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MODEL PAPER-24

DIGITAL EXPLANATION

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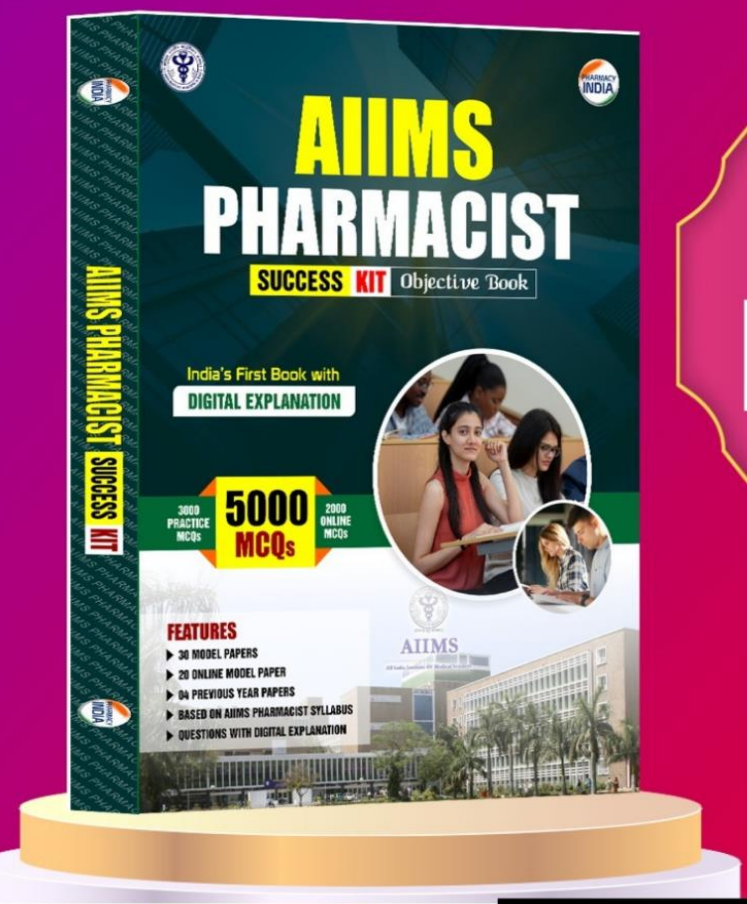

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Model Paper – 24 | Detailed Solutions

1. The ---------- due

- **(b) Hydrogen bonding**

Explanation:

Phenols have a hydroxyl (-OH) group attached to an aromatic ring. The hydroxyl group can form **intermolecular hydrogen bonds**, significantly increasing the boiling point compared to other compounds of similar molecular weights.

- **Hydrogen bonding** occurs between the hydrogen atom of one -OH group and the oxygen atom of another, resulting in strong cohesive forces.
- This explains their high boiling points and relative stability as liquids or low-melting solids.

Reference:

- *Organic Chemistry*, Morrison and Boyd, 7th Edition, Page 512.

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2. IR ---------- of:

- **(b) A carbonyl group and phenolic OH in the sample respectively**

Explanation:

- **1740 cm^{-1}**: This peak is characteristic of a **carbonyl group (C=O)**, typically found in ketones, aldehydes, and esters.
- **3600 cm^{-1}**: This broad peak corresponds to **hydroxyl (-OH)** groups, especially those found in phenols or alcohols.

By identifying both peaks, we conclude the sample contains a carbonyl group and a phenolic hydroxyl group.

Reference:

- *Introduction to Spectroscopy*, Pavia, Lampman, and Kriz, 5th Edition, Page 150.

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3. The ---------- is:

- **(d) N-(4-hydroxyphenyl) acetamide**

Explanation:

- Paracetamol is a compound with a hydroxyl (-OH) group on the benzene ring and an amide group ($-CONH_2$).
- Its structure is accurately represented as **N-(4-hydroxyphenyl) acetamide** according to IUPAC nomenclature:
  - **N-** indicates substitution on the nitrogen atom.
  - **(4-hydroxyphenyl)** denotes the hydroxyl group on the 4th position of the benzene ring.
  - **acetamide** signifies the presence of the amide group.

Reference:

- *Textbook of Organic Chemistry*, Bahl and Bahl, 21st Edition, Page 678.

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4. Match ---------- identify:

- **(b) (i)–Q, (ii)–R, (iii)–S, (iv)–P**

Explanation:

1. **Iodine vapor (i)**: Used to identify **organic bases (Q)**.
2. **1% Ninhydrin (ii)**: Reacts with **amino acids (R)**, producing a characteristic purple or blue color.
3. **2,4-Dinitrophenyl hydrazine (iii)**: Identifies **aldehydes and ketones (S)**, forming a yellow-orange precipitate.
4. **Dragendorff reagent (iv)**: Used for **alkaloids (Q)**, yielding an orange or red complex.

Reference:

- *Practical Pharmaceutical Chemistry*, Beckett and Stenlake, 4th Edition, Page 258.

---

5. **If ---------- get a:**

- **(b) 1 N solution**

Explanation:

The normality (N) of a solution is calculated as:

$$\text{Normality} = \frac{\text{Weight of solute (g)}}{\text{Equivalent weight of solute} \times \text{Volume (L)}}$$

1. **Weight of solute**: 5.6 g
2. **Equivalent weight of KOH**: 56 g/mol (since KOH dissociates completely into K^+ and OH^-, its equivalent weight equals its molar mass).
3. **Volume**: 100 ml = 0.1 L

$$\mathbf{N = \frac{5.6}{56 \times 0.1} = 1}$$

Thus, the solution is **1 N**.

Reference:

- *Advanced Practical Medicinal Chemistry*, Ashutosh Kar, 3rd Edition, Page 101.

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6. Which ---------- solvents?

- **(d) Cyclohexane < Toluene < Acetone < Acetonitrile**

Explanation:

- **Elution order** in chromatography depends on the polarity of the solvents.
  - **Cyclohexane**: Nonpolar.
  - **Toluene**: Slightly polar.
  - **Acetone**: Moderately polar.
  - **Acetonitrile**: Highly polar.
- The increasing order of elution corresponds to increasing polarity: Cyclohexane < Toluene < Acetone < Acetonitrile.

Reference:

- *Chromatography: Concepts and Applications*, Schoenmakers, 3rd Edition, Page 78.

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7. How ---------- compound?

- **(c) 16**

Explanation:

The number of stereoisomers is calculated using the formula:

Number of stereoisomers=2n\text{Number of stereoisomers} = 2^nNumber of stereoisomers=2n

where nnn is the number of chiral centers.

