

GATE-1994

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

1. Multiple choice question

i. Natural camphor is

- (a) An optically inactive aldehyde obtained from cinnamomum camphora
- (b) A white dextrorotatory ketone obtained from the wood of cinnamomum camphora
- (c) A white optically inactive ketone obtained from the bark of cinnamomum camphora
- (d) A white volatile aldehyde obtained from the bark of cinnamomum camphora

ii. Ingredients used for capsulation in soft capsule should flow by gravity at a temperature not exceeding

- (a) 35°C
- (b) 30°C
- (c) 25°C
- (d) 20°C

iii. The region of the electromagnetic spectrum below 200 nm is known as

- (a) Vacuum ultra violet region
- (b) Far UV region
- (c) Low UV region
- (d) Microwave region

iv. O/W micro emulsion containing hydrophilic surfactant produces

- (a) Translucent emulsion
- (b) Transparent emulsion
- (c) Milky white emulsion
- (d) Intense white emulsion

v. Which of the following steroids shows predominant mineralocorticoid action?

- (a) Hydrocortisone
- (b) Spironolactone
- (c) Dexamethasone
- (d) Fludrocortisone

vi. The factors affecting diffusion current in polarography can be denoted by

- (a) Nernst equation
- (b) Ilkovic equation
- (c) Lambert's law
- (d) Mark-Houwink equation

vii. Rotosort is equipment used

- (a) To separate unfilled capsules
- (b) To fix the cap and body of the capsules after filling
- (c) To separate the improper tablets
- (d) To adjust the required compression for the tablets

viii. As per G.M.P. permitted limit of solid contents in water for injection is

- (a) 100 ppm
- (b) 1.0 ppm
- (c) 0.1 ppm
- (d) 10.0 ppm

ix. Nujol is

- (a) Hexachlorobutadiene
- (b) Mineral oil
- (c) Perfluorokerosene
- (d) Fluorolube

x. Which of the following is a microsomal enzyme inducer?

- (a) Indomethacin
- (b) Clofibrate
- (c) Tolbutamide
- (d) Glutethimide

xi. Fiducial limit is a term used in

- (a) Microbiological assay
- (b) Biological assay
- (c) Chemical assay
- (d) Instrumental methods of assay

xii. Phenothiazines are metabolized

- (a) In the hepatic microsomal system by hydroxylation followed by conjugation with glucuronic acid
- (b) In the liver by oxidation
- (c) In the hepatic microsomal system by reduction
- (d) In the hepatic microsomal system by oxidation followed by conjugation with glycine.

xiii. Benzodiazepines potentiate

- (a) The binding of protein to nervous tissue
- (b) The binding of GABA to liver
- (c) The binding of GABA to receptors
- (d) The binding of GABA to carbohydrates

xiv. Benzalkonium chloride is a germicidal surfactant which is rendered inactive in the presence of

- (a) Organic acid
- (b) Cationic surfactants
- (c) Soaps
- (d) Inorganic salts

xv. Enkephalins are

- (a) Exogenous compounds useful in Analgesia
- (b) Endogenous ligands which are pentapeptides that are localized in some nerve endings.
- (c) Endogenous ligands which are tripeptides that are present in nervous tissue
- (d) Endogenous ligands which are tetrapeptides that are present in cardiovascular tissue

xvi. Benorylate is a Prodrug, chemically it is polymeric condensation product of

- (a) Aluminium oxide and aspirin
- (b) An acetyl salicylic ester of phenol
- (c) An acetyl salicylic ester of paracetamol
- (d) An acetyl salicylic ester of B-naphthol

xvii. Listed below are some of the common vehicles, which one is most appropriate for the intravenous admixture of ampicillin 500 mg/50 ml

- (a) 5% Dextrose injection
- (b) 5% Dextrose and 0.9% Sodium Chloride solution
- (c) 2.5% Dextrose and 0.45% Sodium Chloride injection
- (d) 0.9% Sodium Chloride injection

xviii. Acetonides are prepared to improve the bioavailability of certain drugs. Which of the following is available as acetonide

