JELET Pharmacy Sample Paper-6

Duration: 120 Minutes **Maximum Marks: 100**

Instructions

- This paper contains **100** Multiple Choice Questions (Single Correct).
- Each correct answer carries **+1 marks**.
- Each incorrect answer carries: **−0.25** marks.
- Unattempted questions carry **0** marks.
- Only one option is correct for each question.
- Use of mobile phones, smartwatches, calculators, or any electronic gadgets is strictly prohibited.

Q1. Which of the following mechanisms is primarily responsible for the absorption of ultra-fine particles administered via aerosol inhalation?

(A) Phagocytosis

(B) Passive diffusion

(C) Active transport

(D) Pinocytosis

Q2. What is the storage temperature condition specified for a "Cool place" according to the Indian Pharmacopoeia?

(A) Any temperature between 2°C and 8°C

(B) Any temperature between 8°C and 25°C

(C) Any temperature not exceeding 8°C

(D) Exactly at 0°C

Q3. In a hospital pharmacy setup, the 'Floor Stock System' is most vulnerable to which of the following operational risks?

(A) Increased delivery turnaround time for emergency drugs

(B) High incidence of pilferage and inventory discrepancies

(C) Substantial decrease in the workload of nursing staff

(D) Excessive reliance on individual patient prescription sheets

Q4. Which of the following diagnostic clinical tests is specifically employed to confirm a suspected case of Typhoid fever?

(A) Schick test

(B) Widal test

(C) Dick test

(D) Weil-Felix test

Q5. A solution contains 0.5% w/v of a drug. How many milligrams of the drug are present in a 5 mL dose of this solution?

(A) 2.5 mg

(B) 25 mg

(C) 0.25 mg

(D) 250 mg

Q6. What is the minimum age qualification required for a person to have their name entered in the first register of pharmacists under the Pharmacy Act, 1948?

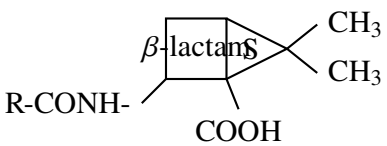
(A) 16 years

(B) 18 years

(C) 21 years

(D) 25 years

Q7. Which structural feature is fundamentally present in all penicillin class antibiotics that is responsible for their bactericidal activity?



(A) Thiazolidine ring alone

(B) β-lactam ring fused to a thiazolidine ring

(C) Macrolide ring structure

(D) β-lactam ring fused to a dihydrothiazine ring

Q8. Which cranial nerve is primarily responsible for regulating the parasympathetic control of the heart rate and gastrointestinal motility?

(A) Glossopharyngeal nerve (IX)

(B) Facial nerve (VII)

(C) Vagus nerve (X)

(D) Oculomotor nerve (III)

Q9. In the limit test for Iron, which reagent is used to prevent the precipitation of iron by ammonia by forming a soluble complex?

(A) Thioglycolic acid

(B) Citric acid

(C) Mercuric chloride

(D) Potassium permanganate

Q10. The biological evaluation of digitalis leaves by observing the cardiac arrest in pigeons is classified under which type of evaluation?

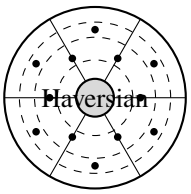
(A) Microscopical evaluation

(B) Chemical evaluation

(C) Physical evaluation

(D) Biological evaluation (Bioassay)

Q11. Which of the following structures represents the primary structural unit of the compact bone tissue?



(A) Osteon (Haversian system)

(B) Trabeculae

(C) Lacunae

(D) Canaliculi

Q12. What is the mechanism of action of the drug Allopurinol used in the chronic management of gout?

(A) Competitive inhibitor of xanthine oxidase

(B) Non-competitive inhibitor of cyclooxygenase

(C) Uricosuric agent blocking renal tubular reabsorption

(D) Inhibitor of microtubule assembly in neutrophils

Q13. Which of the following cell organelles is known as the site for translation and protein synthesis within a eukaryotic cell?

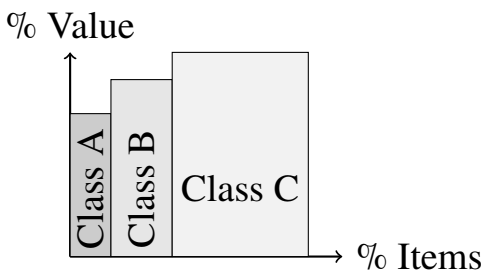
(A) Lysosome

(B) Golgi apparatus

(C) Ribosome

(D) Peroxisome

Q14. In the inventory control technique ABC analysis, 'A' items are characterized by which of the following parameters?



(A) High percentage of total items, low percentage of total annual consumption value

(B) Low percentage of total items, high percentage of total annual consumption value

(C) Moderate percentage of total items, moderate percentage of total annual consumption value

(D) Low percentage of total items, low percentage of total annual consumption value

Q15. Under the Drugs and Cosmetics Act, 1940, the requirements and guidelines for clinical trials and import/manufacture of new drugs are specified under which schedule?

(A) Schedule M

(B) Schedule Y

(C) Schedule X

(D) Schedule H

Q16. The metabolic disorder 'Alkaptonuria' is caused due to the inherited deficiency of which specific enzyme in the tyrosine pathway?

(A) Phenylalanine hydroxylase

(B) Homogentisate 1,2-dioxygenase

(C) Tyrosinase

(D) *p*-Hydroxyphenylpyruvate hydroxylase

Q17. Which of the following herbal drugs is traditionally classified and utilized as an effective natural adaptogen and immunomodulator?

(A) Digitalis

(B) Ashwagandha

(C) Senna

(D) Clove

Q18. What is the fundamental mechanism behind physical incompatibility when an alcoholic solution of a resinous substance is mixed with water?

(A) Chemical neutralization forming an insoluble salt

(B) Liquefaction due to depression of melting point

(C) Precipitation of the resin due to change in vehicle

(D) Redirection of pH leading to molecular ionization

Q19. Which of the following vitamins acts as an essential coenzyme component in the oxidative decarboxylation of α-keto acids?

(A) Riboflavin

(B) Thiamine (Vitamin B1)

(C) Pyridoxine

(D) Ascorbic acid

Q20. Which specialized respiratory cells are responsible for secreting surfactant that lowers surface tension within the alveoli?

(A) Type I alveolar cells

(B) Type II alveolar cells

(C) Alveolar macrophages

(D) Goblet cells

Q21. The chemical test involving the addition of a drop of ferric chloride solution to an aqueous extract of black catechu yields which specific color change?

(A) Deep blue-black

(B) Intense red

(C) Bluish-green

(D) Canary yellow

Q22. Which of the following conditions is an absolute contraindication for the administration of non-selective β-blockers like Propranolol?

(A) Essential hypertension

(B) Sinus tachycardia

(C) Bronchial asthma

(D) Chronic stable angina

Q23. Which of the following legal classifications applies to Phenobarbital under the Narcotic Drugs and Psychotropic Substances (NDPS) Act?

(A) Narcotic Drug

(B) Psychotropic Substance

(C) Essential Narcotic Drug

(D) Prohibited Coca Derivative

Q24. What is the primary therapeutic rationale for prescribing an over-the-counter (OTC) formulation containing dextromethorphan?

(A) Productive cough clear up

(B) Suppression of a dry, non-productive cough

(C) Relief from acute allergic rhinitis

(D) Management of hyperacidity

Q25. Which parameter is used to determine the efficiency of a mixing process for cohesive semi-solid masses in unit operations?

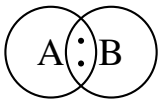
(A) Sedimentation volume

(B) Mixing index

(C) Angle of repose

(D) Clear-point value

Q26. What type of bond is formed when two atoms share electrons equally due to comparable electronegativities?



(A) Ionic bond

(B) Nonpolar covalent bond

(C) Hydrogen bond

(D) Coordinate bond

Q27. The volume of air that can be inspired forcefully after a normal tidal inspiration is termed as:

(A) Expiratory Reserve Volume

(B) Inspiratory Reserve Volume

(C) Vital Capacity

(D) Functional Residual Capacity

Q28. Which of the following biochemical tests is specific for detecting the presence of ketohexoses like fructose?

(A) Barfoed's test

(B) Seliwanoff's test

(C) Bial's test

(D) Molisch's test

Q29. What is the primary role of an 'Apothecary-in-charge' in a well-organized hospital committee according to standard clinical practice?

(A) Financial auditing of hospital funds

(B) Selection, procurement, and distribution of medications

(C) Direct surgical assistance in theater

(D) Managing patient nursing schedules

Q30. Which core strategy is emphasized under the National Strategic Plan for Tuberculosis Elimination in India?

(A) Mass distribution of oral rehydration salts

(B) Early diagnosis and complete treatment tracking via NIKSHAY portal

(C) Mandatory vector control operations

(D) Routine universal BCG re-vaccination at age 15

Q31. According to the Henderson-Hasselbalch equation, when the pH of a buffer solution is exactly equal to the pKa of the weak acid, what is the ratio of conjugate base to acid?

(A) 1 : 10

(B) 10 : 1

(C) 1 : 1

(D) 0 : 1

Q32. In the life cycle of crude drugs, what is the prime factor influencing the ideal 'collection time' for volatile oil-containing drugs like peppermint?

(A) Late evening to prevent evaporation losses

(B) Clear sunny days during the flowering stage

(C) Immediately after a heavy rainfall

(D) During the frost period of winter dormancy

Q33. Which parameter must a community pharmacist evaluate during the 'Technical Screening' stage of handling a prescription?

(A) The commercial profit margin of the prescribed brand

(B) The therapeutic validity, proper dosage, and potential drug interactions

(C) The patient's exact insurance premium coverage

(D) The direct wholesale supplier availability of the molecule

Q34. What type of physical degradation occurs when moisture is absorbed by a solid drug matrix resulting in the formation of a liquid solution?

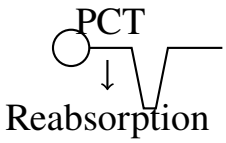
(A) Efflorescence

(B) Deliquescence

(C) Hygroscopy

(D) Polymorphic transition

Q35. Which structural portion of the nephron is the primary site where the bulk (about 65%) of water and essential electrolytes are reabsorbed from the filtrate?



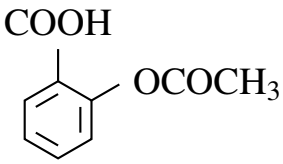
(A) Distal convoluted tubule

(B) Loop of Henle

(C) Proximal convoluted tubule

(D) Collecting duct

Q36. The structural formula of Aspirin corresponds to which of the following chemical names?



(A) Methyl salicylate

(B) Acetylsalicylic acid

(C) *p*-Aminophenol

(D) Phenyl salicylate

Q37. Which of the following conditions is characterized by an abnormal decrease in the total number of circulating white blood cells?

(A) Leukocytosis

(B) Leukemia

(C) Leukopenia

(D) Polycythemia

Q38. How many grams of Sodium Chloride are required to prepare 500 mL of an isotonic normal saline solution (0.9% w/v)?

(A) 4.5 g

(B) 9.0 g

(C) 0.45 g

(D) 45 g

Q39. Which of the following parameters represents a common mechanical cause of tablet capping during industrial compression?

(A) High moisture content in the granules

(B) Entrapment of air within the granule mass during compression

(C) Low compression force

(D) Excessive amount of lubricant in the formulation

Q40. What is the fundamental mechanism of action of Digitalis glycosides in improving cardiac output during congestive heart failure?

(A) Activation of the Na^+/K^+-ATPase pump

(B) Inhibition of the Na^+/K^+-ATPase pump

(C) Blockade of L-type calcium channels

(D) Activation of adenylyl cyclase

Q41. Which of the following crude drugs belongs to the chemical class of steroidal saponin glycosides?

(A) Dioscorea

(B) Senna

(C) Digitalis

(D) Aloe

Q42. Which of the following compounds is chemically classified as an inorganic antimicrobial agent that acts via the mechanism of oxidation?

(A) Boric acid

(B) Hydrogen peroxide

(C) Silver nitrate

(D) Zinc sulfate

Q43. What is the principal site of nutrient absorption within the human digestive system?

(A) Stomach

(B) Small intestine

(C) Large intestine

(D) Esophagus

Q44. Which section of the hospital pharmacy department is exclusively dedicated to the compounding of large volume parenterals (LVPs)?