- For 4 chiral centers: 24=162^4 = 1624=16.
- Therefore, there are **16 possible aldohexoses**.

Reference:

- *Organic Chemistry*, Morrison and Boyd, 7th Edition, Page 221.

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8. How ---------- HCl?

- **(d) Dilute 8.5 ml of hydrochloric acid to 1000 ml with water**

Explanation:

Steps to Calculate the Dilution:

1. **Determine the concentration of concentrated HCl**:
   - Concentrated hydrochloric acid is typically around 37% HCl by weight, which translates to approximately 12 M (molar) concentration.
2. **Use the dilution formula**:
   - The dilution formula is given by:
   $C_1V_1=C_2V_2$
   where:
   C_1C1 = concentration of the concentrated solution (12 M)
   V_1V1 = volume of the concentrated solution (in mL)
   C_2C2 = concentration of the diluted solution (0.1 M)
   V_2V2 = final volume of the diluted solution
3. **Calculate the volume needed**:
   If you want to prepare, for example, 1 L (1000 mL) of 0.1 M HCl:
   $12M \times V_1 = 0.1M \times 1000mL$
   $\mathbf{V_1 = \frac{0.1 \times 1000}{12} \approx 8.33mL}$

Reference:

- *Vogel's Textbook of Quantitative Chemical Analysis*, 6th Edition, Page 255.

9. KCl ---------- as:

- **(c) Precipitation conductometric titration**

Explanation:

- **Precipitation conductometric titration** involves the precipitation of ions that do not contribute to conductance.
- In the reaction: $KCl + AgNO_3 \rightarrow AgCl$ (precipitate) $+ KNO_3$
  - Conductance remains constant as K^+ and NO_3^- ions replace each other without changing ionic strength.

Reference:

- *Instrumental Methods of Analysis*, Willard and Merritt, 7th Edition, Page 305.

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10. Read ---------- correct?

- **(c) Statements (iii) and (iv) are incorrect**

Explanation:

1. **Maceration**: Suitable for **soft and easily extracted drugs** like gummy substances and expensive drugs. **(i) and (ii) are correct**.
2. **Percolation**: Ideal for **hard and tough drugs** that require a more thorough extraction. **(iv) is incorrect**.
3. **Maceration is not used for gummy substances**, as it may cause clogging. **(iii) is incorrect**.

Reference:

- *Pharmacognosy*, Trease and Evans, 16th Edition, Page 222.

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11. Bloom ---------- of:

- **(b) Gelatin**

Explanation:

- Bloom strength measures the **gel strength** of gelatin and determines its firmness and quality.
- It is the weight in grams required to depress a specified plunger into a gelatin gel of standard dimensions by 4 mm.
- Gelatin with higher bloom strength forms stronger and firmer gels.

Reference:

- *Remington: The Science and Practice of Pharmacy*, 22nd Edition, Page 883.

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12. Select ---------- pharmaceutics:

- **(c) Polyacrylamide**

Explanation:

- **Polyacrylamide** is a synthetic, water-soluble polymer commonly used as a thickener, stabilizer, and in controlled drug release formulations.
- The other options:
  - **Carrageenan** and **Chitosan** are natural polymers.
  - **Sodium starch glycolate** is a superdisintegrant but not a synthetic polymer.

Reference:

- *Handbook of Pharmaceutical Excipients*, Rowe et al., 6th Edition, Page 493.

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13. Select the ---------- the following:

- **(a) Hydrophilic colloids are stable and reversible**

Explanation:

- **Hydrophilic colloids** are reversible and stable due to strong interactions with water molecules.
- **Hydrophobic colloids**, on the other hand, are less stable and irreversible because they do not strongly interact with water and tend to coagulate easily.
- Tyndall effect (scattering of light) is stronger in hydrophobic colloids due to larger particle size.

Reference:

- *Physical Pharmacy: Physical Chemical Principles in the Pharmaceutical Sciences*, Alfred Martin, 5th Edition, Page 125.

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14. Which of ---------- for dendrimers?

- **(c) Dendrimers are heterogeneous**

Explanation:

- **Dendrimers** are:
  - **Nano-sized** molecules with a symmetrical structure.
  - **Radially symmetric** and composed of repeating monomeric units.
  - **Hyperbranched**, leading to a tree-like structure.
- They are **homogeneous** because of their uniform molecular weight and structure, not heterogeneous.

Reference:

- *Nanotechnology in Drug Delivery*, Sarwar Beg et al., 2nd Edition, Page 218.

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15. Different types ---------- the USP?

- **(d) Reciprocating column**

Explanation:

- The USP lists the following official dissolution apparatus:
  - **Basket type (Apparatus 1)**
  - **Paddle type (Apparatus 2)**
  - **Flow-through cell (Apparatus 4)**
  - **Paddle over disc (Apparatus 5)**
- **Reciprocating column** is not an official apparatus in the USP.

Reference:

- *United States Pharmacopeia*, USP 43-NF 38

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16. Which of ---------- System (BCS)?

- **(b) Class II: Low solubility, high permeability: exhibits dissolution rate-limited absorption**

Explanation:

The Biopharmaceutics Classification System (BCS) classifies drugs into four categories based on their solubility and permeability:

1. **Class I**: High solubility, high permeability. These drugs are rapidly absorbed and exhibit excellent bioavailability.
2. **Class II**: Low solubility, high permeability. Their absorption is limited by their dissolution rate.
3. **Class III**: High solubility, low permeability. Their absorption is permeability-limited.
4. **Class IV**: Low solubility, low permeability. These drugs have poor bioavailability and are difficult to formulate for oral use.

Reference:

- *Biopharmaceutics and Pharmacokinetics*, D.M. Brahmankar, 2nd Edition, Page 64.

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17. Select the ---------- phytoconstituents:

- **(a) (i)–S, (ii)–P, (iii)–Q, (iv)–R**

Explanation:

1. **Murexide test (i)**: Specific for **caffeine (S)**, producing a purple color.
2. **Borntrager's test (ii)**: Detects **rhein (P)** and other anthraquinones by producing a red color in alkaline conditions.
3. **Froth formation (iii)**: Indicates **glycyrrhizin (Q)** from saponins, forming persistent foam.
4. **Mayer's test (iv)**: Identifies **alkaloids (R)**, such as atropine, forming a cream-colored precipitate.

Reference:

- *Pharmacognosy*, Kokate et al., 52nd Edition, Page 216.

