates to atropine with acid solution; atropine is (–) hyoscyamine
(c) Rearranges to atropine with acid solution; atropine is (+) hyoscyamine
(d) Racemise to atropine with ethanolic alkali

1.35 Correct molecule controlling biosynthesis of proteins in living cells —
(a) DNA (b) RNA (c) Purines (d) Pyrimidines

SECTION – II (Match the Following)

2.1 Listed below are substances which are assayed by methods [P] to [U]. Match them correctly.

Substance	Method
1. Ascorbic Acid Tablets I.P.	[R] Ceric ammonium sulphate oxidation
2. Thiamine Hydrochloride I.P.	[P] Fluorimetry
3. Calcium Pantothenate I.P.	[Q] Spectrophotometry
4. Pyridoxine Hydrochloride I.P.	[S] Complexometry
	[T] Non-aqueous

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

2.2 Diagnostic features of crude drugs

Feature	Description
1. Trichome	[P] Two similar cells placed parallel with small space
2. Cicatrix	[Q] Epidermal cells which do not have any definite function
3. Stomata	[R] Elongated tubular outgrowth of epidermal cell
4. Mesophyll	[S] Scar left after trichomes are rubbed off
	[T] Parenchymatous ground tissue between two epidermises
	[U] Flat and has one or more rows of Palisade cells

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

2.3 Types of anticancer drugs and examples

Drug class	Example
1. Antifolate	[P] Vinblastine
2. Purine analogue	[Q] Thioguanine
3. Pyrimidine analogue	[R] 5-Fluorouracil
4. Antimitotic	[S] Methotrexate
	[T] Actinomycin
	[U] Cytarabine

(a) 1-[D], 2-[B], 3-[C], 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]

2.4 Heterocyclic systems and natural products

Heterocycle	Natural product
1. Imidazole	[P] Reserpine
2. β-Carboline	[Q] Pilocarpine
3. Heterosteroidal	[R] Conessine
4. Isoquinoline	[S] Ergotamine
	[T] Papaverine
	[U] Scopolamine

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

2.5 Starting materials used for the synthesis of the following drugs are given [P] to [U]. Match them.

1. Mepyramine Maleate	[P] Azocine and Chloromethyl cyanide
2. Guanethidine Sulphate	[Q] 10-11 Dihydro-5-H. dibenz. [b-f] azepine
3. Isoxsuprine	[R] 5-Oxo 10-11 dihydro 5-H dibenz [a-d] cycloheptene
4. Imipramine Hydrochloride	[S] 4-hydroxy norephedrine
	[T] Benzaldehyde and 2-chloro pyridine
	[U] 4-methyl benzaldehyde and 2-amino pyridine

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

2.6 Listed below are some tests carried out to identify the constituents given in [P] to [U]. Match them correctly

1. Benedict's test	[P] Bile salt
2. Hay's test	[Q] Calcium
3. Gmelin's test	[R] Bile pigments
4. Salkowski test	[S] Urea
	[T] Ketone bodies
	[U] Glucose

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

2.7 Antibiotics and their biochemical origins are given below. Match them

1. Cycloserine	[P] Two amino acid units
2. Cephalosporin	[Q] Single amino acid
3. Neomycin	[R] Sugars
4. Erythromycin	[S] Polypeptides
	[T] Acetate or Propionate
	[U] Polycyclic units

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

2.8 Match the following relationship correctly

1. Hypokalemia	[P] Biotransformation prior to eliciting pharmacological response
2. Spironolactone	[Q] Competitive antagonist of Aldosterone
3. Rhodopsin in Retina	[R] Sugars
4. Prodrug	[S] Vitamin A
	[T] Reduction of Serum K+ level
	[U] Competitive antagonist of cortisone

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

2.9 In parenteral products, listed below are some ingredients. Their main functions are given in [P] to [U]. Match them

1. Thiomersal	[P] Chelating agent
2. Ascorbic Acid	[Q] Buffer
3. EDTA-salt	[R] Anti-oxidant
4. Sodium Chloride	[S] Anti-microbial agent
	[T] Vehicle
	[U] Tonicity adjusting agent

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

2.10 Size, shape and mode of arrangements is typical of certain micro-organisms. Match them correctly

1. Streptococci	[P] Comma and S shaped form
2. Sarcina	[Q] Gram positive arranged in chains
3. Bacillus Anthracis	[R] Multiples of eight
4. Vibrios and Spirilla	[S] Large bacilli, rectangular and gram positive
	[T] Gram negative cocci
	[U] Rod shaped-Acid fast