- (a) Clonidine
- (b) Prednisolone
- (c) Pyrimethamine
- (d) Triamcinolone

xix. Which one of the following indicators is used in Complexometric Titration

(a) Crystal Violet (b) Murexide
(c) Eosin (d) Methyl Orange

xx. Betamethasone is

(a) 9α Fluoro $11\beta, 17\alpha, 21$ trihydroxy 16β methyl pregn-1, 4 diene 3, 20 dione
(b) 9α Fluoro $12\beta, 13\alpha, 21$ trihydroxy 17β methyl pregn-1, 4 diene 3, 20 dione
(c) 9α Fluoro $11\beta, 17\alpha, 21$ trihydroxy 16β methyl estra-1, 4 diene 3, 20 dione
(d) 9α Fluoro $11\beta, 17\alpha$, dihydroxy 16β methyl pregn-1, 4 diene 3, 20 dione

SECTION - II
(Fill In The Blank)

2. Fill in the blanks with proper answer

A. The anti-inflammatory agent sulindac has the closest structural similarity to _____

B. A long polypeptide which possesses potent analgesic activity and found in the Pituitary and hypothalamus is _____

C. Aminophylline I.P. contains Theophylline and _____

D. Radiopharmaceuticals are filled up in suitable containers in a protected laminar flow cabinet _____

E. Efficiency of a filter used for sterilization is determined by its _____

F. The finger print region in IR spectrum ranges from cm^{-1} .

G. is the ideal micro-encapsulation process for thermostable ingredients _____

H. Spinning of a nucleus perpendicular to the applied field is known as _____

I. The test organism for the microbiological assay of chloramphenicol IP is _____

J. Spironolactone is a competitive antagonist of _____

K. Colchicine is an alkaloid obtained from _____

L. A typical auxin of plant, which is found in growing tissue is _____

M. The largest peak in the mass spectrum is known as _____

N. Procainamide when given intravenously can cause a drop in blood pressure probably from _____

O. The most important property of Digitalis glycosides is their positive _____

P. In non-aqueous titration of amine halides, the halide ion is removed by the addition of _____

Q. Milk of Magnesia is a preparation containing between 7 and 8.5% of _____

R. Light-liquid paraffin IP and Liquid paraffin IP is differentiated by their _____

S. Papain is an enzyme. _____

T. The systematic name of acid-4-lactone. is L-threo-2,3,4,5,6-penta hydroxy-2-hexenoic _____

3. State whether the following are TRUE or FALSE. If the statements are FALSE, CORRECT them. Give reasons and justify the statements in one or two sentences only.

(A) Quinidine is often given intra-muscularly
(B) Micropore cellulose membrane filters are disposed after use by burning
(C) The glass electrode used in potentiometry should not be used in aqueous media.
(D) Lidocaine can be given by continuous intravenous infusion.
(E) Acetazolamide is a sulfonamide type drug used as anti-bacterial
(F) Liquids containing water above 5% and low molecular weight water soluble organic compounds are not encapsulated in soft gelatin capsules.
(G) Neutral molecules produced in the fragmentation cannot be detected in the mass spectrometer
(H) Stable and metastable polymorphs are only included in the preparation of chloramphenicol suspension
(I) Dimethyl sulphoxide is used as permeation inhibitor in transdermal preparations.

(J) The main oxidation product of B carotene is 2 molecular portions of geronic acid hence it shows the presence of an ionone ring structure
(K) Thymol and menthol give a violet colour reaction with neutral ferric chloride solution.
(L) Dry mixtures are the common pediatric dosage forms, because of their extended half life

(M) The reversible oxidation and reduction system of Ascorbic acid accounts for its biological function
(N) Digitalis leaves, after collection should be dried as rapidly as possible at a temperature of about 60°C .
(O) The process of gel filtration involves separation of materials on the basis of particle size.