(A) Ambulatory dispensing area

(B) Sterile compounding / Aseptic area

(C) Medical store warehouse

(D) Quality control laboratory

Q45. Which of the following parameters defines the 'reorder level' in scientific inventory management?

(A) The maximum storage capacity of the drug store warehouse

(B) The inventory level at which a fresh purchase requisition must be initiated

(C) The average quantity of items consumed per year

(D) The absolute minimum stock required to prevent stockout during emergencies

Q46. What is the primary purpose of performing a 'Limit Test' for a specific impurity in a pharmaceutical substance?

(A) To determine the exact quantitative amount of the impurity present

(B) To isolate and characterize the chemical structure of the impurity

(C) To identify and control small traces of impurities within permissible limits

(D) To test the chemical stability of the active ingredient under stress

Q47. Which of the following mechanisms explains the occurrence of therapeutic incompatibility when Tetracycline is co-administered with antacids containing Calcium?

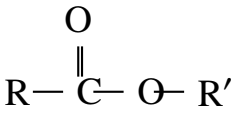
(A) Oxidation of tetracycline by calcium ions

(B) Formation of an insoluble, unabsorbable chelate complex

(C) Alteration of gastric pH preventing drug dissolution

(D) Accelerated renal clearance of tetracycline

Q48. What type of functional group is formed by the reaction between a carboxylic acid and an alcohol?



(A) Ether

(B) Ester

(C) Anhydride

(D) Amide

Q49. Which of the following processes describes the physiological phenomenon of 'first-pass metabolism'?

(A) Excretion of a drug through the kidneys before systemic distribution

(B) Biotransformation of a drug in the gastrointestinal tract or liver prior to reaching systemic circulation

(C) Rapid distribution of a drug into highly vascularized organs like the brain

(D) Binding of a drug to plasma albumin immediately upon absorption

Q50. Which primary hormone is synthesized and released by the parafollicular cells (C cells) of the thyroid gland to lower blood calcium levels?

(A) Thyroxine (T_4)

(B) Triiodothyronine (T_3)

(C) Calcitonin

(D) Parathyroid hormone (PTH)

Q51. The primary purpose of the 'Malthusian theory' contextually evaluated in public health programs is to highlight the relationship between:

(A) Sanitation standards and infectious disease transmission

(B) Exponential population growth and arithmetic food supply growth

(C) Maternal mortality ratios and institutional delivery rates

(D) Vector density indices and malaria incidence rates

Q52. Which crude drug evaluation method involves the determination of parameters such as ash value, extractive value, and moisture content?

(A) Organoleptic evaluation

(B) Chemical evaluation

(C) Physical evaluation

(D) Microscopical evaluation

Q53. When a patient requires counseling regarding the self-administration of a dry powder inhaler (DPI), which instruction is critical?

(A) Shake the inhaler vigorously for 30 seconds before use

(B) Breathe in quickly and deeply through the mouth

(C) Exhale completely into the mouthpiece before inhaling

(D) Wash the device with boiling water after every dose

Q54. Which of the following compounds is widely used as a standard component in systemic antacids due to its rapid neutralizing capacity but can cause systemic alkalosis?

(A) Aluminum hydroxide gel

(B) Magnesium trisilicate

(C) Sodium bicarbonate

(D) Calcium carbonate

Q55. In the chemical structure of local anesthetics like Procaine, which type of linkage connects the lipophilic aromatic ring to the hydrophilic amino group?

(A) Amide linkage

(B) Ester linkage

(C) Ether linkage

(D) Carbonyl linkage

Q56. What is the primary biological function of the enzyme Acetylcholinesterase at the neuromuscular junction?

(A) Synthesis of acetylcholine from choline and acetyl-CoA

(B) Rapid hydrolysis of acetylcholine into choline and acetate to terminate its action

(C) Facilitation of acetylcholine storage into synaptic vesicles

(D) Activation of post-synaptic nicotinic receptors

Q57. Which type of primary tissue forms the inner lining of blood vessels (endothelium) where rapid diffusion or filtration occurs?

(A) Simple cuboidal epithelium

(B) Simple squamous epithelium

(C) Stratified squamous epithelium

(D) Pseudostratified columnar epithelium

Q58. What is the HLB (Hydrophilic-Lipophilic Balance) value range typically required for an emulsifying agent to stabilize a water-in-oil (w/o) emulsion?

(A) 3 to 6

(B) 8 to 16

(C) 13 to 15

(D) 16 to 18

Q59. Which of the following options represents a major clinical manifestation of acute poisoning due to Organophosphate insecticides?

(A) Mydriasis, tachycardia, and dry mouth

(B) Miosis, bradycardia, profuse salivation, and bronchoconstriction

(C) Urinary retention and severe constipation

(D) Central nervous system excitation and hyperthermia

Q60. Which organelle contains hydrolytic enzymes capable of breaking down worn-out cellular parts and foreign substances entering the cell?

(A) Mitochondrion

(B) Lysosome

(C) Endoplasmic reticulum

(D) Centrosome

Q61. What is the primary objective of 'Purchasing and Procurement' workflows utilizing the 'Tendering System' in public hospital pharmacies?

(A) To bypass local drug regulatory validations for fast delivery

(B) To secure high-quality pharmaceuticals at the most competitive market price via open competition

(C) To maintain a monopoly of a single specific pharmaceutical brand

(D) To reduce the clerical paperwork involved in maintaining accounts

Q62. What is the biological function of bile salts during the process of digestion in the small intestine?

(A) Enzymatic cleavage of complex carbohydrates into monosaccharides

(B) Emulsification of large dietary lipid droplets into small micelles

(C) Activation of pepsinogen into active pepsin

(D) Neutralization of the alkaline pancreatic juices

Q63. Which type of crude drug classification system groups drugs based on the specific plant or animal family from which they are derived?

(A) Morphological classification

(B) Taxonomical classification

(C) Pharmacological classification

(D) Chemical classification

Q64. What type of functional group consists of a nitrogen atom bonded to a carbonyl carbon atom ($-C(=O)NH-$)?

(A) Amine

(B) Amide

(C) Imine

(D) Nitrile

Q65. Under the Drugs and Cosmetics Act, 1940, the commercial manufacture of cosmetics requires a license that must be applied for and issued under which broad regulatory authority?

(A) Pharmacy Council of India (PCI)

(B) State Licensing Authority appointed by the State Government

(C) Ministry of Corporate Affairs

(D) Central Drug Research Institute (CDRI)

Q66. Which type of packaging material is highly preferred for the preservation of moisture-sensitive solid dosage forms due to its excellent impermeable barrier properties?

(A) Low-density polyethylene (LDPE) containers

(B) Aluminum foil blisters

(C) Type III soda-lime glass vials

(D) Corrugated cardboard boxes

Q67. Which hormone is directly responsible for stimulating the development and maturation of ovarian follicles during the first half of the menstrual cycle?

(A) Luteinizing hormone (LH)

(B) Follicle-stimulating hormone (FSH)

(C) Progesterone

(D) Prolactin

Q68. In clinical pathology, an elevated serum level of which specific enzyme is considered a classic biomarker for diagnosing acute myocardial infarction within the first 24 hours?

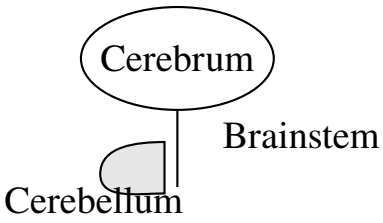
(A) Alanine aminotransferase (ALT)

(B) Creatine kinase-MB (CK-MB)

(C) Amylase

(D) Alkaline phosphatase (ALP)

Q69. Which component of the human nervous system acts as the primary coordination center for maintaining posture, balance, and fine motor control?



(A) Cerebrum

(B) Medulla oblongata

(C) Cerebellum

(D) Thalamus

Q70. What is the biological source of the natural purgative crude drug 'Senna'?

(A) Dried leaflets of *Cassia angustifolia*

(B) Dried juice of the leaves of *Aloe barbadensis*

(C) Dried ripe seeds of *Plantago ovata*

(D) Dried bark of *Rhamnus purshiana*

Q71. Which of the following mechanisms represents the primary pathway for the chemical degradation of Ascorbic acid in liquid formulations?

(A) Hydrolysis

(B) Oxidation

(C) Photolysis

(D) Polymerization

Q72. Which of the following indicators is traditionally employed in the limit test for Sulphates to facilitate visual turbidimetric comparison?

(A) Potassium chromate

(B) Barium chloride reagent

(C) Silver nitrate solution

(D) Phenolphthalein

Q73. What type of liquid dosage form is defined as a coarse aqueous dispersion of insoluble solid drugs intended for oral administration?

(A) Elixir

(B) Suspension

(C) Emulsion

(D) Linctus

Q74. Which of the following elements is classified as a structural component of the human skeleton and is vital for bone mineralization and blood clotting?

(A) Sodium

(B) Iron

(C) Calcium

(D) Potassium

Q75. The diagnostic criteria of checking for the adulteration of Clove oil with duplicated synthetics involves checking for the absence of which naturally occurring major constituent?

(A) Eugenol

(B) Cineole

(C) Anethole

(D) Menthol

Q76. Which core strategic initiative is promoted under the 'National Family Welfare Programme' in India to stabilize population trends?

(A) Compulsory institutional quarantine of infectious cases

(B) Distribution of subsidised weaning foods for infants

(C) Cafeteria approach offering a wide choice of contraceptive methods

(D) Implementing strict legislation restricting domestic migration

Q77. What is the primary pharmacological mechanism of action of the antibiotic Ciprofloxacin?

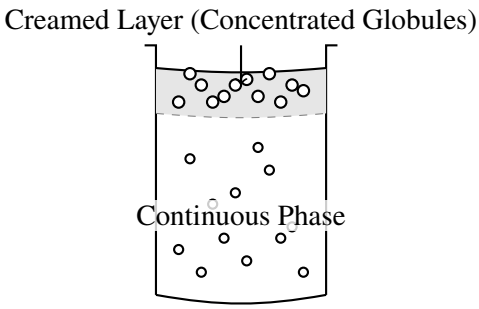
(A) Inhibition of bacterial cell wall synthesis

(B) Inhibition of bacterial DNA gyrase and topoisomerase IV enzymes

(C) Binding to the 50S ribosomal subunit inhibiting translation

(D) Disruption of bacterial cytoplasmic membrane function

Q78. In the preparation of a stable emulsion, the process of 'creaming' is characterized as which type of phenomenon?



(A) Irreversible separation of the internal phase from the external phase

(B) Reversible upward or downward movement of dispersed droplets due to density differences

(C) Total phase inversion where an o/w emulsion becomes a w/o emulsion

(D) Complete microbial degradation of the emulsifying agent

Q79. Which functional area of a hospital pharmacy handles the distribution of investigational drugs undergoing phase III clinical testing?

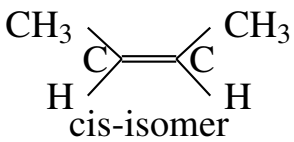
(A) Inpatient dispensing department

(B) Clinical pharmacy service unit

(C) Central sterile supply department (CSSD)

(D) Bulk compounding wing

Q80. What type of isomerism occurs in organic compounds that have identical molecular formulas and connectivity but differ in the spatial orientation of groups around a rigid double bond?



(A) Structural isomerism

(B) Cis-trans (Geometric) isomerism

(C) Optical isomerism

(D) Conformational isomerism

Q81. Which of the following biological lipids serves as the direct metabolic precursor for the biosynthesis of steroid hormones and bile acids in the human body?

(A) Lecithin

(B) Cholesterol

(C) Triacylglycerol

(D) Sphingomyelin

Q82. According to Young's rule for pediatric dose calculation, what is the formula used to calculate the child's dose based on age?

(A) Child's Dose $= \frac{\text{Age in years}}{\text{Age in years+12}} \times \text{Adult Dose}$

(B) Child's Dose $= \frac{\text{Age in years}}{20} \times \text{Adult Dose}$

(C) Child's Dose $= \frac{\text{Weight in pounds}}{150} \times \text{Adult Dose}$

(D) Child's Dose $= \frac{\text{Age in months}}{150} \times \text{Adult Dose}$

Q83. Which of the following terms defines the systematic study of the absorption, distribution, metabolism, and excretion (ADME) of drugs?

(A) Pharmacodynamics

(B) Pharmacokinetics

(C) Pharmacotherapeutics

(D) Toxicology

Q84. What is the primary role of 'Epidemiology' in public health monitoring operations?