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

PART - B
Answer any FIFTEEN questions

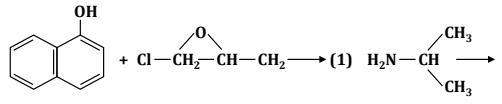
3. Give the names of the equipments used for the following
(a) To determine the flash point in aerosols
(b) To determine the particle size distribution in aerosols
(c) To determine the hardness of the tablets
(d) To determine the particle size in a suspension
(e) To measure the volume of particles in powers

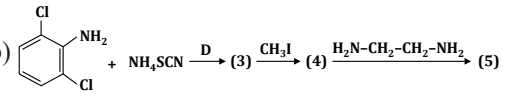
4. (i) Mention 2 gaseous materials used for sterilization
(ii) Name a filter used for sterilization
(iii) Name the method used for sterilization of plastic syringes
(iv) Name an equipment which can give limited aseptic area

5. (a) Give four important side effects of MAO inhibitors
(b) Name a drug which is a presynaptic receptor stimulant

6. (a) Define the following terms
(i) Molar absorptivity
(ii) Frequency
(iii) Equivalent conductance
(b) Give only the equations for the reactions involved in the assay (IP-1985) of I.N.H.

7. Complete the following reactions by inserting the appropriate products.

(a) 

(b) 

8. Define mottling. Give three reasons for mottling

9. (a) Name the causative organisms of the following infections
(i) Intestinal and extraintestinal amoebiasis
(ii) Schistosomiasis
(iii) Filariasis
(b) Name a Macrolide antibiotic containing a lactone ring and one or more deoxy sugars which inhibits protein synthesis
(c) A derivative of Tetracyclines which has greater acid and alkaline stability and slower rate of excretion. It produces higher and more prolonged blood levels. Name it

10. Give one typical identification test each for
(a) Eugenol in clove oil
(b) Cardenolides of Digitalis
(c) Alkaloids of Belladonna
(d) Alkaloids of Ergot
(e) Glycosides of Senna

11. Laboratory report of the blood analysis of a patient showed RBC count = 440000/cu mm. Hb content 11.2 gm/100 ml Calculate the % age of Haemoglobin, % of red cell and colour index
Comment on the condition of the patient
Normal value. RBC count = 500000/cu mm
Hb content = 14.8 gm/100 ml.

12. Complete the following equations showing the structure of reactants and products
(a) Pyrazine-2-Carboxylic acid is treated with CH3OH and the resulting compound is treated with ammonia
(b) 5-Chloro salicylic acid is treated with 2 chloro-4-nitro aniline in presence of PCl3
(c) 2-methyl-5-nitro imidazole is treated with 2-chloro ethanol, resulting compound is benzoylated

13. Categorize the following drugs pharmacologically and draw the heterocyclic system present in them
(i) Imipramine (ii) Diazepam
(iii) Cimetidine (iv) Dipyridamole
(v) Thiotepa

14. (a) Name four specific tests in the investigation of a suspected case of AIDS
(b) Name the organism which is used in the microbiological assay of Gentamicin

15. (a) Calculate the half life for a drug formulation which is most stable at pH 2.5 at which pH, the rate constant is 5×10-7 s¹ at 25°C. The drug obeys first order kinetics.
(b) Give the Henderson-Hasselbalch equation for a weak base.
(c) Define the term: Area under the curve.

16. (a) The UV spectrum of Benzaldehyde contains different absorption bands. What are the electronic transition taking place to form these bands? Name them.
(b) Define auxochrome. Give two examples.

17. Outline the synthesis of CAFFEINE from Dimethyl urea and ethyl cyanoacetate. Give complete steps showing the reactants and products

18. Give a specimen lable of GENTAMICIN INJECTION [I.P.1985] as per D and C act

19. **Show how you would convert the following. Choose any other reagents if need be. Give equations**
(a) 2-4 dichloro benzoic acid to FUROSEMIDE
(b) 4-chloro benzyl cyanide and 2-chloropyridine to an antihistaminic
(c) Benzhydryl bromide to Diphenhydramine

20. Write the reaction sequence catalyzed by the enzymes for the transfer of acyl Co-A across inner mitochondrial membrane and degradation of fatty acids

21. (a) Give an equation and show how it can be used to measure the solubility of a sparingly soluble salt by conductometry
(b) Give three important requirements to prepare a normal Hydrogen electrode

22. **Name the metabolic reaction and give the structure of the major metabolite formed from the following medicinal agents**
(a) Chlorpromazine (b) 6-mercapatopurine
(c) Meperidine (d) Sulphamethoxazole
(e) Nicotinamide

23. **Write the characteristic I.R. absorption bands from the following functional groups**
(a) > C = 0 group in Aldehydes (b) Free-OH group
(c) Primary amino group (d) C-Cl-stretching
(e) C-NO_2 Aromatic