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18. If 0.8 ----------volatile oil

- **(a) 1.6% v/w**

Explanation:

The yield percentage is calculated as:

$$\textbf{Yield (\% v/w)} = \frac{\textbf{Volume of volatile oil (ml)}}{\textbf{Weight of drug (g)}} \textbf{x100}$$

Substitute the values:

$$\textbf{Yield} = \frac{0.8}{50} \times 100 = 1.6\%\ \textbf{v/w}$$

Reference:

- *Practical Pharmacognosy*, C.K. Kokate, 4th Edition, Page 78.

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19. A sample of ---------- the presence of:

- **(d) Anthraquinone C-glycosides**

Explanation:

- **Borntrager's test** detects free anthraquinones.
- **Modified Borntrager's test** detects **anthraquinone C-glycosides**, which require hydrolysis to release anthraquinones that give the pink color.

Reference:

- *Pharmacognosy*, Trease and Evans, 16th Edition, Page 266.

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20. Which drug ---------- the DRC?

- **(d)** Drug D is most potent and less efficacious than A

Explanation:

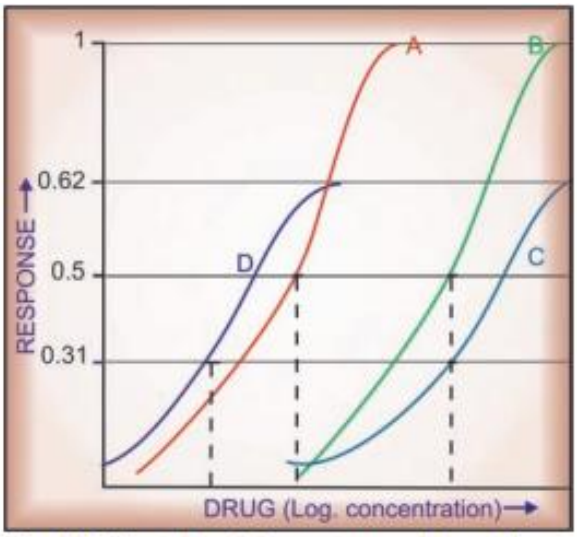

Fig. 4.13: Illustration of drug potency and drug efficacy. Dose-response curve of four drugs producing the same qualitative effect

- Drug B is less potent but equally efficacious as drug A.
- Drug C is less potent and less efficacious than drug A.
- Drug D is more potent than drugs A, B, & C, but less efficacious than drugs A & B, and equally efficacious as drug C

Reference:

- *KD Tripathi, Essentials of Medical Pharmacology*, 7th Edition, Page54.

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21. Which route for ----------pass effect?

Correct Answer: (b) Oral
Explanation:

- Drugs administered orally pass through the **liver (via the portal vein)** before reaching systemic circulation, where **first-pass metabolism** reduces their bioavailability.
- Other routes (subcutaneous, sublingual, buccal) bypass the liver initially.
  Reference: Goodman & Gilman's The Pharmacological Basis of Therapeutics, 13th Edition, Page 32.

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22. If a person ---------- known as:

Correct Answer: (b) Naturally acquired active immunity
Explanation:

- Immunity developed after exposure to a pathogen (e.g., coronavirus) and subsequent immune response involving antibody production is **naturally acquired active immunity**.
- Passive immunity involves antibodies from another source, and artificial immunity involves vaccines.
  Reference: Essentials of Immunology by Roitt, 13th Edition, Page 96.

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23. High plasma ---------- drug to have:

Correct Answer: (b) Prolonged action
Explanation:

- Drugs highly bound to plasma proteins (e.g., albumin) have a **slow release into free form**, prolonging their duration of action.
- Protein binding reduces the rate of elimination and metabolism.
  Reference: Goodman & Gilman's The Pharmacological Basis of Therapeutics, 13th Edition, Page 156.

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24. Which of the ---------- insulin secretion?

Correct Answer: (a) Glimepiride
Explanation:

- **Glimepiride**, a sulfonylurea, stimulates insulin release by **blocking ATP-sensitive K^+ channels** in pancreatic β-cells.
- **Metformin** reduces glucose production (liver), **acarbose** inhibits carbohydrate digestion, and **bromocriptine** acts on dopamine receptors.
  Reference: Basic and Clinical Pharmacology by Katzung, 15th Edition, Page 754.

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25. Which of ---------- not GMO?

Correct Answer: (a) Dolly
Explanation:

- **Dolly**, the cloned sheep, is not a **genetically modified organism (GMO)** but a **clone**, produced via somatic cell nuclear transfer.

- **Golden rice, BT brinjal, and CT corn** are genetically engineered to express specific traits.
  Reference: Biotechnology by B.D. Singh, 1st Edition, Page 324

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26. Classification of ---------- the following?

Correct Answer: (a) Cyano
Explanation:

- Bacterial classification based on shapes includes:
  - **Bacilli**: Rod-shaped.
  - **Cocci**: Spherical.
  - **Spirilla**: Spiral-shaped.
- **Cyano** (referring to cyanobacteria) is classified based on pigment (photosynthetic ability) rather than shape.
  Reference: Prescott's Microbiology, 10th Edition, Page 215.

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27. By which ---------- culture laboratory?

Correct Answer: (b) (i)–S, (ii)–R, (iii)–Q, (iv)–P
Explanation:

- **(i) Laboratory - Fumigation (S):** Sterilizes large spaces using gaseous disinfectants (e.g., formaldehyde or hydrogen peroxide vapor).
- **(ii) Enzyme solution - Micropore filtration (R):** Removes contaminants without damaging heat-sensitive enzymes.
- **(iii) Growth media - Moist heat (Q):** Autoclaving sterilizes media effectively.
- **(iv) Glassware - Dry heat (P):** Achieved using a hot air oven at 160°C–180°C.
  Reference: Principles and Techniques of Biochemistry and Molecular Biology by Wilson & Walker, 7th Edition, Page 241.

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28. regarded ---------- biotechnology.

Correct Answer: (c) Karole Ereky
Explanation:

- **Karole Ereky**, a Hungarian engineer, coined the term **biotechnology** in 1919, referring to the production of products using biological systems.

- Other individuals (e.g., Haberlandt, Murashige) contributed to tissue culture techniques but are not considered the "father" of biotechnology.
  Reference: Biotechnology by B.D. Singh, 1st Edition, Page 1.

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29. For in-vitro ---------- micronutrient?

Correct Answer: (c) Copper
Explanation:

- **Copper (Cu)** is a **micronutrient** required in trace amounts as a cofactor for enzymatic reactions.
- Nitrogen and carbon are **macronutrients**, while phosphate is also a **macronutrient**.
  Reference: Microbial Physiology by Moat, 4th Edition, Page 28.