(A) The synthesis and testing of new chemical entities in labs

(B) The study of the distribution and determinants of health-related states or events in specified populations

(C) The financial assessment of health insurance schemes

(D) The microscopic identification of pathological bacterial strains

Q85. Which of the following vitamins is structurally classified as water-soluble and plays a critical role in preventing megaloblastic anemia and neural tube defects?

(A) Vitamin A

(B) Vitamin K

(C) Folic acid (Vitamin B9)

(D) Vitamin D

Q86. What is the normal physiological pacemaker of the human heart responsible for initiating the rhythmic electrical impulses of cardiac contraction?

(A) Atrioventricular (AV) node

(B) Sinoatrial (SA) node

(C) Bundle of His

(D) Purkinje fibers

Q87. Which of the following parameters represents a structural feature of 'Herbal Drugs' that complicates their chemical standardization compared to synthetic molecules?

(A) High thermal stability under extreme stress testing

(B) Presence of a complex mixture of multiple phytochemical constituents rather than a single active entity

(C) Complete absence of organic functional groups

(D) Total resistance to microbial contamination

Q88. Which of the following conditions is most likely to be triggered by the intentional or accidental ingestion of toxic doses of Acetaminophen (Paracetamol)?

(A) Acute renal failure due to tubular necrosis

(B) Severe hepatotoxicity and hepatic necrosis due to NAPQI metabolite accumulation

(C) Irreversible aplastic anemia

(D) Pulmonary fibrosis and respiratory depression

Q89. Which of the following clinical advice tips is crucial when counseling a patient who has been freshly prescribed a course of Rifampin?

(A) Take the medication with high-fat meals to prevent nausea

(B) Expect a harmless reddish-orange discoloration of urine, sweat, and tears

(C) Double the dose if you experience a mild fever

(D) Discontinue the drug immediately if you develop temporary joint pain

Q90. Which of the following structural components is an absolute requirement for the systemic action of general anesthetics administered via inhalation?

(A) Presence of a quaternary ammonium ion

(B) High lipid solubility (high oil/gas partition coefficient) to cross the blood-brain barrier

(C) High water solubility to circulate unbound in plasma

(D) Presence of an aromatic ester linkage

Q91. Which organ system is primarily responsible for the chemical regulation of blood volume, blood pressure, and plasma osmolarity through the excretion of controlled urine amounts?

(A) Digestive system

(B) Urinary system

(C) Integumentary system

(D) Lymphatic system

Q92. What structural type of carbohydrate is 'Sucrose' chemically classified as?

(A) Monosaccharide

(B) Disaccharide

(C) Oligosaccharide

(D) Polysaccharide

Q93. Which unit operation involves the reduction of solid particle size by utilizing a combination of impact and attrition forces in a rotating drum containing metallic balls?

(A) Hammer mill

(B) Ball mill

(C) Fluid energy mill

(D) Cutter mill

Q94. Which hormone is synthesized by the hypothalamus and stored/released by the posterior pituitary gland to promote water reabsorption by the collecting ducts of the kidney?

(A) Oxytocin

(B) Antidiuretic Hormone (ADH / Vasopressin)

(C) Aldosterone

(D) Growth Hormone

Q95. The deliberate addition of inferior, exhausted, or look-alike cheap foreign matter to a genuine crude drug is defined as:

(A) Substitution

(B) Adulteration

(C) Deterioration

(D) Sophistication

Q96. Which type of chemical bond involves the complete electrostatic attraction between two oppositely charged ions formed by the transfer of valence electrons?

(A) Covalent bond

(B) Ionic bond

(C) Coordinate bond

(D) Metallic bond

Q97. Which of the following structural parts of an antibody molecule is responsible for binding directly to a specific antigenic determinant?

(A) Constant region of the heavy chain

(B) Variable region (Fab fragment) consisting of light and heavy chains

(C) Fc region of the light chain

(D) Hinge region alone

Q98. What is the required sample volume size and standard temperature condition commonly used for the determination of refractive index as a physical evaluation parameter for volatile oils?

(A) 100 mL at 0°C

(B) A few drops at a stabilized temperature of 20°C or 25°C

(C) 1 L at 100°C

(D) 10 mL at 37°C

Q99. Which of the following options represents a common trap in inventory control where an item is classified as 'V' in VED analysis?

(A) It means the item has a very low unit cost

(B) It indicates the item is 'Vital', meaning its absence will completely halt hospital operations

(C) It means the item has a high annual turnover rate

(D) It indicates the item is structurally volatile and prone to rapid chemical spoilage

Q100. Which type of functional group contains a nitrogen atom directly bonded to three alkyl or aryl organic substituents (R_3N)?

(A) Primary amine

(B) Secondary amine

(C) Tertiary amine

(D) Quaternary ammonium salt

Detailed Solutions

Q1.

Solution

Concept: The absorption of particles via the respiratory tract depends heavily on their aerodynamic diameter. Ultra-fine particles (nanoparticles) skip gravitational settling and inertial impaction in upper airways, moving deep into alveolar spaces where they undergo specialized cellular processes.

Solution: Step 1: Analyze the size-dependent transport mechanisms of inhaled particles. Larger particles undergo inertial impaction in the nasopharyngeal region, while mid-sized particles deposit by gravitational sedimentation in the bronchioles.
Step 2: Identify the mechanism for ultra-fine particles (typically below 0.1 μm). These particles travel to the terminal alveoli. Because of their extremely small dimensions, they bypass standard clearance filters.
Step 3: Evaluate cellular response in alveolar spaces. Phagocytosis by macrophages clears larger microscopic debris (1 to 5 μm). However, ultra-fine matrices trigger cellular invagination of fluid or small structures.
Step 4: Distinguish pinocytosis from passive diffusion. While gases diffuse across membranes, insoluble fine structures are engulfed via fluid-phase endocytosis, specifically pinocytosis, allowing entry into systemic circulation.
Final Answer: Pinocytosis

Answer: (D)

Go Back to Question 1

Q2.

Solution

Concept: The Indian Pharmacopoeia (IP) strictly mandates standardized environmental storage conditions for pharmaceutical formulations to preserve active therapeutic ingredients against thermal degradation and acceleration of chemical pathways.

Solution: Step 1: Review official temperature parameters outlined within the general chapters of the Indian Pharmacopoeia.
Step 2: Define standard thermodynamic classifications: "Cold place" is explicitly maintained between 2°C and 8°C, whereas a standard refrigerator environment matches this exact bracket.
Step 3: Define the "Cool place" threshold. The official pharmacopoeia text defines a cool setting as any storage environment that is dynamically managed between the limits of 8°C and 25°C.
Step 4: Correlate other storage criteria. "Room temperature" ranges between 15°C and 30°C. Therefore, an environment bounded by 8°C and 25°C accurately represents a cool storage location.
Final Answer: Any temperature between 8°C and 25°C

Answer: (B)

Go Back to Question 2

Q3.

Solution

Concept: The 'Floor Stock System' is a drug distribution method where medications are stored directly in nursing stations rather than dispensed per individual patient prescription from the central pharmacy department.

Solution: Step 1: Evaluate the operational framework of the Floor Stock system. Medications are readily available on hospital wards to ensure rapid access for acute nursing administration without immediate oversight.
Step 2: Identify administrative vulnerabilities. Because stocks are physically decentralized, direct supervision by a registered pharmacist at the time of dispensing is absent.
Step 3: Correlate storage accessibility with material control. Open or semi-restricted ward storage increases unauthorized accessibility, poor material tracking, missing records, and systematic inventory leakage.
Step 4: Analyze systemic outcomes. These conditions contribute directly to a high incidence of pilferage, unrecorded dose allocations, and discrepancies when cross-checking financial billing against actual shelf counts.
Final Answer: High incidence of pilferage and inventory discrepancies

Answer: (B)

Go Back to Question 3

Q4.

Solution

Concept: Diagnostic clinical pathology relies on serological assays to identify specific microbial agglutinins or toxins present in patient blood plasma during infectious disease states.

Solution: Step 1: Examine the pathology of Typhoid fever, a systemic infection caused by the Gram-negative bacterium *Salmonella enterica* serovar Typhi.
Step 2: Evaluate the mechanisms of various serological tests. The Schick test assesses immunity against diphtheria toxin, while the Dick test evaluates susceptibility to scarlet fever erythrogenic toxin.
Step 3: Analyze the Widal test mechanism. This agglutination reaction detects bacterial antibodies (O somatic and H flagellar antigens) present in the serum of an infected individual during the second week of illness.
Step 4: Confirm diagnostic specificity. The cross-reaction of patient antibodies with standard killed bacterial suspensions yields visible clumping, confirming a positive Widal test for enteric typhoid fever.
Final Answer: Widal test

Answer: (B)

Go Back to Question 4

Q5.

Solution

Concept: Percentage weight-in-volume (% w/v) expression defines the absolute weight of a solute in grams dissolved per 100 mL of total liquid pharmaceutical solution.

Solution: Step 1: Convert the given percentage concentration into mathematical terms. A strength of 0.5% w/v means that 0.5 g of the active pharmaceutical ingredient is contained in 100 mL of solution.
Step 2: Set up a proportional ratio to calculate the mass present in a 5 mL therapeutic dose:

$$\text{Mass in grams} = \frac{0.5 \text{ g}}{100 \text{ mL}} \times 5 \text{ mL}$$

Step 3: Execute the basic arithmetic steps:

$$\text{Mass} = \frac{2.5}{100} = 0.025 \text{ g}$$

Step 4: Convert the result from grams to milligrams to match standard dosage units:

$$\text{Mass} = 0.025 \times 1000 \text{ mg} = 25 \text{ mg}$$

Final Answer: 25 mg

Answer: (B)

Go Back to Question 5

Q6.

Solution

Concept: The Pharmacy Act of 1948 provides a legal statutory framework regulating the profession and practice of pharmacy in India, including strict criteria for the preparation of the first official register of pharmacists.

Solution: Step 1: Analyze Section 30 of the Pharmacy Act, 1948, which governs the structural qualifications required for entry into the initial state registration database.
Step 2: Identify the baseline legal requirements for an applicant. The individual must reside or carry out the business of pharmacy within the designated state boundaries.
Step 3: Review statutory age restrictions. The act states that a person must have attained the age of majority to hold professional accountability under registration guidelines.
Step 4: Verify the specific minimum age threshold. The statutory minimum age requirement for a candidate to register their name as a qualified pharmacist is exactly 18 years.
Final Answer: 18 years

Answer: (B)

Go Back to Question 6

Q7.

Solution

Concept: The bactericidal efficacy of penicillin and related cephalosporin derivatives is fundamentally linked to their core stereochemical architecture, which mimics natural bacterial cell wall building blocks.

Solution: Step 1: Examine the molecular structure of the penicillin class. It features a highly strained, four-membered cyclic amide ring known as the β-lactam ring.
Step 2: Determine structural ring fusion. This β-lactam ring is fused directly to a five-membered sulfur-containing heterocyclic ring called the thiazolidine ring.
Step 3: Identify the pharmacological target. The fused bicyclic structure mimics the D-Ala-D-Ala terminus of nascent peptidoglycan strands, binding covalently to transpeptidase enzymes (penicillin-binding proteins).
Step 4: Correlate structure with activity. Rupture of the highly strained β-lactam carbonyl bond inactivates the cross-linking enzyme, disrupting cell wall assembly and inducing osmotic lysis.
Final Answer: β-lactam ring fused to a thiazolidine ring

Answer: (B)

Go Back to Question 7

Q8.

Solution

Concept: The autonomic nervous system uses specific cranial pathways to manage visceral homeostasis, controlling involuntary physiological functions like cardiac rate and enteric motility.

Solution: Step 1: Review the functional geography of the twelve pairs of cranial nerves emerging from the brainstem.
Step 2: Identify the primary parasympathetic pathway. Cranial nerves III, VII, IX, and X possess preganglionic parasympathetic motor fibers that target smooth muscles and visceral glands.
Step 3: Isolate the specific tract of Cranial Nerve X (Vagus nerve). Unlike other cranial pathways confined to the head and neck, the vagus nerve extends through the thoracic and abdominal cavities.
Step 4: Connect the vagus nerve to target organs. It releases acetylcholine to slow sinoatrial node firing (negative chronotropy) and activates enteric muscarinic receptors to stimulate gastrointestinal motility.
Final Answer: Vagus nerve (X)

Answer: (C)

Go Back to Question 8

Q9.