24. **Write in one or two sentences the mechanism of action of the following**
(a) Isosorbide mononitrate
(b) Sulphamethoxazole and Trimethoprim
(c) Cisplatin
(d) Chloramphenicol

25. **Following phytoconstituents are present in specific part of a crude drug. Give the botanical name and the part in which they are present**
(a) Morphine
(b) Eugenol
(c) Deserpidine
(d) Dihydroxy Anthracene derivatives
(e) Ergotoxine

26. **Give the drug interactions for the following combination. Answer in 2 sentences each**
(a) Acetazolamide and Quinidine
(b) Methyl Dopa and Chlorothiazide
(c) Amphotericin-B and Digitalis glycosides
(d) Ascorbic Acid and PAS
(e) Haloperidol and Rifampicin

27. **Name and draw the structural formula of a**
(a) Vitamin which participates in the metabolic reaction as coenzyme-A
(b) Water soluble vitamin which is derived from sugar
(c) Vitamin which contains Pteridine ring system and is used as an antianemic factor
(d) Vitamin which as coenzyme takes part in the decarboxylation of keto acid
(e) Vitamin which forms part of NAD and NADH

Answer Key

PART (SECTION - I)

1.1 - b	1.2 - c	1.3 - b	1.4 - d	1.5 - c	1.6 - a	1.7 - d	1.8 - a	1.9 - b	1.10 - c
1.11 - b	1.12 - b	1.13 - b	1.14 - b	1.15 - d	1.16 - b	1.17 - a	1.18 - b	1.19 - d	1.20 - a
1.21 - d	1.22 - a	1.23 - d	1.24 - d	1.25 - a	1.26 - d	1.27 - a	1.28 - c	1.29 - a	1.30 - d
1.31 - d	1.32 - d	1.33 - c	1.34 - a	1.35 - b					

PART (SECTION - II)

2.1- c	2.2 - a	2.3 - a	2.4 - b	2.5 - c	2.6 - a	2.7 - d	2.8 - d	2.9 - c	2.10 - a

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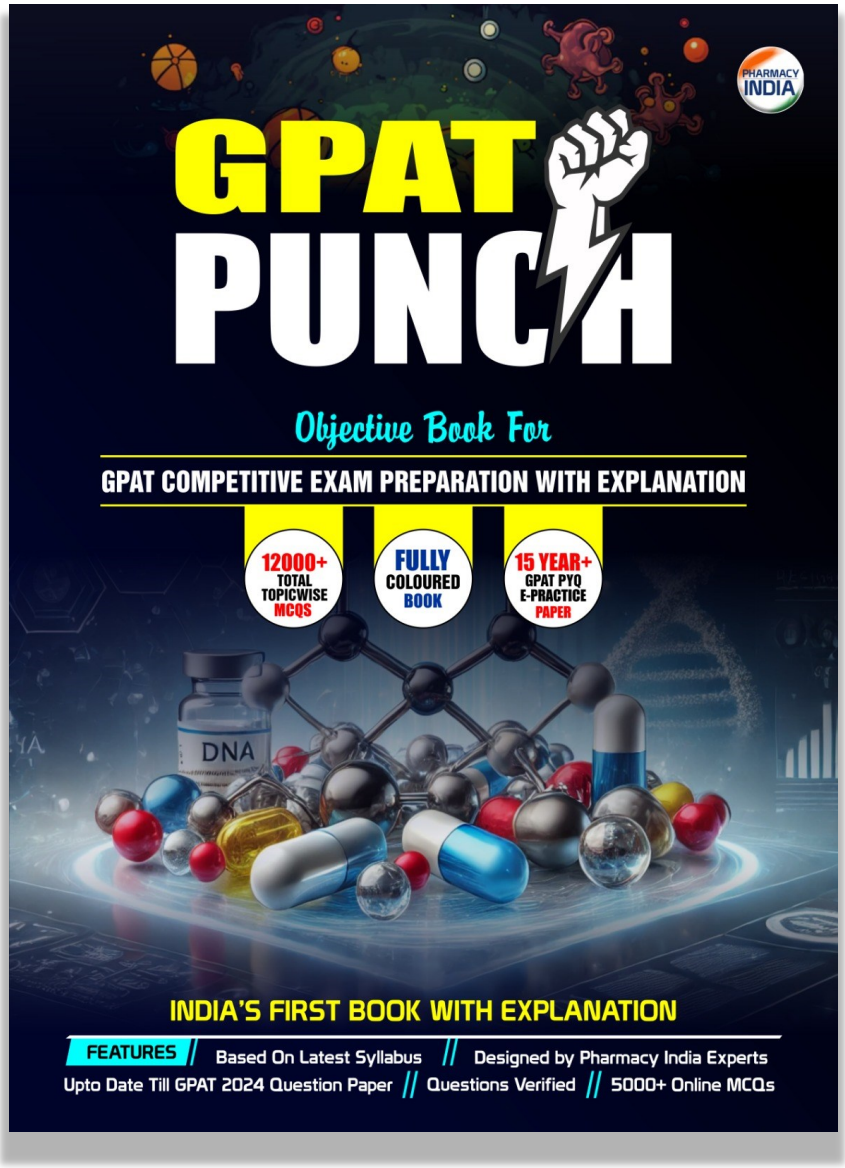