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30. Which of the ---------- reliability of evidence?

Correct Answer: (b) Case report < randomized clinical trial < randomized double-blind clinical trial < meta-analysis
Explanation:

- **Case report:** Lowest reliability as it involves observations of a single or few cases.
- **Randomized clinical trial:** More reliable due to random assignment of interventions.
- **Randomized double-blind clinical trial:** Higher reliability as both patients and researchers are blinded to reduce bias.
- **Meta-analysis:** The most reliable as it combines data from multiple studies for a robust conclusion.
  Reference: Evidence-Based Medicine by Trisha Greenhalgh, 6th Edition, Page 45.

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31. In the Drugs ---------- clinical trials?

Correct Answer: (d) Schedule Y
Explanation:

- **Schedule Y** of the Drugs and Cosmetics Act provides detailed guidelines for the **requirements and conduct of clinical trials**, including ethical considerations, data reporting, and investigator responsibilities.

- Other schedules pertain to unrelated aspects (e.g., Schedule U for records, Schedule X for psychotropic drugs).
  Reference: Drugs and Cosmetics Act and Rules (India), 2022 Edition, Page 154.

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32. The sequence ---------- summarized by:

Correct Answer: (a) Detection of adverse event → Separating signal from noise → Signal assessment → Recommendation for action → Exchange of information
Explanation:

- Pharmacovigilance involves the detection of **adverse drug reactions (ADRs)**, filtering meaningful data (signal detection), assessing causality, recommending actions to minimize risk, and communicating findings globally.
  Reference: Pharmacovigilance by Elizabeth B. Andrews, 2nd Edition, Page 23.

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33. The Pharmacy ---------- enacted in:

Correct Answer: (b) 1948
Explanation:

- The **Pharmacy Act, 1948**, was enacted to regulate the profession of pharmacy in India, ensuring proper education and licensing for pharmacists.
  Reference: Textbook of Forensic Pharmacy by B.M. Mithal, 6th Edition, Page 12.

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34. The mean ---------- 6, 7 are:

Correct Answer: (d) 3.75 and 2 respectively
Explanation:

- **Mean:** Sum of the numbers ÷\div÷ total count.
  - Mean = (4+2+4+3+2+2+6+7)/8 = 30/8 = 3.75.
- **Mode:** The number that occurs most frequently.
  - **Mode = 2** (appears 3 times).
    Reference: Basic Statistics by B.L. Agarwal, 4th Edition, Page 52.

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35. The full ---------- CPCSEA is:

Correct Answer: (c) Committee for the Purpose of Control and Supervision of Experiments on Animals
Explanation:

- The **CPCSEA** regulates the use of animals in scientific research, ensuring ethical treatment and adherence to proper guidelines.
  Reference: CPCSEA Guidelines, Indian Council of Medical Research, 2022 Edition, Page 10.

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36. The first edition ---------- independent India in:

Correct Answer: (c) 1955
Explanation:

- The **first edition of the Indian Pharmacopoeia (IP)** was published in 1955, under the guidance of the **Indian Pharmacopoeia Committee**, to provide standard references for drugs in India.
  Reference: Indian Pharmacopoeia 2022, Preface.

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37. How many ---------- plasma (5 mEq/L)?

Correct Answer: (d) 36.75
Explanation:

1. **Determine the amount of calcium ions needed:**
   - Human plasma contains 5 mEq/L of calcium ions.
   - We need to prepare 100 mL (0.1 L) of solution.
   - Amount of calcium ions needed = 5 mEq/L * 0.1 L = 0.5 mEq
2. **Convert mEq to mmol:**
   - Since calcium ions have a charge of +2, 1 mEq of calcium ions is equal to 0.5 mmol.
   - Therefore, 0.5 mEq of calcium ions is equal to 0.5 * 0.5 = 0.25 mmol.
3. **Calculate the mass of calcium chloride dihydrate:**
   - Molecular weight of $CaCl_2 \cdot 2H_2O$ = 147 g/mol
   - We need 0.25 mmol of calcium ions, which means we need 0.25 mmol of $CaCl_2 \cdot 2H_2O$.
   - Mass of $CaCl_2 \cdot 2H_2O$ = 0.25 mmol * 147 mg/mmol = 36.75 mg

Therefore, 36.75 mg of calcium chloride dihydrate is required to prepare 100 mL of a solution equal in Ca^{2+} to human plasma.

- **Reference:** Textbook of Biochemistry by Devlin, 7th Edition, Page 56.

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38. Which of ----------enantiomer?

Correct Answer: (d) It is the mirror image of the corresponding (R)-enantiomer
Explanation:

- **(S)- and (R)-enantiomers** are mirror images of each other but are **non-superimposable**.
- The direction of optical rotation (**d- or l-**) is not determined by (S) or (R) configuration.
  Reference: Organic Chemistry by Clayden, 2nd Edition, Page 356.

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39. Which of the ---------- trimethylsilyl ethers?

Correct Answer: (a) F^-
Explanation:

- **Fluoride ions (F^-)** are highly effective in removing the trimethylsilyl (TMS) group due to their strong affinity for silicon.
- Other nucleophiles like OH^-, NH_2^-, and SH^- are less specific and inefficient for this purpose.
  Reference: Advanced Organic Chemistry by Carey and Sundberg, 5th Edition, Page 789.

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40. In oxidation----------to Fe of:

Correct Answer: (d) 6 moles
Explanation:

- The reduction of **$Cr_2O_7^{2-}$ to Cr^{3+}** involves 6 electrons:
  $Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$
- Therefore, 1 mole of dichromate can oxidize **6 moles of Fe^{2+}** (1 electron each).
  Reference: Vogel's Quantitative Chemical Analysis, 6th Edition, Page 356.

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41. Presence of ---------- characteristic of:

Correct Answer: (d) Gram-negative bacteria
Explanation:

- **Gram-negative bacteria** have a unique outer membrane in their cell wall that contains **lipopolysaccharides (LPS)**, contributing to structural integrity and acting as an endotoxin.
- Gram-positive bacteria lack LPS and have thicker peptidoglycan layers.
  Reference: Prescott's Microbiology, 10th Edition, Page 219.

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42. Two bacteria ---------- engineering are:

Correct Answer: (d) Escherichia and Agrobacterium
Explanation:

- **Escherichia coli** is widely used as a host for cloning due to its well-understood genetics.
- **Agrobacterium tumefaciens** is used to transfer genes into plants via its **Ti plasmid**.
  Reference: Biotechnology by B.D. Singh, 1st Edition, Page 245.