Solution

Concept: Pharmacopoeial limit tests utilize analytical chemical reactions to identify and control tracing iron contamination via colored coordination complex solutions under alkaline environments.

Solution: Step 1: Analyze the chemical reagents in the limit test for iron. The assay relies on reacting iron impurities with thioglycolic acid in a solution buffered with ammonia.
Step 2: Determine the role of the buffer. Ammonia provides the necessary alkaline medium for generating a purple-colored ferrous thioglycolate complex.
Step 3: Identify potential chemical interference. In an alkaline environment, ferric and ferrous ions tend to react with hydroxyl ions, forming an insoluble precipitate of iron hydroxide, $Fe(OH)_3$.
Step 4: Determine the protective mechanism of citric acid. Citric acid is added to form a stable, soluble iron-citrate chelate complex. This prevents precipitation by ammonia, keeping the iron accessible for colorimetric measurement.
Final Answer: Citric acid

Answer: (B)

Go Back to Question 9

Q10.

Solution

Concept: Crude drug standardization utilizes biological evaluation (bioassay) when chemical or physical assays are insufficient to measure the therapeutic potency of complex phytochemical structures.

Solution: Step 1: Review methods for evaluating crude botanical drugs. Organoleptic methods evaluate sensory attributes, microscopical techniques look at structural cell layout, and chemical assays measure active concentrations.
Step 2: Analyze cardiac glycoside standardization challenges. Complex herbs like digitalis contain multiple co-existing glycosides, making chemical isolation and quantification difficult.
Step 3: Examine the biological testing process. The preparation is administered to live test subjects (such as pigeons, frogs, or guinea pigs) to observe a specific physiological response, such as systolic cardiac arrest.
Step 4: Classify the analytical technique. Measuring the biological response of a living organism against a standard reference substance is defined as biological evaluation, or a bioassay.
Final Answer: Biological evaluation (Bioassay)

Answer: (D)

Go Back to Question 10

Q11.

Solution

Concept: Microscopic osseous anatomy reveals structural adaptations designed to support mechanical loads. Compact bone is organized into repetitive, functional cylindrical structural units.

Solution: Step 1: Examine the histology of mature cortical compact bone. It features tightly packed concentric ring structures that optimize weight distribution and resist torsional stress.
Step 2: Identify the components of this cylindrical layout. Each unit consists of a central longitudinal canal containing blood vessels and nerve fibers, surrounded by concentric layers of calcified matrix called lamellae.
Step 3: Review the anatomical nomenclature. This functional network is called an osteon, or a Haversian system.
Step 4: Differentiate related structures. Lacunae are the small spaces housing osteocytes, canaliculi are the small interconnecting channels, and trabeculae are found in spongy (cancellous) bone tissue.
Final Answer: Osteon (Haversian system)

Answer: (A)

Go Back to Question 11

Q12.

Solution

Concept: The chronic management of hyperuricemia and gout focuses on lowering serum uric acid levels by blocking its metabolic synthesis from purine breakdown products.

Solution: Step 1: Trace the purine metabolic pathway. Hypoxanthine converts into xanthine, which is further oxidized into uric acid. This entire multi-step process is catalyzed by the enzyme xanthine oxidase.
Step 2: Examine the chemical structure of Allopurinol. It acts as an analogue of hypoxanthine.
Step 3: Determine the mechanism of inhibition. Allopurinol binds competitively to the active site of xanthine oxidase, reducing enzyme activity and slowing the synthesis of uric acid.
Step 4: Differentiate from other antigout therapies. Allopurinol reduces uric acid production at the source, unlike uricosuric agents (e.g., probenecid) which promote renal excretion, or colchicine which prevents neutrophil migration.
Final Answer: Competitive inhibitor of xanthine oxidase

Answer: (A)

Go Back to Question 12

Q13.

Solution

Concept: Cellular protein expression requires translating genetic codes from messenger ribonucleic acid (mRNA) strands into functional polypeptides at specific intracellular organelle sites.

Solution: Step 1: Review eukaryotic cell structure and the roles of individual organelles. The Golgi apparatus modifies and packages macromolecules, while lysosomes manage intracellular digestion.
Step 2: Locate the site of translation. This process requires a structural platform that can bind mRNA strands and coordinate incoming aminoacyl-tRNA complexes.
Step 3: Identify the ribosome complex. Ribosomes are dense granules composed of ribosomal RNA (rRNA) and proteins, existing either free in the cytoplasm or bound to the rough endoplasmic reticulum.
Step 4: Correlate structure with function. Ribosomes read the mRNA codon sequence to assemble amino acids into polypeptide chains, acting as the primary site for cellular protein synthesis.
Final Answer: Ribosome

Answer: (C)

Go Back to Question 13

Q14.

Solution

Concept: ABC analysis is an inventory categorization technique used in selective material management. It divides stock items into three distinct groups based on their total annual financial consumption value.

Solution: Step 1: Analyze the Pareto principle (80/20 rule) applied to pharmaceutical store management. A small percentage of physical inventory items often accounts for the majority of the total expenditure.
Step 2: Define 'Class A' inventory parameters. These items require strict control, frequent review, and precise stock tracking because they have a high financial value.
Step 3: Evaluate the numerical distribution. 'Class A' items represent a low physical proportion of total stock (about 10% to 15%), but account for a high proportion of the annual consumption budget (around 70% to 80%).
Step 4: Compare with Class B and C. Class C items show the opposite pattern: they comprise a large physical volume of inventory but have a minimal financial impact.
Final Answer: Low percentage of total items, high percentage of total annual consumption value

Answer: (B)

Go Back to Question 14

Q15.

Solution

Concept: The Drugs and Cosmetics Rules of 1945 contain alphabetical schedules that outline specific legal standards, administrative guidelines, and compliance workflows for various drug categories.

Solution: Step 1: Review the statutory definitions within the schedules of the Drugs and Cosmetics Act. Schedule M sets standards for Good Manufacturing Practices (GMP) for pharmaceutical factories.
Step 2: Examine Schedule X and Schedule H parameters. Schedule X regulates psychotropic substances requiring special prescriptions, while Schedule H governs prescription-only human drugs.
Step 3: Analyze Schedule Y requirements. This schedule provides detailed guidelines, application procedures, and clinical trial frameworks required to import or manufacture a new drug entity in India.
Step 4: Match the clinical trial mandate. Any company seeking manufacturing clearance for an unlisted new chemical entity must fulfill the data requirements specified under Schedule Y.
Final Answer: Schedule Y

Answer: (B)
Go Back to Question 15

Q16.

Solution

Concept: Alkaptonuria is an autosomal recessive metabolic disorder affecting phenylalanine and tyrosine catabolism, leading to the accumulation of intermediary organic acids.

Solution: Step 1: Trace the biochemical breakdown of tyrosine. Tyrosine converts via intermediary steps into homogentisic acid (2, 5-dihydroxyphenylacetic acid).
Step 2: Identify the next metabolic step. Homogentisic acid is normally broken down into maleylacetoacetic acid by the hepatic enzyme homogentisate 1, 2-dioxygenase (homogentisic acid oxidase).
Step 3: Analyze the metabolic block in alkaptonuria. A genetic mutation causes a deficiency in functional homogentisate 1, 2-dioxygenase, halting the pathway.
Step 4: Characterize the symptoms. The resulting excess of homogentisic acid deposits in connective tissues (ochronosis) and excretes in the urine, turning it dark black upon oxidation in the air.
Final Answer: Homogentisate 1, 2-dioxygenase

Answer: (B)
Go Back to Question 16

Q17.

Solution

Concept: Pharmacognosy classifies medicinal crude drugs based on their therapeutic applications and ability to modulate physiological systems, such as adaptive responses to stress.

Solution: Step 1: Define adaptogenic agents. Adaptogens are natural herbal substances that increase the body's resistance to physical, environmental, and emotional stressors by normalizing metabolic functions.
Step 2: Analyze the pharmacological profiles of the options. Digitalis serves as a cardiotonic, Senna acts as an anthraquinone purgative, and Clove functions as a local dental analgesic.
Step 3: Examine Ashwagandha (Withania somnifera, family Solanaceae). Its roots contain active chemical constituents like withanolides and alkaloids.
Step 4: Confirm its therapeutic classification. Ashwagandha is used in traditional medicine to modulate the hypothalamic-pituitary-adrenal axis, working as an adaptogen and immunomodulator.
Final Answer: Ashwagandha

Answer: (B)

Go Back to Question 17

Q18.

Solution

Concept: Physical incompatibility occurs when structural formulation changes affect drug solubility, leading to visible alterations like precipitation, phase separation, or liquefaction without chemical reactions.

Solution: Step 1: Analyze the solubility characteristics of resinous substances. Resins are complex amorphous plant exudates that dissolve readily in high-strength alcohol but are insoluble in water.
Step 2: Evaluate what happens during vehicle dilution. When an alcoholic tincture of a resin is mixed with an aqueous medium, the overall polarity of the solvent system shifts significantly.
Step 3: Determine the effect on resin solubility. The addition of water reduces the alcohol concentration below the threshold needed to keep the non-polar resin molecules solvated.
Step 4: Identify the physical result. The resin molecules aggregate and precipitate out of solution. This change in vehicle composition causes immediate physical incompatibility.
Final Answer: Precipitation of the resin due to change in vehicle

Answer: (C)

Go Back to Question 18

Q19.

Solution

Concept: Water-soluble vitamins undergo cellular biotransformation into active coenzyme structures that participate in crucial intermediate metabolic reactions.

Solution: Step 1: Examine the biochemical requirements for decarboxylating α-keto acids, such as converting pyruvate to acetyl-CoA or α-ketoglutarate to succinyl-CoA.
Step 2: Identify the required coenzyme. These multi-enzyme dehydrogenase complexes require a specific cofactor to break carbon-carbon bonds and transfer the resulting acyl group.
Step 3: Correlate the cofactor with its vitamin precursor. Thiamine (Vitamin B_1) is phosphorylated in cell tissues to form Thiamine Pyrophosphate (TPP).
Step 4: Confirm metabolic function. TPP acts as an essential coenzyme component in oxidative decarboxylation, making Thiamine critical for carbohydrate metabolism.
Final Answer: Thiamine (Vitamin B1)

Answer: (B)

Go Back to Question 19

Q20.

Solution

Concept: Pulmonary biophysics requires regular modulation of alveolar surface tension to prevent structural collapse during expiration, a function performed by specialized epithelial cells.

Solution: Step 1: Analyze the cellular layout of terminal alveolar walls. The epithelium consists of two distinct types of cells, along with protective macrophages.
Step 2: Identify the role of Type I alveolar cells. These thin, simple squamous cells form the primary structural surface for gas exchange across the respiratory membrane.
Step 3: Evaluate Type II alveolar cells. These cuboidal epithelial cells contain specialized secretory structures called lamellar bodies.
Step 4: Determine the secretory product. Type II cells synthesize and secrete pulmonary surfactant, a mixture of phospholipids and proteins. This lining reduces alveolar surface tension, preventing atelectasis.
Final Answer: Type II alveolar cells

Answer: (B)

Go Back to Question 20

Q21.

Solution

Concept: Phytochemical screening uses specific chemical colorimetric tests to identify primary polyphenol classes, such as condensed tannins, in crude botanical extracts.

Solution: Step 1: Identify the primary chemical constituents of Black Catechu (obtained from *Acacia catechu*, family Leguminosae). It contains high concentrations of catechin and catechu-tannic acid.
Step 2: Analyze the chemical structure of these constituents. They feature phenolic hydroxyl groups that react readily with transition metal salts.
Step 3: Evaluate the reaction with ferric chloride ($FeCl_3$). Ferric ions form coordination complexes with phenolic groups, producing distinct color shifts based on the tannin subclass.
Step 4: Identify the specific color change for catechus. Hydrolyzable tannins yield blue-black precipitates, whereas condensed tannins (like those in black catechu) produce a distinct bluish-green color.
Final Answer: Bluish-green

Answer: (C)

Go Back to Question 21

Q22.

Solution

Concept: Administering autonomic receptor antagonists requires an understanding of receptor distribution across different tissue groups to avoid triggering severe adverse drug reactions.