4. Match of the following

i. The biological indicators mentioned below are used for specific type of sterilization listed [P] to [T]. Match them

1. <i>Bacillus subtilis</i>	[P] Ionising radiation
2. <i>Bacillus stearothermophilus</i>	[Q] Dry heat sterilization
3. <i>Bacillus pumilus</i>	[R] Filtration
4. <i>Pseudomonas dementia</i>	[S] Moist heat sterilization
	[T] Gaseous sterilization

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

ii. Following are some of the starting materials for the synthesis of compounds listed from [P] to [T]. Match them correctly

1. y- Picoline	[P] Diethyl Carbamazine
2. 2-Nitro thiophenol	[Q] Isoniazid
3. Piperazine and Diethyl Carbamoyl Chloride	[R] Chlorpromazine
4. 2-Chloro Phenothiazine	[S] Diltiazem
	[T] P.A.S.
(a) 1-[Q], 2-[P], 3-[R], 4-[S]	
(b) 1-[P], 2-[Q], 3-[S], 4-[R]	
(c) 1-[Q], 2-[S], 3-[P], 4-[R]	
(d) 1-[Q], 2-[R], 3-[T], 4-[P]	

iii. Microscopical characters [P] to [T] are associated with the plant drugs listed below. Match them

1. Elettaria cardamomum	[P] Rhytidome
2. Quillaia saponaria	[Q] Clothing and glandular trichomes
3. Digitalis purpurea	[R] Thin membranous arillus
4. Atropa belladonna	[S] Stomata of the anisocytic type
	[T] Concave midrib
(a) 1-[R], 2-[P], 3-[Q], 4-[S]	
(b) 1-[P], 2-[Q], 3-[S], 4-[R]	
(c) 1-[T], 2-[P], 3-[Q], 4-[R]	
(d) 1-[Q], 2-[R], 3-[T], 4-[P]	

iv. The equipment listed [P] to [T] are used for the identification of the properties of aerosol mentioned below. Match them

1. Particle size determination	[P] Pycnometer
2. Identification of propellants	[Q] Rotational viscometer
3. Stability of foam	[R] Tag open cup apparatus
4. Flash point	[S] Infrared spectroscopy
	[T] Cascade impactor
(a) 1-[Q], 2-[P], 3-[R], 4-[S]	
(b) 1-[P], 2-[Q], 3-[S], 4-[R]	
(c) 1-[T], 2-[S], 3-[Q], 4-[R]	
(d) 1-[Q], 2-[R], 3-[T], 4-[P]	

v. Match the terms mentioned from [P] to [T] with the corresponding spectroscopic methods

1. IR	[P] Antibonding orbital
2. Mass Spectra	[Q] Stretching and bending
3. NMR	[R] Metastable ion
4. UV	[S] Chemical shift
	[T] Depolarisation
(a) 1-[Q], 2-[P], 3-[R], 4-[S]	
(b) 1-[P], 2-[Q], 3-[S], 4-[R]	
(c) 1-[T], 2-[P], 3-[Q], 4-[R]	
(d) 1-[Q], 2-[R], 3-[S], 4-[P]	

vi. Pharmacological activity of certain well known plant drugs are listed [P] to [T]. Match them

1. Papaverine	[P] Weak analeptic
2. Camphor	[Q] Vasodilator
3. Veratrum alkaloids	[R] Antineoplastic
4. Vincristine	[S] Cardiac depressant
	[T] Anxiolytic

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

vii. Given below are some of the common reactions. Their definitions are listed [P] to [T] Match them

1. Saponification	[P] Reaction of acids and bases to form salt and water
2. Esterification	[Q] Reaction of an oil with an alkali to form soap and glycerol
3. Neutralisation	[R] Reaction in which hydrogen atoms are added to double bonds
4. Hydrolysis	[S] Reaction in which hydroxyl group is replaced by alkoxy group
	[T] Reaction of salt or ester with water to form acids and bases or alcohol

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

viii. Listed below are some of important drugs. Classify them as per the relevant Schedules of Drugs and Cosmetics Act

1. Chlorpropamide	[P] Schedule G
2. Betamethasone benzoate	[Q] Schedule M
3. Amaranth	[R] Schedule H
4. Dextroamphetamine	[S] Schedule Q
	[T] Schedule X

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

ix. Match the coatings given below with their corresponding techniques listed [P] to [T].