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43. Bilirubin ---------- from:

Correct Answer: (d) RBC
Explanation:

- Bilirubin is derived from the breakdown of **hemoglobin** in **red blood cells (RBCs)**. The heme portion is converted to **biliverdin** and then reduced to **bilirubin**.
  Reference: Harper's Illustrated Biochemistry, 31st Edition, Page 273.

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44. Maintaining the volume ---------- narrow range called:

Correct Answer: (c) Homeostasis
Explanation:

- **Homeostasis** refers to the regulation of internal conditions (e.g., fluid balance, pH, and electrolytes) within narrow limits to maintain a stable environment.
  Reference: Guyton and Hall Textbook of Medical Physiology, 14th Edition, Page 290.

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45. Which of the ---------- inhibits renin?

Correct Answer: (c) Aliskiren
Explanation:

- **Aliskiren** is a **direct renin inhibitor**, preventing the conversion of angiotensinogen to angiotensin I.
- Other options:
  - **Enalapril and Captopril:** Angiotensin-converting enzyme (ACE) inhibitors.
  - **Losartan:** Angiotensin II receptor blocker (ARB).
    Reference: Goodman & Gilman's The Pharmacological Basis of Therapeutics, 13th Edition, Page 826.

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46. Which of the ---------- oral administration?

Correct Answer: (c) Nifedipine
Explanation:

- **Nifedipine**, a **dihydropyridine calcium channel blocker (CCB)**, has a **rapid onset of action** when given orally, typically within 20–30 minutes.
- It causes **potent vasodilation**, making it useful for acute hypertensive crises or angina.
- Other CCBs (e.g., verapamil, diltiazem) have slower onsets due to different pharmacokinetics.
  Reference: Goodman & Gilman's The Pharmacological Basis of Therapeutics, 13th Edition, Page 818.

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47. Which drug is ---------- prostaglandin E1?

Correct Answer: (a) Misoprostol
Explanation:

- **Misoprostol** is a synthetic **prostaglandin E1 (PGE1) analog** that protects the gastric mucosa by increasing mucus and bicarbonate secretion.
- It is used to prevent NSAID-induced gastric ulcers and as an abortifacient.
- **Dinoprostone** is a PGE2 analog, not PGE1.
  Reference: Katzung's Basic and Clinical Pharmacology, 15th Edition, Page 567.

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48. Identify the ---------- to neuroleptics:

Correct Answer: (b) Prochlorperazine
Explanation:

- **Prochlorperazine** is a **phenothiazine neuroleptic** that blocks **dopamine (D2) receptors** in the chemoreceptor trigger zone (CTZ), providing antiemetic effects.
- Other options:
  - **Meclizine:** Antihistamine (H1 blocker).
  - **Tropisetron:** Serotonin (5-HT3) antagonist.
  - **Nabilone:** Cannabinoid receptor agonist.
    Reference: Goodman & Gilman's The Pharmacological Basis of Therapeutics, 13th Edition, Page 1032.

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49. Which of ---------- inhibits peristalsis?

Correct Answer: (a) Loperamide
Explanation:

- **Loperamide** is a peripherally acting **μ-opioid receptor agonist** that reduces intestinal motility and inhibits peristalsis, increasing the transit time of intestinal contents.
- Other options:
  - **Bisacodyl** and **Sorbitol:** Stimulant and osmotic laxatives, respectively.
  - **Racecadotril:** Reduces intestinal secretion but does not inhibit peristalsis.
    Reference: Goodman & Gilman's The Pharmacological Basis of Therapeutics, 13th Edition, Page 1083.

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50. Which of ---------- about carbamazepine?

Correct Answer: (a) It can be used in the treatment of bipolar disorder, trigeminal neuralgia, and epilepsy
Explanation:

- **Carbamazepine** is a broad-spectrum drug used for:
  - **Epilepsy** (particularly focal seizures).
  - **Trigeminal neuralgia** (as first-line therapy).
  - **Bipolar disorder** (as a mood stabilizer).
- Other options are incorrect:
  - **(b):** Unlike phenytoin, it does not enhance GABA activity but blocks sodium channels.
  - **(c):** Carbamazepine is an **enzyme inducer**, not an inhibitor.

- **(d):** Mild leukopenia is **not an indication to stop treatment** unless it progresses.
  Reference: Goodman & Gilman's The Pharmacological Basis of Therapeutics, 13th Edition, Page 507.

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51. TNF-α ---------- the following?

Correct Answer: (b) Gram-negative bacteria
Explanation:

- **Tumor Necrosis Factor-alpha (TNF-α)** is a cytokine that plays a key role in the immune response to **Gram-negative bacterial infections**.
- It is primarily released in response to **lipopolysaccharides (LPS)** found in the cell wall of Gram-negative bacteria, leading to inflammation and activation of the immune system.
  Reference: Basic Immunology by Abbas, 6th Edition, Page 89.

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52. Which of ---------- contain DNA?

Correct Answer: (c) Mature RBCs
Explanation:

- **Mature red blood cells (RBCs)** lack a nucleus and therefore do not contain DNA.
- Other options:
  - **Enucleated ovum, hair root, and spermatozoa** all contain DNA in varying amounts.
    Reference: Guyton and Hall Textbook of Medical Physiology, 14th Edition, Page 52.

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53. Hemophilia-A ---------- clotting factor?

Correct Answer: (a) Factor VIII
Explanation:

- **Hemophilia-A** is caused by a deficiency or absence of **Factor VIII**, leading to defective blood clotting.
- **Factor IX deficiency** causes Hemophilia-B.
  Reference: Harrison's Principles of Internal Medicine, 20th Edition, Page 657.

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54. Most of the ---------- lungs as:

Correct Answer: (b) Bicarbonates
Explanation:

- Around 70% of CO_2 produced in tissues is transported as **bicarbonate ions (HCO_3^-)** in the plasma.
- CO_2 reacts with water under the action of **carbonic anhydrase** to form bicarbonates.
  Reference: Harper's Illustrated Biochemistry, 31st Edition, Page 344.

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55. During the ----------for sodium?

Correct Answer: (a) Potassium
Explanation:

- In the **distal convoluted tubule and collecting duct**, **potassium ions (K^+)** are secreted into the tubule in exchange for **sodium ions (Na^+)** during active reabsorption under the influence of **aldosterone**.
  Reference: Guyton and Hall Textbook of Medical Physiology, 14th Edition, Page 376.