Solution: Step 1: Analyze the receptor profile of non-selective β-blockers like Propranolol. It blocks both β_1 receptors (located primarily in cardiac tissue) and β_2 receptors (located in bronchial smooth muscle).
Step 2: Evaluate the physiological effects of receptor blockade. Blocking β_1 receptors slows heart rate, which helps manage hypertension and tachycardia.
Step 3: Evaluate the effect of blocking bronchial β_2 receptors. β_2 activation normally mediates bronchodilation. Blocking these receptors leads to unopposed bronchoconstriction.
Step 4: Identify clinical contraindications. In patients with hyper-reactive airway diseases like bronchial asthma, even low doses of a non-selective β-blocker can cause severe, life-threatening bronchospasm.
Final Answer: Bronchial asthma

Answer: (C)

Go Back to Question 22

Q23.

Solution

Concept: The Narcotic Drugs and Psychotropic Substances (NDPS) Act of 1985 regulates specific chemical compounds to control addiction and abuse, classifying substances based on their medical utility and dependence risk.

Solution: Step 1: Review the statutory definitions in the NDPS Act. The law distinguishes between classical plant-derived narcotics and synthesized psychotropic molecules.
Step 2: Examine Phenobarbital. It is a long-acting barbiturate derivative used clinically as an anticonvulsant and sedative agent.
Step 3: Analyze its potential for abuse. While it carries a risk of physiological dependence, it does not fit the legal definition of a narcotic drug (such as morphine or diacetylmorphine).
Step 4: Determine its legal category. Phenobarbital is classified under the schedule of psychotropic substances, subjecting its manufacture, distribution, and storage to strict regulatory audits.
Final Answer: Psychotropic Substance

Answer: (B)

Go Back to Question 23

Q24.

Solution

Concept: Over-the-counter (OTC) cough and cold remedies are formulated with specific ingredients tailored to manage different types of respiratory tract symptoms.

Solution: Step 1: Identify the pharmacological classification of dextromethorphan. It is a synthetic non-opioid derivative that acts centrally as an antitussive agent.
Step 2: Examine its mechanism of action. Dextromethorphan increases the cough threshold by acting on the cough center in the medulla oblongata, reducing the frequency of cough reflexes.
Step 3: Differentiate cough types. Productive coughs produce mucus and require expectorants to help clear airway secretions. Dry, hacking coughs do not produce mucus.
Step 4: Match ingredient to symptom. Centrally acting antitussives like dextromethorphan are used specifically to suppress a dry, non-productive cough, preventing chest soreness and sleep disruption.
Final Answer: Suppression of a dry, non-productive cough

Answer: (B)

Go Back to Question 24

Q25.

Solution

Concept: Industrial manufacturing requires quantitative parameters to monitor unit operations, ensuring uniform distribution of active ingredients within high-viscosity semi-solid mixtures.

Solution: Step 1: Review evaluation methods for mixing processes. Parameters like the angle of repose assess the flow properties of dry granular masses.
Step 2: Analyze the challenges of mixing semi-solids. Ointments, creams, and pastes exhibit non-Newtonian flow behavior, requiring high shear forces to distribute component particles evenly.
Step 3: Identify the relevant analytical parameter. The degree of homogeneity achieved in a semi-solid blend over a specified time is measured using the mixing index.
Step 4: Interpret the index values. The mixing index calculates statistical variance among samples drawn from the mixture. This value directly indicates the efficiency and uniformity of the blending operation.

Final Answer: Mixing index

Answer: (B)

Go Back to Question 25

Q26.

Solution

Concept: Chemical bonds are formed by the interaction of valence electrons between atoms. The nature of the bond is determined by the difference in electronegativity between the participating atoms.

Solution: Step 1: Analyze the distribution of electrons during bond formation. When the electronegativity difference between two bonded atoms is minimal or zero, electrons are shared.
Step 2: Differentiate between covalent variants. If one atom is significantly more electronegative, it pulls the shared electron pair closer to itself, creating a polar covalent bond.
Step 3: Evaluate equal sharing conditions. When two identical non-metal atoms or atoms with very similar electronegativity values share electrons, the electron density is distributed symmetrically.
Step 4: Identify the specific bond classification. This symmetric, equal sharing of valence electrons results in a stable nonpolar covalent bond, as illustrated by the symmetrical overlapping fields in the diagram.

Final Answer: Nonpolar covalent bond

Answer: (B)

Go Back to Question 26

Q27.

Solution

Concept: Pulmonary function testing involves measuring distinct, non-overlapping volumes of air shifted during specific phases of the respiratory cycle to determine structural lung capacities.

Solution: Step 1: Define baseline respiratory components. Tidal Volume (TV) represents the volume of air inspired or expired during standard, relaxed breathing cycles.
Step 2: Evaluate maximum forced inhalation boundaries. When an individual completes a normal, quiet inhalation, their lungs still have additional capacity available for expansion.
Step 3: Define the volume of this additional capacity. The volume of air that can be drawn into the respiratory system with maximal, forceful effort above the normal tidal peak is defined as the Inspiratory Reserve Volume (IRV).
Step 4: Distinguish from other capacities. Vital Capacity (VC) represents the total exchangeable air volume, whereas IRV measures only the forced inspiratory component.
Final Answer: Inspiratory Reserve Volume

Answer: (B)

Go Back to Question 27

Q28.

Solution

Concept: Colorimetric carbohydrate assays utilize varying rates of acid-catalyzed dehydration reactions to differentiate aldose sugars from ketohexose isomers within solution matrices.

Solution: Step 1: Review the chemical principles of Seliwanoff's test. This assay uses resorcinol and concentrated hydrochloric acid (HCl) to differentiate ketoses from aldoses.
Step 2: Analyze the dehydration phase. Ketoses undergo rapid dehydration when heated with mineral acids to form 5-hydroxymethylfurfural derivatives more quickly than aldoses.
Step 3: Evaluate the color-forming condensation. The generated furfural derivative reacts with resorcinol to form a deep, cherry-red complex.
Step 4: Determine sugar specificity. Fructose is a ketohexose sugar. It reacts quickly in this test to yield a cherry-red color within two minutes, distinguishing it from glucose.
Final Answer: Seliwanoff's test

Answer: (B)

Go Back to Question 28

Q29.

Solution

Concept: The Pharmacy and Therapeutics Committee (PTC) regulates the formal selection, clinical deployment, and storage parameters of therapeutic agents inside institutional medical facilities.

Solution: Step 1: Analyze the structural composition of a standard hospital committees. The operational unit includes medical practitioners, nursing officers, and institutional clinical pharmacists.
Step 2: Define the historical and traditional role of the Apothecary-in-charge or chief institutional pharmacist. This role oversees the hospital formulary, procurement streams, and storage protocols.
Step 3: Evaluate specific clinical administrative duties. The position handles technical evaluation, stock acquisition, cold-chain maintenance, safe compounding, and drug distribution to ward stations.
Step 4: Select the primary professional role. Selecting, procuring, and organizing the internal distribution of medications represents the main operational mandate of this clinical position.
Final Answer: Selection, procurement, and distribution of medications

Answer: (B)

Go Back to Question 29

Q30.

Solution

Concept: National health programs implement specific technological frameworks to improve diagnostic tracking and treatment compliance for endemic infectious diseases across rural and urban communities.

Solution: Step 1: Review the National Strategic Plan (NSP) for Tuberculosis Elimination in India. The program focuses on active case finding, molecular screening, and complete treatment compliance.
Step 2: Identify the primary tracking tool. The government developed the NIKSHAY portal, an online platform for monitoring tuberculosis patients and managing direct benefit transfers.
Step 3: Analyze the role of the platform. NIKSHAY serves as a unified system for public health notifications, treatment adherence tracking via digital tools, and managing inventory of anti-TB medications.
Step 4: Match the programmatic objective. Early diagnosis combined with complete treatment monitoring via the digital NIKSHAY platform forms the foundation of India's TB elimination strategy.
Final Answer: Early diagnosis and complete treatment tracking via NIKSHAY portal

Answer: (B)

Go Back to Question 30

Q31.

Solution

Concept: The Henderson-Hasselbalch equation defines the mathematical relationship between pH, the acid dissociation constant (pK_a), and the relative concentrations of conjugate base and weak acid in a buffer system.

Solution: Step 1: Write out the Henderson-Hasselbalch equation for an acid buffer system:

$$\text{pH} = pK_a + \log_{10}\left(\frac{[\text{Conjugate Base}]}{[\text{Acid}]}\right)$$

Step 2: Substitute the given condition into the formula. The problem states that the pH of the solution is exactly equal to the pK_a of the acid (pH = pK_a). This gives:

$$pK_a = pK_a + \log_{10}\left(\frac{[\text{Conjugate Base}]}{[\text{Acid}]}\right)$$

Step 3: Simplify the equation by subtracting pK_a from both sides:

$$0 = \log_{10}\left(\frac{[\text{Conjugate Base}]}{[\text{Acid}]}\right)$$

Step 4: Convert from logarithmic form to exponential form to find the concentration ratio:

$$\frac{[\text{Conjugate Base}]}{[\text{Acid}]} = 10^0 = 1$$

This shows that the ratio of conjugate base to acid is exactly 1 : 1.

Final Answer: 1 : 1

Answer: (C)

Go Back to Question 31

Q32.

Solution

Concept: The concentration of volatile oils in medicinal plants varies during different growth stages, making the timing of the harvest critical to optimize active chemical yields.

Solution: Step 1: Review the factors that influence the collection of crude drugs. Active constituent production is linked to the physiological development of the plant and ambient weather conditions.
Step 2: Analyze volatile oil dynamics. Volatile oils are synthesized and stored in specialized structures like glandular trichomes. High temperatures or rain can cause these oils to evaporate or wash away.
Step 3: Evaluate the optimal growth stage. For leaf-based volatile oil drugs like peppermint (*Mentha piperita*), active oil production peaks during the flowering stage.
Step 4: Determine the best harvest conditions. Harvesting on dry, sunny days during the flowering stage ensures maximum oil concentration and prevents mold growth during initial drying.
Final Answer: Clear sunny days during the flowering stage

Answer: (B)

Go Back to Question 32

Q33.

Solution

Concept: Prescription handling in a community pharmacy requires a systematic verification workflow to protect patient safety and optimize therapeutic outcomes before dispensing any medication.

Solution: Step 1: Define the stages of prescription screening. The process includes administrative verification, technical screening, and clinical evaluation.
Step 2: Differentiate administrative and business aspects. Financial variables, insurance eligibility, and product brand margins are business operations that do not impact clinical technical screening.
Step 3: Define technical screening. This step requires the pharmacist to evaluate the medical validity of the written document.
Step 4: Identify the specific clinical parameters checked. The pharmacist reviews the drug selection, evaluates dosage metrics, calculates proper administration schedules, and checks for potential drug-drug or drug-excipient interactions.
Final Answer: The therapeutic validity, proper dosage, and potential drug interactions

Answer: (B)

Go Back to Question 33

Q34.

Solution

Concept: Solid state stability is affected by environmental moisture absorption. The physical response of a crystal matrix to atmospheric water vapor depends on its chemical composition.

Solution: Step 1: Differentiate between moisture-related terms. Efflorescence occurs when a crystalline salt loses its water of crystallization to dry air.
Step 2: Analyze hygroscopy. A hygroscopic substance absorbs atmospheric moisture but does not physically dissolve or liquefy; it remains a solid mass.
Step 3: Evaluate deliquescence. Deliquescent materials have a strong affinity for water. They absorb enough moisture from the air to dissolve themselves, turning from a solid crystal into an aqueous solution.
Step 4: Match the definition. The process where a solid drug matrix absorbs water vapor until it liquefies into a solution is defined as deliquescence.
Final Answer: Deliquescence

Answer: (B)

Go Back to Question 34

Q35.

Solution

Concept: Renal physiology relies on coordinated transport mechanisms across different segments of the nephron to reabsorb water and solutes from the glomerular filtrate.

Solution: Step 1: Trace the path of the ultrafiltrate as it exits Bowman's capsule and enters the tubular network of the nephron.
Step 2: Analyze the transport capacity of the Proximal Convoluted Tubule (PCT). The PCT features a highly adapted epithelium with a dense brush border of microvilli that maximizes surface area.
Step 3: Quantify reabsorption rates. The PCT reabsorbs approximately 65% of the filtered water, sodium, potassium, and chloride ions, along with 100% of filtered glucose and amino acids.
Step 4: Confirm anatomical location. The diagram highlights this highly active segment, identifying the proximal convoluted tubule as the primary site for bulk solute and water reabsorption.
Final Answer: Proximal convoluted tubule

Answer: (C)

Go Back to Question 35

Q36.