1. Compression coating	[P] Air in the coating pan is replaced with nitrogen
2. Dip Coating	[Q] Application of coating to conductive substrates
3. Electrostatic Coating	[R] Acid insoluble coating
4. Vacuum Film coating	[S] A tablet within a tablet
	[T] Repeated coating and drying

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

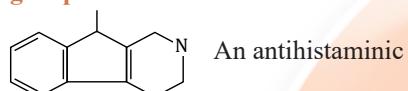
x. The most appropriate pharmacological actions of the following drugs are listed in [P] X. to [T]. Match them

1. Verapamil	[P] Calcium channel blocker
2. Propranolol	[Q] Coronary vasodilator
3. Dipyridamole	[R] B-Adrenergic blocker
4. Hydralazine	[S] Arteriolar vasodilator
	[T] Arterial and venous vasodilator

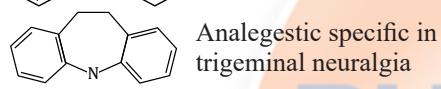
(a) 1-[Q], 2-[P], 3-[R], 4-[S]
 (b) 1-[P], 2-[R], 3-[Q], 4-[S]
 (c) 1-[T], 2-[P], 3-[Q], 4-[R]
 (d) 1-[Q], 2-[R], 3-[T], 4-[P]

PART - B

5. Following ring structures are present in well-known drugs on their pharmacological category is indicated Complete the structure by introducing the relevant groups and their common name



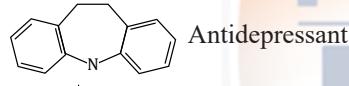
An antihistaminic



Analgesic specific in trigeminal neuralgia



Antihypertensive



Antidepressant



Antiinflammatory Analgesic

6. Give the names of five important factors which protect the chemical stability of medicaments in parenterals

7. Give reasons for the following

- Temperature programming gives the best result in gas chromatography.
- The detectors used in U.V. and visible region cannot be used in longer wave length.
- In polarographic analysis expelling dissolved oxygen by passing of inert gas is done before the actual measurement
- Phenol and anisole fluorescence at pH 7, but at pH 12 Phenol does not show fluorescence.
- Buffer solution is always used in E.D.T.A. titration.

8. Draw inferences for the following

- Microscopic examination of powdered digitalis leaves showed small leaf parts with densely covered large wooly hairs.
- Two different samples of squill. One gives reddish purple colour with iodine and another pale yellow colour.
- A transverse section of Belladonna root sample showed number of concentric cambia, Parenchyma shows acicular calcium oxalate crystals.
- To an alkaloidal salt solution in water bromine water and dilute ammonia solution are added - a bright green colour is produced

(v) An alkaloid when treated with p-dimethyl amino benzaldehyde reagent in presence of H₂SO₄ and traces of Ferric chloride gives blue violet colour

9. Give the mechanism of action of the following drugs. Answer each in not more than two sentences

- Nifedipine
- Hexamethonium
- Interferons
- Pyrantel pamoate
- Erythromycin

10. Draw the heterocyclic system present in the drugs listed below and name them

- Nitrofurantoin
- Cloxacillin
- Primidone
- Mebendazole
- Methotrexate

11. Give reasons for the following

- Using opaquant-extenders in film-coating of tablets.
- Elevation of storage temperature in Accelerated stability studies.
- Grossing in syrup coating
- Application of Stoke's law in emulsion preparation

12. Mention 5 important factors for selection of Fluid Bed Spray Granulator.

13. (A) Draw the configurational boat and chair structures of

- 3a Hydroxy tropane
- 33 Hydroxy tropanes
- 6, 73 Epoxy-34-hydroxy tropanes

(B) Adult dose of a drug is 150 mg/kg and the drug is available as tablets of 2 mg strength Calculate the requirement for a boy aged 14 years, weighing 35 kg

14. (A) When was Pharmacy Act passed

(B) Define the following as per Pharmacy Act.