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56. A hormone ---------- is called:

Correct Answer: (d) Erythropoietin
Explanation:

- **Erythropoietin (EPO)** is a glycoprotein hormone secreted by the kidney in response to **hypoxia**.
- It stimulates the **bone marrow** to produce red blood cells.
- Other options:
  - **Renin:** Regulates blood pressure.
  - **Aldosterone:** Controls sodium and water balance.
  - **Somatomedin:** A growth factor produced by the liver.
    Reference: Guyton and Hall Textbook of Medical Physiology, 14th Edition, Page 462.

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57. Lowering of ---------- menstrual cycle?

Correct Answer: (c) Progesterone
Explanation:

- A decline in **progesterone levels** at the end of the luteal phase triggers the breakdown of the uterine lining (endometrium), leading to **menstruation**.
- **Estrogen** also declines but does not directly cause menstruation.
  Reference: Essential Endocrinology by Brook, 6th Edition, Page 201.

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58. Change of ---------- known as:

Correct Answer: (d) Deposition
Explanation:

- **Deposition** is the process where a **gas directly transitions into a solid**, bypassing the liquid phase (e.g., formation of frost).
- **Sublimation** is the reverse process (solid to gas).
  Reference: Physical Chemistry by Atkins, 11th Edition, Page 125.

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59. The triple ---------- corresponds to:

Correct Answer: (b) 610 N/m² pressure and 0.0075 °C temperature
Explanation:

- The **triple point of water** is the specific temperature and pressure at which water exists in all three states (solid, liquid, gas) in equilibrium.
  Reference: Physical Chemistry by Atkins, 11th Edition, Page 202.

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60. At the ---------- liquid is:

Correct Answer: (a) Zero
Explanation:

- At the **critical temperature**, the distinction between liquid and gas phases disappears, and thus, **surface tension becomes zero**.
  Reference: Physical Chemistry by Atkins, 11th Edition, Page 357.

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61. Increase in resistance ---------- referred to as:

Correct Answer: (a) Dilatancy
Explanation:

- **Dilatancy** refers to a non-Newtonian flow behavior where the viscosity increases with an increase in shear rate.
- Examples include concentrated suspensions of starch or sand in water.
- Other options:
  - **Rheopexy**: Viscosity increases with time under constant shear.
  - **Thixotropy**: Viscosity decreases with time under constant shear.
  - **Antithixotropy**: Similar to rheopexy but rarely used.
    Reference: Martin's Physical Pharmacy and Pharmaceutical Sciences, 6th Edition, Page 135.

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62. What will be ---------- first-order kinetics?

Correct Answer: (d) 75%
Explanation:

- In **first-order kinetics**, the amount of drug eliminated is proportional to its concentration.
- After **2 half-lives**, 75% of the drug is eliminated:
  - 1 half-life: 50% remaining.
  - 2 half-lives: 50%×50%=25%50\% \times 50\% = 25\%50%×50%=25% remaining, or 75% eliminated.
    Reference: Goodman & Gilman's The Pharmacological Basis of Therapeutics, 13th Edition, Page 56.

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63. unabsorbable complex ---------- with tetracycline.

Correct Answer: (b) Dicalcium phosphate
Explanation:

- **Dicalcium phosphate** forms an **insoluble complex** with tetracyclines, reducing their absorption in the gastrointestinal tract.
- Dairy products (containing calcium) and other divalent/trivalent cations (e.g., iron, magnesium) have a similar effect.
  Reference: Katzung's Basic and Clinical Pharmacology, 15th Edition, Page 637.

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64. The distinctive ---------- known as:

Correct Answer: (d) Trademark
Explanation:

- A **trademark** protects symbols, logos, or designs that distinguish a company's goods/services.
- Other options:
  - **Copyright:** Protects literary and artistic works.
  - **Patent:** Protects inventions.
  - **Geographical indications:** Identify goods based on origin.
    Reference: Intellectual Property Rights in Pharmacy by P. Narayanan, 2nd Edition, Page 45.

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65. Which of the ----------verbal communication?

Correct Answer: (d) A speech
Explanation:

- Non-verbal communication involves **body language, gestures, facial expressions, and eye contact**, but speech (spoken words) is part of **verbal communication**.
  Reference: Essentials of Communication Skills by P. D. Chaturvedi, 2nd Edition, Page 32.

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66. The correct sequence ---------- of their polarity

Correct Answer: (c) Hexane < Toluene < Chloroform < Ethyl acetate < Methanol < Water
Explanation:

- **Hexane** (non-polar) has the lowest polarity, while **water** (polar) has the highest.
- The polarity of common solvents increases as follows:
  Hexane < Toluene < Chloroform < Ethyl acetate < Methanol < Water.
  Reference: Vogel's Practical Organic Chemistry, 5th Edition, Page 345.

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67. Biogenetic precursor ---------- alkaloids is:

Correct Answer: (a) Tryptophan
Explanation:

- Indole alkaloids are biosynthesized from **tryptophan**, which provides the indole nucleus.
- Other options:
  - **Phenylalanine** and **tyrosine** are precursors for phenolic and aromatic alkaloids.
  - **Glycine** is not involved in alkaloid biosynthesis.
    Reference: Pharmacognosy by Trease and Evans, 16th Edition, Page 273.

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68. Which of the ----------alcoholic compounds?

Correct Answer: (c) Spearmint oil
Explanation:

- **Spearmint oil** is rich in **linalool**, an alcoholic compound.
- Other options:
  - **Fennel oil:** Contains mostly anethole.
  - **Chenopodium oil:** Contains ascaridole (peroxide).
  - **Coriander oil:** Contains linalool but in smaller quantities.
    Reference: Pharmacognosy by C.K. Kokate, 53rd Edition, Page 352.

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69. Phenylpropanoids are ---------- through pathway.

Correct Answer: (d) Shikimic acid
Explanation:

- **Phenylpropanoids** are derived from the **shikimic acid pathway**, which involves the conversion of **chorismate** to **phenylalanine** or **tyrosine**, the precursors for phenylpropanoids.
  Reference: Pharmacognosy by Trease and Evans, 16th Edition, Page 276.

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70. A substance ---------- when it is:

Correct Answer: (a) Above its critical point of temperature and pressure
Explanation:

- A **supercritical fluid** exists above its **critical temperature and pressure**, where it exhibits properties of both a liquid (density) and a gas (diffusion).
- Example: Supercritical CO_2 used in extraction.
  Reference: Physical Chemistry by Atkins, 11th Edition, Page 362.