Solution

Concept: The nomenclature of synthetic medicinal chemistry defines molecular compounds by their structural modifications, functional linkages, and parent organic chemical structures.

Solution: Step 1: Analyze the chemical structure of Aspirin shown in the diagram. The molecule features a central benzene ring that has undergone substitution at adjacent positions (ortho-substitution).
Step 2: Identify the functional substituents. The structure contains a carboxylic acid group ($-COOH$) and an ester-linked acetyl group ($-OCOCH_3$).
Step 3: Determine the parent compound. Salicylic acid consists of a benzene ring with adjacent carboxylic acid and hydroxyl groups (*o*-hydroxybenzoic acid).
Step 4: Establish the chemical name. Replacing the hydrogen of the phenolic hydroxyl group with an acetyl group yields acetylsalicylic acid, which is the official chemical name for Aspirin.
Final Answer: Acetylsalicylic acid

Answer: (B)

Go Back to Question 36

Q37.

Solution

Concept: Hematological terminology uses specific suffixes to classify blood cell disorders as either abnormal cell proliferation or clinical cellular deficiencies.

Solution: Step 1: Analyze the roots of blood cell terms. Leukocytes refer to white blood cells, while erythrocytes refer to red blood cells.
Step 2: Define relevant suffixes. The suffix "-cytosis" or "-emia" generally indicates an increase or proliferation of cells, as seen in leukocytosis or leukemia.
Step 3: Evaluate the suffix for deficiencies. The suffix "-penia" comes from the Greek word for poverty or deficiency, indicating a decrease below normal physiological limits.
Step 4: Combine root and suffix. A significant decrease in the total number of circulating white blood cells is defined as leukopenia, which contrasts with polycythemia (an excess of red blood cells).
Final Answer: Leukopenia

Answer: (C)

Go Back to Question 37

Q38.

Solution

Concept: Pharmaceutical compounding calculations use percentage metrics to determine the exact mass of solute needed to prepare a specific volume of an isotonic solution.

Solution: Step 1: Define the target concentration. Isotonic normal saline is a 0.9% w/v aqueous solution of sodium chloride (NaCl), which matches the osmotic pressure of human blood plasma.
Step 2: Express the percentage value as a ratio. A concentration of 0.9% w/v means that 0.9 g of sodium chloride is dissolved in every 100 mL of finished solution.
Step 3: Set up a proportion to calculate the mass needed for the total volume of 500 mL:

$$\text{Required Mass} = \frac{0.9 \text{ g}}{100 \text{ mL}} \times 500 \text{ mL}$$

Step 4: Complete the calculation:

$$\text{Required Mass} = 0.9 \times 5 = 4.5 \text{ g}$$

This shows that preparing 500 mL of normal saline requires exactly 4.5 g of NaCl.
Final Answer: 4.5 g

Answer: (A)

Go Back to Question 38

Q39.

Solution

Concept: Tablet manufacturing can encounter mechanical defects during high-speed compression if air becomes trapped within the granule matrix or if compression settings are incorrect.

Solution: Step 1: Define tablet capping. Capping occurs when the upper or lower segment of a compressed tablet separates horizontally from the main body, either immediately after compression or during subsequent handling.
Step 2: Analyze potential causes. Excess moisture typically causes granules to stick, whereas excess lubricant reduces granule binding, leading to softer tablets.
Step 3: Examine mechanical air entrapment. During rapid down-stroke compression, air is forced out from between the granule particles. If granules are too dense or if compression occurs too quickly, air can become trapped inside the matrix.
Step 4: Identify the mechanical cause of separation. When the compression pressure is released, this trapped, highly compressed air expands, causing the tablet layers to split and cap.
Final Answer: Entrapment of air within the granule mass during compression

Answer: (B)

Go Back to Question 39

Q40.

Solution

Concept: Cardiotonic glycosides exert a positive inotropic effect by selectively inhibiting specific ion transport systems in myocardial cell membranes.

Solution: Step 1: Identify the cellular target of digitalis glycosides (such as digoxin). These molecules bind to the extracellular domain of the active transport enzyme Na^+/K^+-ATPase.
Step 2: Analyze the immediate ionic consequences of this binding. Inhibiting the Na^+/K^+-ATPase pump decreases the transport of sodium out of the cell, leading to an accumulation of intracellular sodium ions.
Step 3: Evaluate downstream transport mechanisms. The elevated intracellular sodium concentration slows the action of the Na^+/Ca^{2+} exchanger, reducing the export of calcium ions.
Step 4: Correlate ion concentrations with muscle contraction. The resulting increase in intracellular calcium ions enhances the force of myocardial contraction (positive inotropy), which improves overall cardiac output in heart failure.
Final Answer: Inhibition of the Na^+/K^+-ATPase pump

Answer: (B)

Go Back to Question 40

Q41.

Solution

Concept: Phytochemical classification groups natural crude drugs based on the core chemical structure of their active secondary metabolites, such as specific glycosidic structures.

Solution: Step 1: Analyze the chemical classes of the options. Senna contains anthraquinone glycosides, Digitalis contains cardenolide steroidal glycosides, and Aloe contains anthraquinone derivatives.
Step 2: Examine Dioscorea (obtained from *Dioscorea deltoidea*). Its primary active constituent is diosgenin.
Step 3: Characterize the structural properties of diosgenin. Diosgenin is a steroidal sapogenin linked to a carbohydrate chain, forming a steroidal saponin glycoside.
Step 4: Identify industrial applications. Because of its steroidal structure, dioscorea-derived diosgenin serves as a key starting material for the semi-synthetic production of systemic corticosteroids, progesterone, and oral contraceptives.
Final Answer: Dioscorea

Answer: (A)

Go Back to Question 41

Q42.

Solution

Concept: Inorganic antimicrobial agents use specific chemical pathways, such as halogenation, protein precipitation, or oxidation, to disrupt bacterial structural integrity.

Solution: Step 1: Analyze the mechanisms of action of common inorganic microbicides. Boric acid serves as a weak bacteriostatic agent, while zinc sulfate and silver nitrate act primarily by precipitating bacterial proteins.
Step 2: Evaluate Hydrogen Peroxide (H_2O_2). Hydrogen peroxide is an inorganic chemical structure containing a reactive peroxide bond ($-O-O-$).
Step 3: Examine the oxidative reaction. When applied to tissues, it breaks down to release highly reactive free hydroxyl radicals and singlet oxygen species.
Step 4: Identify the antimicrobial effect. These reactive oxygen species oxidize essential cellular components, disrupting membrane lipids, bacterial enzymes, and microbial DNA structures.
Final Answer: Hydrogen peroxide

Answer: (B)

Go Back to Question 42

Q43.

Solution

Concept: The human digestive tract contains specialized organs that perform specific mechanical processing, enzymatic digestion, and nutrient transport functions.

Solution: Step 1: Review the functional roles of the digestive organs. The esophagus transports food, the stomach breaks down food mechanically and initiates protein digestion, and the large intestine primarily reabsorbs water and compacts waste.
Step 2: Analyze the structural adaptations of the small intestine. The small intestine includes the duodenum, jejunum, and ileum. Its mucosal lining features specialized circular folds, villi, and microvilli.
Step 3: Evaluate surface area adaptations. This unique anatomical arrangement increases the internal surface area millions of times, creating an optimal environment for transport.
Step 4: Determine the primary function. Because of its massive surface area and specialized transport systems, the small intestine serves as the principal site for absorbing digested nutrients into the bloodstream.
Final Answer: Small intestine

Answer: (B)

Go Back to Question 43

Q44.

Solution

Concept: Hospital pharmacy design requires distinct, physically isolated functional zones to safely compound sterile formulations and prevent microbial contamination.

Solution: Step 1: Evaluate different hospital pharmacy work areas. The ambulatory dispensing zone manages outpatient prescriptions, while general bulk storage warehouses hold non-sterile supplies.
Step 2: Analyze the manufacturing requirements for large volume parenterals (LVPs). LVPs enter the systemic circulation directly, bypassing protective physiological barriers like the skin and gastrointestinal tract.
Step 3: Determine the required environmental controls. Injectable formulations must be completely free of microorganisms and pyrogens, requiring an environment with high-efficiency particulate air (HEPA) filters.
Step 4: Identify the appropriate zone. Compounding operations for sterile parenterals must be performed in a dedicated, high-standard sterile compounding or aseptic area.
Final Answer: Sterile compounding / Aseptic area

Answer: (B)

Go Back to Question 44

Q45.

Solution

Concept: Scientific inventory control uses mathematical ordering parameters to manage stock levels, balances holding costs against stockout risks, and schedules replenishment orders.

Solution: Step 1: Analyze stock depletion cycles. As inventory is consumed during regular store operations, total stock levels drop over time.
Step 2: Define lead time. Lead time is the period between submitting a purchase requisition and receiving the items at the warehouse.
Step 3: Calculate the reorder point threshold. To avoid running out of stock during the lead time, a replenishment order must be submitted before supplies are completely exhausted.
Step 4: Define the reorder level. The specific stock quantity that triggers the creation of a new purchase order is defined as the reorder level, ensuring new stock arrives before inventory dips into emergency reserves.
Final Answer: The inventory level at which a fresh purchase requisition must be initiated

Answer: (B)

Go Back to Question 45

Q46.

Solution

Concept: Pharmacopoeial limit tests are semi-quantitative control assays designed to identify and restrict chemical impurities within safe, legally permissible levels.

Solution: Step 1: Define the role of limit tests in pharmaceutical analysis. These tests do not aim to isolate impurities or determine their exact quantitative chemical structure.
Step 2: Evaluate the testing methodology. Limit tests compare the visual appearance, turbidity, or color intensity of a test sample directly against a predefined standard solution.
Step 3: Analyze the testing threshold. The standard solution represents the maximum allowable limit for a given impurity, such as chloride, heavy metals, or iron.
Step 4: Determine the clinical purpose. These tests ensure that trace manufacturing impurities remain below established safety thresholds, verifying the quality and purity of the active ingredient.

Final Answer: To identify and control small traces of impurities within permissible limits

Answer: (C)

Go Back to Question 46

Q47.

Solution

Concept: Therapeutic and pharmacokinetic drug interactions can occur when co-administered substances react chemically within the gastrointestinal tract, altering absorption.

Solution: Step 1: Analyze the chemical properties of tetracycline antibiotics. The tetracycline molecule contains functional groups that can form stable coordination complexes with polyvalent metallic cations.
Step 2: Evaluate the composition of standard antacids. These formulations often contain high concentrations of divalent or trivalent metal ions, such as calcium (Ca^{2+}), magnesium (Mg^{2+}), or aluminum (Al^{3+}).
Step 3: Examine the reaction when taken together. When tetracycline is co-administered with a calcium-containing antacid, the components react to form an insoluble, stable chelate complex.
Step 4: Determine the clinical outcome. This large, non-polar chelate complex cannot cross the intestinal mucosa, reducing tetracycline absorption and causing therapeutic failure.

Final Answer: Formation of an insoluble, unabsorbable chelate complex

Answer: (B)

Go Back to Question 47

Q48.

Solution

Concept: Organic synthesis pathways can transform starting materials into new compounds through condensation reactions that join molecules together via functional group linkages.

Solution: Step 1: Analyze the structure shown in the diagram. The drawing shows a carbonyl group (C = O) bonded directly to an oxygen atom, which connects to an adjacent organic carbon chain (R – COO – R′).
Step 2: Examine how this functional linkage is formed. The condensation reaction of a carboxylic acid (R – COOH) with an alcohol (R′ – OH) eliminates a molecule of water (H_2O).
Step 3: Review the relevant functional groups. Ethers contain an oxygen atom bridging two carbon atoms (R – O – R), while amides feature a nitrogen atom bonded next to a carbonyl group (R – CONH – R′).
Step 4: Identify the compound class. The reaction joining a carboxylic acid and an alcohol creates an ester linkage, which defines the chemical property of the resulting molecule.
Final Answer: Ester

Answer: (B)

Go Back to Question 48

Q49.

Solution

Concept: Orally administered drugs must pass through specific vascular routes and metabolic clearing organs before entering the systemic circulation.