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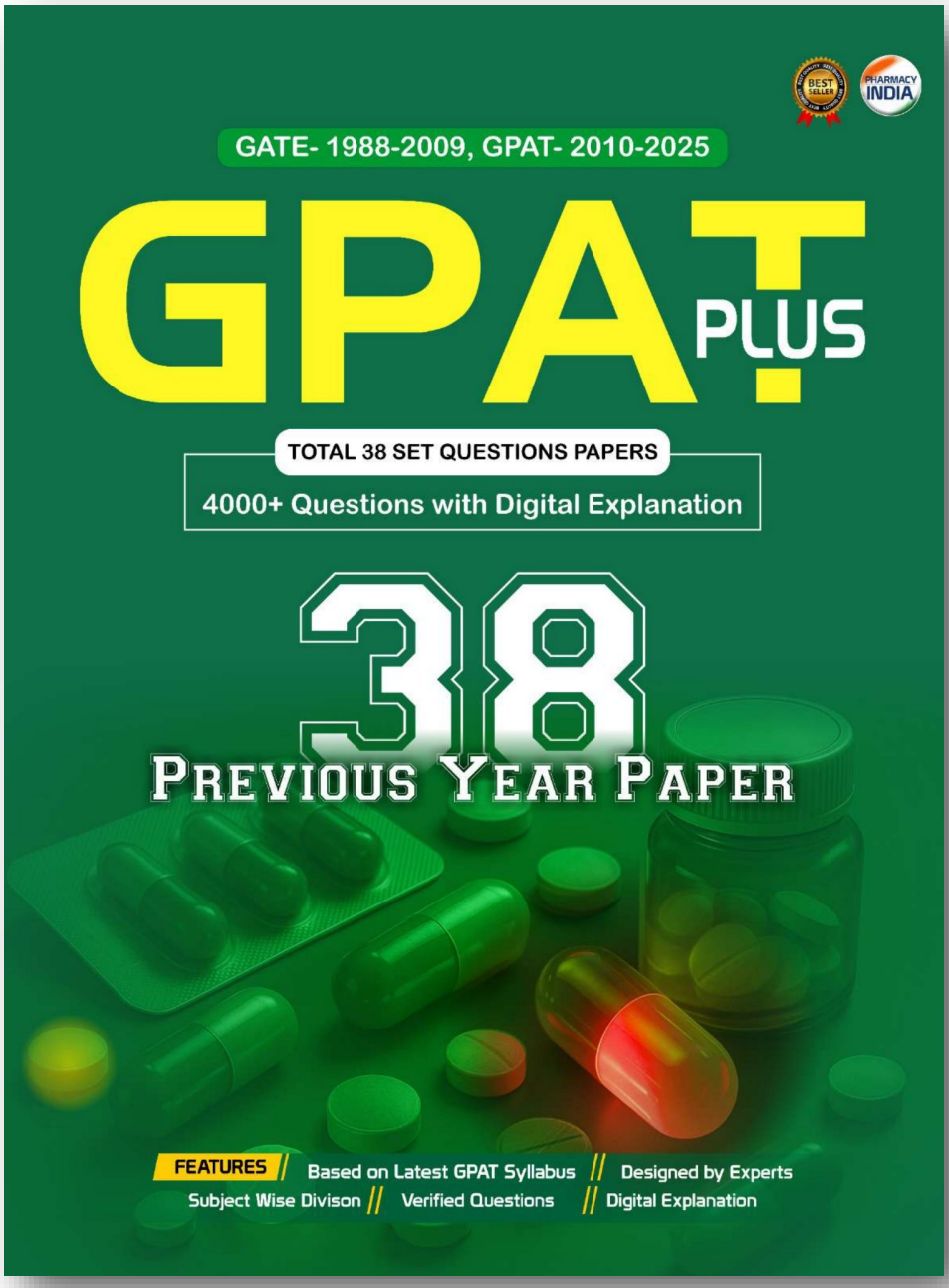

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