- Central Register
- First Register
- Education Regulation
- Schedule F

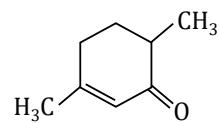
15. Give the names and chemical nature of the principal constituents present in the volatile oil

- Coriandrum sativum
- Carum carvi
- Pimpinella anisum
- Myristica fragrans
- Anethum graveolens

16. (A) Define:

- Chromophore
- Equivalent Conductance

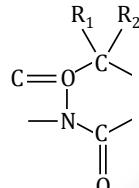
(B) What is λ_{max} ? How λ_{max} in the following structure is calculated



17. (A) Name 4 important additives used in the formulation of hard gelatin capsule

(B) What peak plasma concentration might be obtained by administering 60 mg of a drug ($V = 0.4 \text{ l/kg}$) to a boy weighing 40 kg

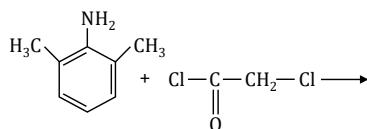
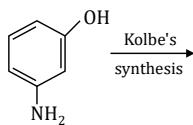
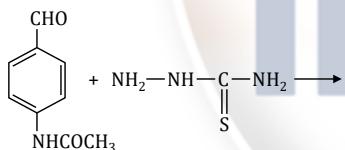
18. The MAO inhibitors form stable complexes with monoamine oxidase, irreversibly inactivating it and thereby preventing the oxidative deamination of biogenic amines. Name 5 of these biogenic amines
19. Give the principle, with relevant equations of the reactions involved and the method of assay of Amylobarbitone IP
20. Anti convulsants containing the ureide structure is disrupted by the common formula given below. Different classes of these compounds have different groups which are missing in the structure, enter them and give their names



21. Show the structural alteration in the compounds mentioned, state what improvement in their activity is resulted

- (i) Introduction of ethinyl group at C17 in Estradiol
- (ii) Attachment of tertiary amino group to the 4th carbon of the butyrophenone
- (iii) Introduction of 3, 5 dimethoxy-4-ethoxy carbohy-droxy group at C18 in Reserpine
- (iv) Introduction of chloro group at 7 positions of 1, 3 dihydro-1- methyl, 5, phenyl 2H, 1-4 benzodiazepine 2-one

22. Complete the following reactions given the name and structural formula of the final product



23. Give the mechanism of action of osmotic diuretics

24. What happens when? Give complete equations

- Succinaldehyde, methylamine and acetone are condensed at room temperature.
- Chloramphenicol (?) is hydrolyzed, the resulting product is oxidized with periodate.

25. Starting from the following, outline the synthesis of

- Bephenium hydroxynaphthoate from 1-Chloro-2-phenoxy ethane
- Trimethoprim from Trimethoxy benzaldehyde and 3 ethoxy-propionitrile

26. Complete the following reaction

(1) Scillaren A $\xrightarrow[\text{Hydrolysis}]{\text{Enzyme}}$ (1) + glucose $\xrightarrow{\text{acid hydrolysis}}$ (2) + (3)

(2) Scillaren A $\xrightarrow[\text{Hydrogen}]{\text{Acid}}$ (4) + (5)

27. Draw the structural formula for the following

- Methyl 11, 17a dimethoxy 18 β (3, 4, 5 trimethoxy benzoyloxy) 3 β , 20 a Yohimbane - 16 β carboxylate.
- 3, 7 dihydro-1, 3, 7 trimethyl purine 2, 6 dione
- 4-Chloro-N-furfuryl-5-sulphamoyl anthranilic acid
- 11 β , 17 α , 21 trihydroxypregna-14-diene-3, 20-dione
- N-(5-methyl isoxazol-3-yl) Sulphanilamide