Solution: Step 1: Trace the physiological route of an oral dosage form. The formulation dissolves in the stomach or intestines, and the active drug is absorbed across the gastrointestinal mucosal wall.
Step 2: Analyze the mesenteric venous circulation. Blood draining from the gastrointestinal tract enters the hepatic portal vein, which flows directly into the liver.
Step 3: Evaluate hepatic metabolic activity. The liver contains high concentrations of metabolizing enzymes, such as the cytochrome P450 enzyme family, which can chemically modify active drugs.
Step 4: Define first-pass metabolism. This initial biotransformation of an absorbed drug in the gut wall or liver before it reaches systemic circulation is called first-pass metabolism, which can reduce bioavailability.
Final Answer: Biotransformation of a drug in the gastrointestinal tract or liver prior to reaching systemic circulation

Answer: (B)

Go Back to Question 49

Q50.

Solution

Concept: The thyroid gland consists of distinct endocrine cell types that synthesize and secrete different hormones to regulate metabolism and mineral balance.

Solution: Step 1: Analyze the cellular anatomy of the thyroid gland. Thyroid follicles are lined by follicular cells that produce thyroid hormones like thyroxine (T_4) and triiodothyronine (T_3) to regulate systemic metabolic rates.
Step 2: Identify alternative endocrine cells within the gland. Dispersed in the interstitial spaces between these thyroid follicles are parafollicular cells, also known as C cells.
Step 3: Determine the hormone produced by C cells. Parafollicular cells synthesize and secrete calcitonin, a linear polypeptide hormone.
Step 4: Evaluate its physiological function. Calcitonin helps lower blood calcium levels by inhibiting osteoclast activity in bone tissue and reducing calcium reabsorption in the kidneys, balancing parathyroid hormone.
Final Answer: Calcitonin

Answer: (C)

Go Back to Question 50

Q51.

Solution

Concept: Public health planning incorporates classical demographic frameworks to study population dynamics, resource sustainability, and their long-term impact on community health programs.

Solution: Step 1: Analyze the core principles of the Malthusian theory proposed by Thomas Robert Malthus. This framework evaluates the balance between population expansion and resource availability.
Step 2: Evaluate the mathematical models used. The theory asserts that a human population, when unchecked, increases at a geometric or exponential rate $(1, 2, 4, 8, 16, \dots)$.
Step 3: Analyze resource production constraints. In contrast, the food supply and agricultural productivity increase only at an arithmetic rate $(1, 2, 3, 4, 5, \dots)$ due to land limits.
Step 4: Identify the public health implication. This growing imbalance creates a resource gap, causing food scarcity, poverty, and disease outbreaks, illustrating the link between exponential population growth and arithmetic food supply growth.
Final Answer: Exponential population growth and arithmetic food supply growth

Answer: (B)

Go Back to Question 51

Q52.

Solution

Concept: Standardizing crude drugs requires physical testing methods to evaluate ash values, extractive metrics, and moisture levels, ensuring the quality and uniformity of botanical batches.

Solution: Step 1: Review the different methods used to evaluate crude drugs. Organoleptic methods focus on sensory traits, while microscopical methods examine cell arrangements.
Step 2: Analyze the nature of chemical testing. Chemical methods focus on identifying and measuring active phytoconstituents using specific color reactions or chemical assays.
Step 3: Evaluate physical testing methods. Physical methods apply measurable physical constants and analytical values to assess crude materials.
Step 4: Match the analytical parameters. Ash values evaluate inorganic residue, extractive values measure soluble constituents in specific solvents, and moisture content tracks drying efficiency. These quantitative tests are classified as physical evaluation methods.
Final Answer: Physical evaluation

Answer: (C)

Go Back to Question 52

Q53.

Solution

Concept: Counseling patients on dry powder inhaler (DPI) use requires precise instructions to ensure the breath-actuated medication releases and deposits effectively in the lower airways.

Solution: Step 1: Analyze the mechanical design of a dry powder inhaler (DPI). Unlike pressurized metered-dose inhalers (pMDIs), DPIs do not contain chemical propellants and are driven entirely by the patient's inhalation.
Step 2: Review operational constraints. Since the device is breath-actuated, shaking it is unnecessary. Patients must avoid exhaling into the mouthpiece, as moisture from their breath can cause the dry powder to clump.
Step 3: Identify the required inhalation technique. To pull the fine powder from the internal capsule or reservoir into the bronchial passages, the patient must inhale rapidly and deeply through the mouth.
Step 4: Formulate the key counseling instruction. Pharmacists must instruct patients to breathe in quickly and deeply through the mouth to ensure proper medication delivery.
Final Answer: Breathe in quickly and deeply through the mouth

Answer: (B)

Go Back to Question 53

Q54.

Solution

Concept: Antacids are classified into systemic and non-systemic categories based on their chemical solubility, absorption across the intestinal wall, and impact on systemic acid-base balance.

Solution: Step 1: Analyze non-systemic antacids like aluminum hydroxide, magnesium trisilicate, and calcium carbonate. These compounds form insoluble salts in the gut, are minimally absorbed, and carry a low risk of metabolic alkalosis.
Step 2: Evaluate Sodium Bicarbonate ($NaHCO_3$). Sodium bicarbonate is a highly soluble chemical compound that dissolves completely in the gastric environment.
Step 3: Analyze its chemical reaction with gastric acid. It reacts rapidly with hydrochloric acid (HCl) to neutralize acidity, releasing carbon dioxide gas (CO_2).
Step 4: Determine the systemic risk. Unreacted sodium bicarbonate is easily absorbed through the intestinal walls into the bloodstream. This excess bicarbonate can raise blood pH, leading to systemic metabolic alkalosis.
Final Answer: Sodium bicarbonate

Answer: (C)

Go Back to Question 54

Q55.

Solution

Concept: The molecular structure of local anesthetics features a lipophilic aromatic group joined to a hydrophilic tertiary amine section by an intermediate chemical linkage.

Solution: Step 1: Analyze the chemical structure of Procaine. Procaine is a classical local anesthetic derived from para-aminobenzoic acid (PABA).
Step 2: Examine the core functional linkages used in anesthetics. Local anesthetics are divided into two main chemical classes based on this central connection: amides and esters.
Step 3: Identify the linkage in Procaine. The lipophilic para-aminobenzene ring is joined to the diethylaminoethanol side chain via an ester functional group ($-COO-$).
Step 4: Connect the structure to metabolism. This ester linkage is rapidly broken down by plasma esterase enzymes, giving procaine a shorter duration of action compared to amide-linked anesthetics like lidocaine.
Final Answer: Ester linkage

Answer: (B)

Go Back to Question 55

Q56.

Solution

Concept: Neurotransmission at the neuromuscular junction requires rapid breakdown of neurotransmitters to terminate the signaling impulse and prepare the postsynaptic membrane for subsequent stimulation.

Solution: Step 1: Analyze neurotransmitter release at cholinergic synapses. Motor nerve terminals release acetylcholine (ACh), which diffuses across the synaptic cleft to bind nicotinic receptors on the motor endplate.
Step 2: Evaluate the need to terminate this signal. Continuous activation of these receptors would cause persistent muscle depolarization, leading to neuromuscular blockade and muscle fatigue.
Step 3: Examine the role of Acetylcholinesterase (AChE). This highly efficient enzyme is localized within the synaptic cleft.
Step 4: Identify the specific enzymatic reaction. Acetylcholinesterase rapidly hydrolyzes acetylcholine into choline and acetate, terminating the signal and clearing the receptor site.

Final Answer: Rapid hydrolysis of acetylcholine into choline and acetate to terminate its action

Answer: (B)

Go Back to Question 56

Q57.

Solution

Concept: Epithelial tissues are organized into specific cell shapes and layer configurations tailored to perform filtration, absorption, protection, or transport functions across organ boundaries.

Solution: Step 1: Analyze the structural properties of different epithelial layouts. Stratified epithelium features multiple cell layers designed to protect surfaces from mechanical wear, like the skin.
Step 2: Evaluate areas that require rapid diffusion. Transport zones like blood vessel linings (endothelium) or alveolar walls need a very thin barrier to minimize diffusion distance.
Step 3: Examine simple squamous epithelium. This tissue consists of a single layer of flattened, scale-like cells resting on a basement membrane.
Step 4: Match tissue structure to function. The thin, single-layer profile of simple squamous epithelium allows gases and dissolved nutrients to diffuse rapidly across the vessel wall.

Final Answer: Simple squamous epithelium

Answer: (B)

Go Back to Question 57

Q58.

Solution

Concept: The Hydrophilic-Lipophilic Balance (HLB) scale provides a numerical value for surfactants, indicating their relative solubility properties and suitability for stabilizing specific emulsion types.

Solution: Step 1: Analyze the structure of the HLB scale, which ranges from 1 to 20. Lower values indicate hydrophobic, lipid-soluble properties, while higher values indicate hydrophilic, water-soluble characteristics.
Step 2: Evaluate surfactant requirements for water-in-oil (w/o) emulsions. A w/o emulsion features aqueous droplets dispersed throughout a continuous oil phase.
Step 3: Determine the required surfactant properties. To stabilize this system, the emulsifying agent must dissolve preferentially in the continuous oil phase, requiring a low HLB value.
Step 4: Identify the target HLB range. Surfactants with an HLB value between 3 and 6 are lipophilic and well-suited for stabilizing water-in-oil formulations, whereas values from 8 to 16 are used for oil-in-water systems.
Final Answer: 3 to 6

Answer: (A)

Go Back to Question 58

Q59.

Solution

Concept: Organophosphate poisoning causes toxic accumulation of acetylcholine at cholinergic synapses, leading to overstimulation of muscarinic and nicotinic receptors throughout the body.

Solution: Step 1: Identify the mechanism of organophosphates. These compounds bind irreversibly to acetylcholinesterase, blocking the breakdown of acetylcholine across the nervous system.
Step 2: Analyze the resulting receptor overstimulation. The excess acetylcholine triggers widespread activity at autonomic and somatic nerve endings.
Step 3: Evaluate muscarinic responses using the DUMBELS mnemonic. Symptoms include diaphoresis, urination, miosis (pupillary constriction), bronchospasm, bradycardia, emesis, lacrimation, and salivation.
Step 4: Identify the correct clinical profile. Acute organophosphate toxicity is characterized by miosis, bradycardia, profuse salivation, tearing, and bronchoconstriction, which contrasts with the dry symptoms seen in atropine overdose.
Final Answer: Miosis, bradycardia, profuse salivation, and bronchoconstriction

Answer: (B)

Go Back to Question 59

Q60.

Solution

Concept: Eukaryotic cells use specialized, membrane-bound organelles containing specific enzyme groups to break down waste products and maintain cellular health.

Solution: Step 1: Review the functions of various cellular organelles. Mitochondria generate adenosine triphosphate (ATP), while the endoplasmic reticulum manages protein and lipid synthesis.
Step 2: Analyze the requirements for intracellular digestion. The cell needs a secure compartment to isolate powerful digestive enzymes, protecting the rest of the cytoplasm from self-digestion.
Step 3: Examine the lysosome. Lysosomes are spherical, membrane-bound vesicles that maintain an acidic internal environment.
Step 4: Identify the active enzymes. Lysosomes contain over forty types of acid hydrolases that break down damaged organelles, macromolecules, and engulfed foreign microbes, serving as the cell's waste processing system.
Final Answer: Lysosome

Answer: (B)

Go Back to Question 60

Q61.

Solution

Concept: Institutional pharmacy procurement utilizes standardized purchasing workflows to manage budgets effectively while securing high-quality medical inventory.

Solution: Step 1: Analyze procurement strategies in institutional settings. Purchasing methods include direct buying, emergency purchasing, and competitive tendering.
Step 2: Define the tendering system. This process involves inviting sealed, competitive bids from licensed pharmaceutical manufacturers who must meet specific quality criteria.
Step 3: Evaluate the economic advantages. Open competition among suppliers prevents monopolies and drives down procurement costs for high-volume items.
Step 4: Identify the primary goal. The main purpose of competitive tendering is to secure bulk quantities of high-quality pharmaceuticals at the most competitive market price, optimizing the hospital's operational budget.
Final Answer: To secure high-quality pharmaceuticals at the most competitive market price via open competition

Answer: (B)

Go Back to Question 61

Q62.

Solution

Concept: Fat digestion requires physical breaking down of large lipid aggregates to maximize the surface area available for water-soluble digestive enzymes in the small intestine.