71. The phenomenon ---------- known as:

Correct Answer: (b) Competitive antagonism
Explanation:

- **Competitive antagonism** occurs when a drug competes with an agonist for the same receptor, preventing the agonist's action without activating the receptor.
- Other options:
  - **Partial antagonism:** Involves partial activation of the receptor.
  - **Chemical antagonism:** Direct chemical interaction between drugs.
  - **Non-competitive antagonism:** Binding at an allosteric site, preventing receptor activation.
    Reference: Goodman & Gilman's The Pharmacological Basis of Therapeutics, 13th Edition, Page 94.

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72. Which of the ----------memory disorders?

Correct Answer: (c) Acetylcholinesterase inhibitors
Explanation:

- **Acetylcholinesterase inhibitors** (e.g., donepezil, rivastigmine) increase acetylcholine levels in the brain by inhibiting its breakdown, improving memory in conditions like **Alzheimer's disease**.
- Other options:
  - **Calcium channel blockers:** Treat cardiovascular disorders.
  - **COX inhibitors:** Anti-inflammatory drugs.
  - **β-blockers:** Used in hypertension and arrhythmias.
    Reference: Katzung's Basic and Clinical Pharmacology, 15th Edition, Page 584.

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73. Which condition ---------- digoxin toxicity?

Correct Answer: (d) Hypomagnesemia
Explanation:

- **Hypomagnesemia** predisposes to digoxin toxicity by enhancing digoxin's effect on myocardial cells, increasing the risk of arrhythmias.
- Other conditions:

- **Hypochloremia, hyponatremia, and hypocalcemia** are not directly linked to digoxin toxicity.
  Reference: Harrison's Principles of Internal Medicine, 20th Edition, Page 2140.

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74. A patient ---------- relief from:

Correct Answer: (c) Ondansetron
Explanation:

- **Ondansetron** is a **5-HT3 receptor antagonist** that blocks serotonin receptors in the gut and brain, providing effective relief from nausea and vomiting caused by chemotherapy.
- Other options:
  - **Bromocriptine:** Used in Parkinson's disease.
  - **Cimetidine:** Reduces gastric acid secretion.
  - **Loratadine:** Antihistamine for allergies.
    Reference: Goodman & Gilman's The Pharmacological Basis of Therapeutics, 13th Edition, Page 1042.

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75. Thioridazine was ---------- use causes:

Correct Answer: (d) Cardiac arrhythmias
Explanation:

- **Thioridazine**, an antipsychotic, was withdrawn due to its association with **QT interval prolongation** and fatal **torsades de pointes** (a type of cardiac arrhythmia).
- Other options (e.g., constipation, disturbed sleep cycles, hormonal imbalance) are not life-threatening and were not reasons for withdrawal.
  Reference: Harrison's Principles of Internal Medicine, 20th Edition, Page 1045.

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76. The unit ---------- processor is

Correct Answer: (a) Hertz
Explanation:

- Processor speed is measured in **Hertz (Hz)**, typically in **Gigahertz (GHz)**, indicating the number of cycles a processor can perform per second.
- Other options (bytes, bits, cycles) measure storage or data transmission but not processor speed.

Reference: Computer Organization and Architecture by William Stallings, 10th Edition, Page 50.

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77. In Windows, ---------- dialog box?

Correct Answer: (a) Windows + R
Explanation:

- The **Windows + R** shortcut opens the **Run dialog box**, allowing users to quickly execute commands or open programs.
- Other options (Ctrl + R, Alt + R, Shift + R) are not assigned to this function.
  Reference: Windows User Guide by Microsoft, Online Documentation.

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78. Which of the ---------- valid IP address?

Correct Answer: (a) 192.168.1.1
Explanation:

- **192.168.1.1** is a valid IPv4 address.
- **256.256.256.256** exceeds the maximum value for each octet (255).
- **192.169.1** is incomplete (missing an octet).
- **192.1:80:00:1** is incorrectly formatted and does not follow IPv4 or IPv6 standards.
  Reference: Computer Networking by Kurose and Ross, 8th Edition, Page 35.

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79. Which of ---------- internet browser?

Correct Answer: (d) Adobe Acrobat
Explanation:

- **Adobe Acrobat** is a PDF reader and editor, not a web browser.
- **Microsoft Edge, Opera, and Google Chrome** are internet browsers.
  Reference: Computer Fundamentals by P.K. Sinha, 6th Edition, Page 124.

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80. In Excel, ---------- comparing percentages?

Correct Answer: (b) Pie Chart
Explanation:

- **Pie charts** are ideal for visualizing **percentages** of a whole, as they show proportions of data in a circular graph.
- **Bar charts** and **line charts** are better for trends or comparisons over time, while **area charts** are used to display cumulative data.
  Reference: Microsoft Excel User Guide, Online Documentation.

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81. If "SIMPLE" ----------COMPLEX" coded?

Correct Answer: (c) DPNQMFY
Explanation:

- The coding pattern involves replacing each letter with its **next alphabetical letter**.
- Example:
  - **S → T, I → J, M → N, P → Q, L → M, E → F.**
- For "COMPLEX":
  - **C → D, O → P, M → N, P → Q, L → M, E → F, X →Y.**

---

82. Pointing to a ---------- related to Ravi?

Correct Answer: (c) Wife
Explanation:

- **"My mother's only son"** refers to Ravi himself.
- The woman is his **wife**.

---

83. Find the ---------- one out

Correct Answer: (d) 27
Explanation:

- All numbers except **27** are **prime numbers** (divisible only by 1 and itself).
- **27** is not a prime number as it is divisible by 3.

---

84. If "WATER----------EARTH" coded?

Correct Answer: (b) GCTVJ
Explanation:

- The coding involves shifting each letter **forward by 2 positions** in the alphabet.
- Example:
  - **W → Y, A → C, T → V, E → G, R → T.**
- For "EARTH":
  - **E → G, A → C, R → T, T → V, H → J.**

---

85. In a row ---------- between A and B?

Correct Answer: (c) 7
Explanation:

- Total students = 40.
- Position of A from the right = 40−15+1=26.
- Position of B from the left = 40−20+1=21.
- Students between A and B = 26−21−1=7.