28. List the important parts of a UV double beam spectrophotometer and mention their Functions

29. Show how the following drugs are transformed. Name their metabolic product:

(i) Meprobamate	(ii) Salicylic acid
(iii) INH	(iv) Nor-epinephrine
(v) Glyceryl trinitrate	

Answer Key

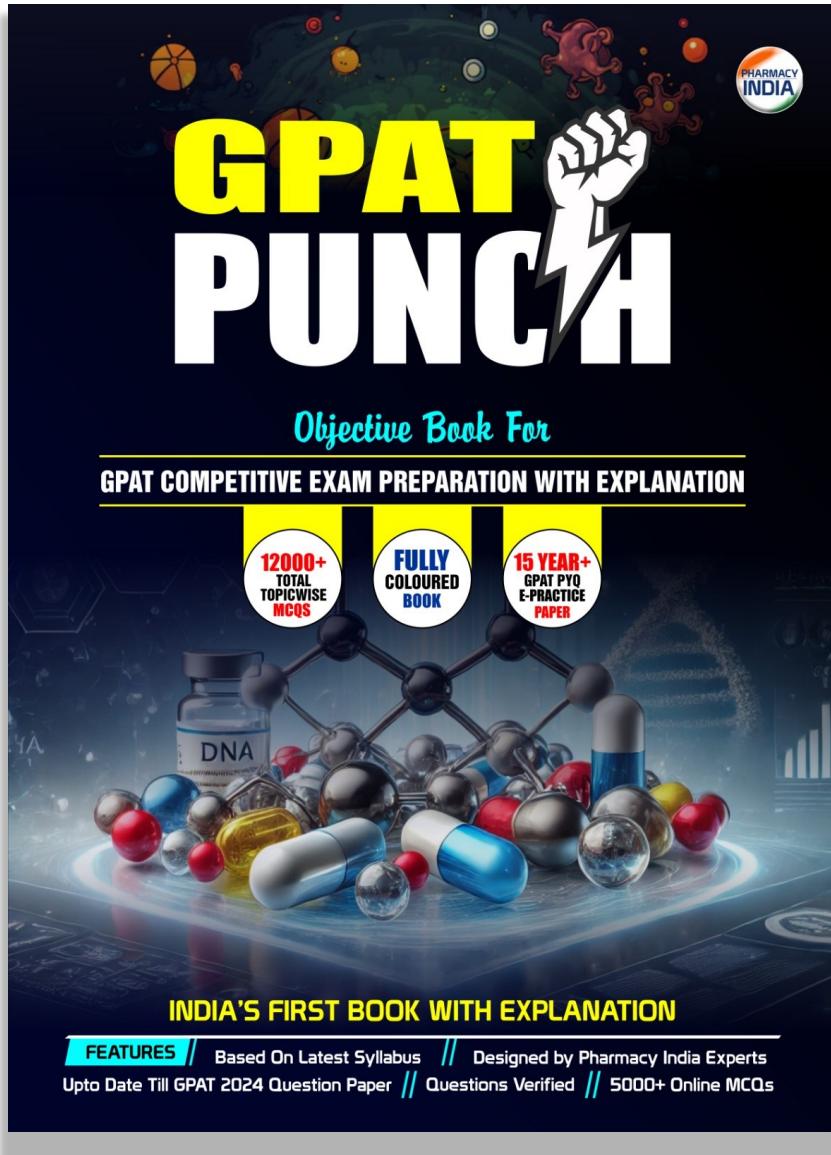
PART (SECTION - I)

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

PART (SECTION - II)

i - b ii - c iii - a iv - c v - d vi - b vii - a viii - d ix - a x - b

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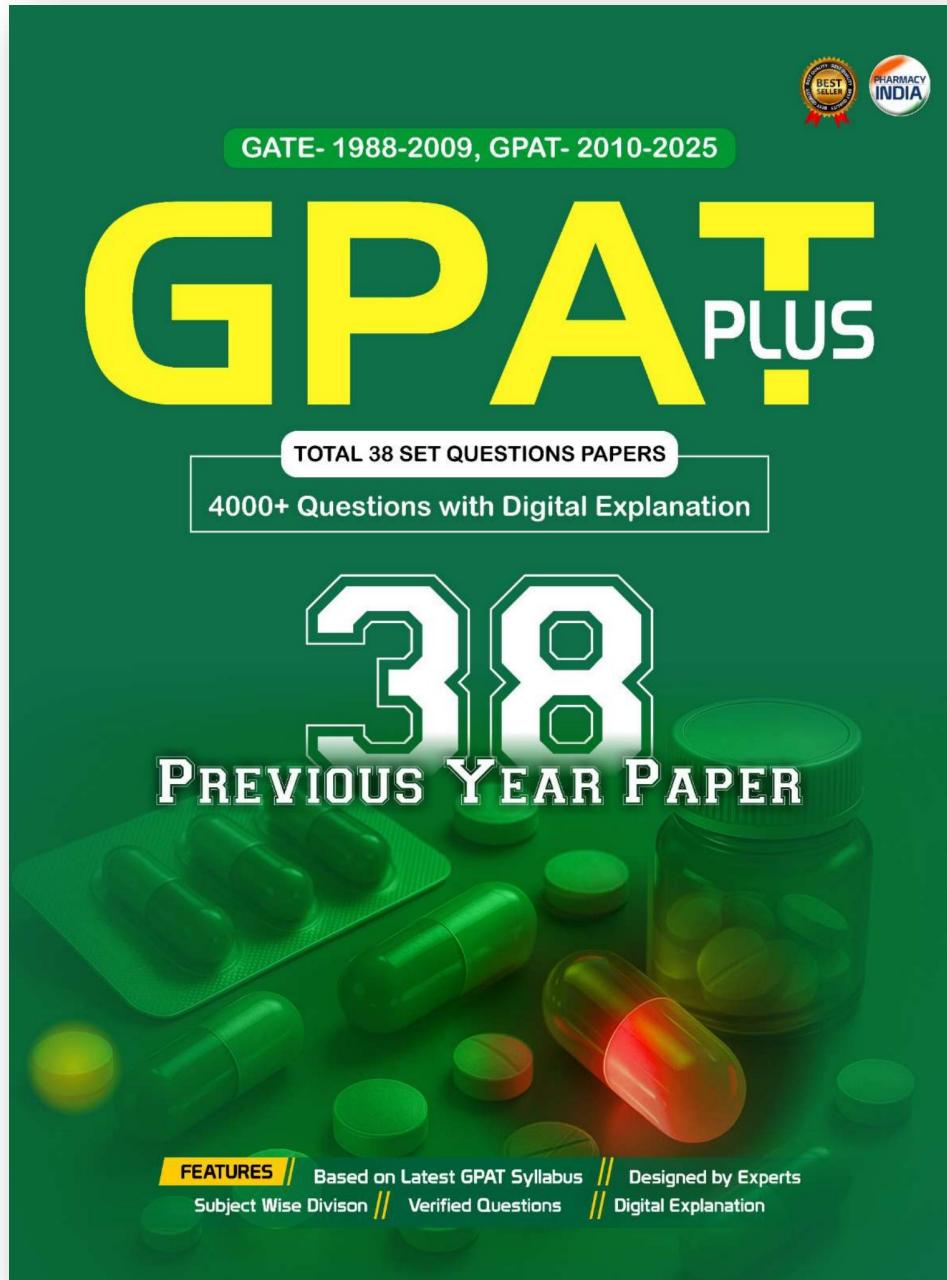
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