---

86. The sum of ---------- are the numbers?

Correct Answer: (a) 27, 18
Explanation:

- Let the two numbers be x and y.
- From the given conditions:
  - x+y=45
  - x−y=9
- Adding these equations:
  2x = 54 → x = 27.
- Subtracting these equations:
  2y = 36 → y=18

---

87. A man covers ---------- remaining journey?

Correct Answer: (c) 80 km/h
Explanation:

- Total distance = **300 km**
- Total time = **6 hours**
- Distance covered in the first 2 hours at **50 km/h**: Distance = Speed × Time = 50×2 = 100 km
- Remaining distance = **300 - 100 = 200 km**
- Remaining time = **6 - 2 = 4 hours**
- Average speed for the remaining journey: Average speed = $\frac{\textbf{Total distance}}{\textbf{Total time}}$

Calculation for Remaining Journey:

The average speed for the remaining journey is calculated as:

Average speed = $\frac{\textbf{Remaining distance}}{\textbf{Remaining time}} = \frac{200}{4} = 75$ km/h

---

88. A shopkeeper marks ----------profit percentage?

Correct Answer: (a) 12%
Explanation:

1. Let's assume:

- Cost Price (CP) = 100

2. Calculate Marked Price (MP):

- MP = CP + 40% of CP
- MP = 100 + (40/100) * 100
- MP = 100 + 40
- MP = 140

3. Calculate Selling Price (SP) after discount:

- Discount = 20% of MP
- Discount = (20/100) * 140
- Discount = 28
- SP = MP - Discount
- SP = 140 - 28
- SP = 112

4. Calculate Profit:

- Profit = SP - CP
- Profit = 112 - 100
- Profit = 12

5. Calculate Profit Percentage:

- Profit Percentage = (Profit / CP) * 100
- Profit Percentage = (12 / 100) * 100
- Profit Percentage = 12%

Therefore, the profit percentage is (a) 12%.

---

89. If 45% of ---------- the same number?

Correct Answer: (b) 195
Explanation:

1. Find the original number:

- If 45% of the number is 135, then 1% of the number is 135 / 45 = 3.
- Therefore, 100% of the number (the original number) is 3 * 100 = 300.

2. Find 65% of the original number:

- 65% of 300 = (65/100) * 300 = 195

Therefore, 65% of the same number is (b) 195.

---

90. A train crosses ---------- of the train?

Correct Answer: (d) 120 m
Explanation:

1. Find the speed of the train:

- **When crossing a pole:**
  - Distance = Length of the train (let's call it 'L')
  - Time = 15 seconds

    - Speed = Distance / Time = L / 15 m/s
- **When crossing the platform:**
    - Distance = Length of the train + Length of the platform = L + 120 meters
    - Time = 30 seconds
    - Speed = Distance / Time = (L + 120) / 30 m/s

2. Equate the speeds:

Since the train's speed remains constant, we can equate the two speed expressions:

L / 15 = (L + 120) / 30

3. Solve for the length of the train (L):

- Cross-multiply: 30L = 15(L + 120)
- Distribute: 30L = 15L + 1800
- Subtract 15L from both sides: 15L = 1800
- Divide both sides by 15: L = 120 meters

Therefore, the length of the train is 120 meters.

---

91. Which Viceroy is ---------- Bengal in 1905?

Correct Answer: (b) Lord Curzon
Explanation:

- **Lord Curzon** partitioned Bengal in 1905, dividing it into **East Bengal and Assam** and **West Bengal**, citing administrative convenience.
- This decision sparked widespread protests and led to the **Swadeshi Movement**.
  Reference: Modern Indian History by Bipan Chandra, Page 176.

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92. Who introduced ---------- system in India?

Correct Answer: (a) Lord Wellesley
Explanation:

- **Lord Wellesley** introduced the **Subsidiary Alliance** in 1798 to establish British control over Indian princely states.

- Under this system, Indian rulers accepted British troops in their territory and gave up foreign policy autonomy.
  Reference: A History of Modern India by Bipan Chandra, Page 95.

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93. Which Indian ---------- Man of India'?

Correct Answer: (b) Dadabhai Naoroji
Explanation:

- **Dadabhai Naoroji**, a key figure in India's independence movement, was called the **'Grand Old Man of India'** for his contributions to nationalism.
- He also authored the **Drain Theory**, highlighting British economic exploitation.
  Reference: India's Struggle for Independence by Bipan Chandra, Page 134.

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94. The Permanent ---------- which region?

Correct Answer: (b) Bengal
Explanation:

- The **Permanent Settlement** was introduced in **1793** by **Lord Cornwallis** in Bengal.
- It established a system of land revenue collection where **zamindars** were made hereditary owners and revenue collectors.
  Reference: A History of Modern India by Bipan Chandra, Page 81.

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95. The Khilafat ---------- which empire?

Correct Answer: (a) Ottoman Empire
Explanation:

- The **Khilafat Movement (1919-1924)** protested the dismantling of the **Ottoman Caliphate** after World War I.
- It was led by **Ali Brothers** and aimed to unify Indian Muslims and protest British policies.
  Reference: Modern Indian History by Bipan Chandra, Page 248.

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96. Which dynasty ---------- Khajuraho temples?

Correct Answer: (c) Chandela Dynasty
Explanation:

- The **Khajuraho temples**, known for their exquisite sculptures, were built by the **Chandela rulers** between the 9th and 11th centuries.
- They represent both Hindu and Jain traditions.
  Reference: A History of Ancient and Early Medieval India by Upinder Singh, Page 483.

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97. The Simon ---------- which year?

Correct Answer: (b) 1928
Explanation:

- The **Simon Commission** was sent to India in **1928** to review constitutional reforms.
- It faced widespread protests due to its lack of Indian representation, leading to the slogan, **"Simon Go Back."**
  Reference: India's Struggle for Independence by Bipan Chandra, Page 263.

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98. Which Article ---------- Election Commission?

Correct Answer: (b) Article 324
Explanation:

- **Article 324** of the Indian Constitution vests the power of **superintendence, direction, and control of elections** in the **Election Commission of India**.
  Reference: Indian Polity by M. Laxmikanth, 6th Edition, Page 15.15.

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99. Who was the ---------- Miss World title?

Correct Answer: (a) Reita Faria
Explanation:

- **Reita Faria** became the first Indian woman to win the **Miss World** title in **1966**.
- She later pursued a career in medicine rather than modeling or films.
  Reference: Indian Achievers Biography by Sharma, 3rd Edition, Page 213.

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100. The Chipko Movement---------- which Indian state?

Correct Answer: (b) Uttarakhand
Explanation:

- The **Chipko Movement** began in the **1970s** in present-day **Uttarakhand** (then part of Uttar Pradesh).
- Villagers, especially women, hugged trees to prevent their felling and raise awareness about deforestation.
  Reference: Environmental Movements in India by Guha, 4th Edition, Page 109.

PHARMACY INDIA