Solution: Step 1: Analyze the chemical properties of dietary lipids. Fats are hydrophobic molecules that tend to aggregate into large droplets within the aqueous environment of the intestinal lumen.
Step 2: Evaluate enzyme constraints. Pancreatic lipase is a water-soluble enzyme that can act only on the outer surface of lipid masses, making the digestion of large droplets inefficient.
Step 3: Examine the action of bile salts. Synthesized in the liver and stored in the gallbladder, bile salts contain both hydrophobic and hydrophilic regions (amphipathic properties).
Step 4: Identify the emulsification process. Bile salts align at the oil-water interface, breaking large fat globules down into small, stable micelles. This emulsification increases the total surface area, accelerating lipase action.
Final Answer: Emulsification of large dietary lipid droplets into small micelles

Answer: (B)

Go Back to Question 62

Q63.

Solution

Concept: Pharmacognosy uses organized systems to classify crude drugs, helping researchers study biological relationships, chemical pathways, and therapeutic properties across different groups.

Solution: Step 1: Review different systems for classifying crude drugs. Morphological systems group drugs by the plant parts used, while chemical systems organize them by their primary active ingredients.
Step 2: Analyze biological classification principles. This approach studies evolutionary paths and shared ancestry using hierarchy: phylum, class, order, family, genus, and species.
Step 3: Define taxonomical classification. This system groups crude botanical and animal drugs according to their precise biological taxonomy and family classifications.
Step 4: Match the system to the description. Organizing drugs based on the specific plant or animal family from which they are derived represents the core approach of the taxonomical classification system.
Final Answer: Taxonomical classification

Answer: (B)

Go Back to Question 63

Q64.

Solution

Concept: Organic nomenclature defines functional groups by their specific atomic arrangements, bonding patterns, and heteroatom configurations along a carbon backbone.

Solution: Step 1: Analyze the structural components described. The group consists of a nitrogen atom bonded directly next to a carbonyl carbon group ($-C(=O)NH-$).
Step 2: Differentiate from similar nitrogen groups. Amines consist of a nitrogen atom bonded to saturated carbon atoms ($-CH_2-NH_2$), lacking an adjacent carbonyl group.
Step 3: Evaluate imine and nitrile structures. Imines contain a carbon-nitrogen double bond ($C=N$), while nitriles feature a carbon-nitrogen triple bond ($C \equiv N$).
Step 4: Identify the target group. A nitrogen atom bonded directly to a carbonyl carbon atom forms an amide functional group, which serves as the structural foundation for peptide bonds and various synthetic drugs.
Final Answer: Amide

Answer: (B)

Go Back to Question 64

Q65.

Solution

Concept: The Drugs and Cosmetics Act of 1940 uses a structured system of regulatory bodies to manage licensing, quality audits, and statutory compliance across different states.

Solution: Step 1: Review the statutory distribution of regulatory authority in India. The Pharmacy Council of India (PCI) focuses primarily on regulating educational standards and professional pharmacist registration.
Step 2: Evaluate the role of central research institutes like the CDRI. These centers conduct drug research and testing but do not issue commercial manufacturing licenses.
Step 3: Analyze industrial licensing pathways. The enforcement of manufacturing provisions for pharmaceuticals, therapeutics, and cosmetics is managed at the state level under the act.
Step 4: Identify the licensing authority. The State Licensing Authority, appointed by individual state governments, is empowered to review applications, audit facilities, and issue commercial licenses for manufacturing cosmetics.
Final Answer: State Licensing Authority appointed by the State Government

Answer: (B)

Go Back to Question 65

Q66.

Solution

Concept: Primary packaging materials must offer excellent barrier properties to shield sensitive solid dosage forms from moisture, atmospheric gases, and environmental degradation.

Solution: Step 1: Analyze the barrier limitations of standard plastics. Low-density polyethylene (LDPE) allows a small amount of moisture to pass through over time, making it less suitable for highly sensitive products.
Step 2: Evaluate glass container characteristics. Glass vials provide good chemical resistance but are typically used for liquid parenterals rather than mass-produced oral solid blisters.
Step 3: Examine aluminum foil properties. Aluminum foil used in blister packs forms a completely impermeable physical barrier against water vapor, oxygen, and light.
Step 4: Determine the ideal packaging choice. For solid dosage forms that degrade in the presence of moisture, aluminum-to-aluminum blister configurations provide maximum product protection and extend shelf life.
Final Answer: Aluminum foil blisters

Answer: (B)

Go Back to Question 66

Q67.

Solution

Concept: The female reproductive cycle is regulated by hormones secreted by the anterior pituitary gland and ovaries that coordinate follicle development and ovulation.

Solution: Step 1: Identify the two gonadotropic hormones released by the anterior pituitary gland: Follicle-stimulating hormone (FSH) and Luteinizing hormone (LH).
Step 2: Analyze the follicular phase, which spans the first half of the menstrual cycle. During this time, primordial follicles begin developing into mature Graafian follicles.
Step 3: Evaluate the action of FSH. As its name implies, follicle-stimulating hormone binds directly to receptors on granulosa cells, promoting follicular growth and stimulating estrogen secretion.
Step 4: Differentiate from LH. FSH drives early follicle development during the first fourteen days, while a sudden surge in LH triggers ovulation at mid-cycle.
Final Answer: Follicle-stimulating hormone (FSH)

Answer: (B)

Go Back to Question 67

Q68.

Solution

Concept: Myocardial infarction triggers the release of intracellular cardiac enzymes into the blood, serving as diagnostic biomarkers to confirm muscle injury.

Solution: Step 1: Review the diagnostic timeline for cardiac enzyme biomarkers. Different enzymes, such as troponins, creatine kinase, and lactate dehydrogenase, show distinct release kinetics following myocardial tissue injury.
Step 2: Evaluate transaminase and phosphatase specificity. Alanine aminotransferase (ALT) serves primarily as a liver function biomarker, while alkaline phosphatase (ALP) tracks bone and biliary conditions.
Step 3: Analyze the Creatine Kinase-MB (CK-MB) isoenzyme. CK-MB is located predominantly within cardiac muscle cells.
Step 4: Determine its diagnostic value. Following myocardial cell injury, CK-MB levels rise in the blood within 4 to 6 hours, peaking around 24 hours. This predictable rise makes it a standard biomarker for diagnosing acute myocardial infarction.
Final Answer: Creatine kinase-MB (CK-MB)

Answer: (B)

Go Back to Question 68

Q69.

Solution

Concept: The central nervous system contains specialized regions that process sensory input, manage cognitive tasks, and coordinate motor control across the skeletal muscles.

Solution: Step 1: Analyze the functional layout of the brain shown in the diagram. The cerebrum manages high-level cognitive processes, sensory perception, and voluntary movement initiation.
Step 2: Examine the roles of lower brain structures. The medulla oblongata within the brainstem regulates essential visceral reflexes, including heart rate and breathing.
Step 3: Evaluate the cerebellum, located in the posterior fossa behind the brainstem. The cerebellum acts as a processing center for motor coordination.
Step 4: Identify the coordination center. The cerebellum receives sensory information regarding body position and fine-tunes motor commands from the cerebrum, making it responsible for maintaining balance, posture, and smooth muscle movement.
Final Answer: Cerebellum

Answer: (C)

Go Back to Question 69

Q70.

Solution

Concept: The pharmacognostical profile of botanical purgatives defines their specific plant sources, geographical origins, and active secondary metabolite content.

Solution: Step 1: Review the biological origins of common laxative drugs. Aloe is derived from the dried leaf juice of *Aloe barbadensis*, while Isapgol consists of the dried ripe seeds of *Plantago ovata*.
Step 2: Examine the properties of Senna. Senna is a widely used stimulant laxative valued for its anthraquinone glycosides, specifically sennosides A and B.
Step 3: Identify its botanical origin. Official senna comes from the dried leaflets of *Cassia angustifolia* (known as Tinnevelly senna) or *Cassia acutifolia* (known as Alexandria senna), both belonging to the family Leguminosae.
Step 4: Match the botanical source. The dried leaflets of *Cassia angustifolia* represent the official biological source of this natural purgative crude drug.

Final Answer: Dried leaflets of *Cassia angustifolia*

Answer: (A)

Go Back to Question 70

Q71.

Solution

Concept: The degradation of vitamins in liquid formulations is driven by specific chemical pathways that break down their core molecular structure when exposed to air or heat.

Solution: Step 1: Analyze the chemical structure of Ascorbic acid (Vitamin C). It features an ene-diol system attached to a five-membered lactone ring, making it highly sensitive to environmental factors.
Step 2: Evaluate potential degradation pathways. While some drugs break down via hydrolysis or photolysis, ascorbic acid is particularly vulnerable to electron loss.
Step 3: Trace the degradation steps. In liquid solutions, dissolved oxygen reacts with the ene-diol group, converting ascorbic acid into dehydroascorbic acid.
Step 4: Determine the primary pathway. This initial reaction is driven by oxidation. Dehydroascorbic acid can then undergo further irreversible ring opening, leading to a complete loss of biological activity.

Final Answer: Oxidation

Answer: (B)

Go Back to Question 71

Q72.

Solution

Concept: Pharmacopoeial limit tests for inorganic anions use specific precipitation reagents to generate visible turbidity, allowing a clear comparison against a predefined standard threshold.

Solution: Step 1: Analyze the chemical principles behind the limit test for sulphates. This assay tracks trace sulphate contamination in a sample solution buffered with dilute hydrochloric acid.
Step 2: Identify the primary precipitating reagent. Barium chloride ($BaCl_2$) solution is added to react with any soluble sulphate ions present in the sample.
Step 3: Examine the precipitation reaction:

$$SO_4^{2-} + BaCl_2 \xrightarrow{HCl} BaSO_4 \downarrow +2Cl^-$$

Step 4: Determine the visual outcome. This reaction precipitates barium sulphate as an insoluble suspension, producing a visible turbidity. Comparing this turbidity against a standard sample determines if the batch complies with purity standards.
Final Answer: Barium chloride reagent

Answer: (B)

Go Back to Question 72

Q73.

Solution

Concept: Liquid oral delivery systems are classified as monophasic or biphasic systems based on the physical state, particle size, and solubility of their active components in the vehicle.

Solution: Step 1: Define monophasic formulations. Elixirs and linctuses are clear, monophasic liquid preparations where the active ingredients are completely dissolved in an aqueous or hydroalcoholic vehicle.
Step 2: Evaluate biphasic liquid systems. Emulsions consist of two immiscible liquid phases dispersed as fine droplets (o/w or w/o) with the help of an emulsifying agent.
Step 3: Analyze suspensions. A suspension is a coarse, heterogeneous biphasic system where solid, insoluble active drug particles are uniformly dispersed throughout a continuous liquid medium.
Step 4: Match the formulation definition. An oral liquid dosage form composed of an insoluble solid drug dispersed in an aqueous vehicle is defined as a suspension.
Final Answer: Suspension

Answer: (B)

Go Back to Question 73

Q74.

Solution

Concept: Essential physiological minerals perform structural roles in tissue formation while also acting as vital cofactors in complex biochemical pathways like blood coagulation.

Solution: Step 1: Review the physiological roles of essential mineral elements. Sodium regulates extracellular fluid volume, while iron serves as the central oxygen-binding atom in hemoglobin.
Step 2: Evaluate calcium's structural functions. Calcium (Ca) is the most abundant mineral in the human body, combining with phosphate to form hydroxyapatite crystals that build the skeletal matrix.
Step 3: Analyze calcium's metabolic roles. Beyond bone health, ionized calcium (Ca^{2+}) acts as an essential clotting factor (Factor IV) in the coagulation cascade, helping convert prothrombin to thrombin.
Step 4: Identify the target mineral. Calcium functions as a core structural element of the skeleton and is equally critical for driving the blood clotting cascade.
Final Answer: Calcium

Answer: (C)

Go Back to Question 74

Q75.

Solution

Concept: Adulteration testing for volatile oils tracks the presence or absence of key active components to differentiate pure botanical extracts from cheap, synthetic substitutes.

Solution: Step 1: Identify the main active component of pure Clove oil (obtained from *Syzygium aromaticum*). Authentic clove oil contains 70% to 90% eugenol, a phenolic volatile compound.
Step 2: Analyze common methods of adulteration. Adulterators may dilute genuine clove oil with synthetic substitutes or mix in exhausted clove buds that have been stripped of their volatile fractions.
Step 3: Determine the diagnostic marker. Eugenol gives clove oil its characteristic aroma and therapeutic properties, such as local dental analgesia.
Step 4: Identify the adulteration indicator. Confirming the absence or low concentration of naturally occurring eugenol serves as a primary diagnostic tool to identify artificial or adulterated clove oil batches.
Final Answer: Eugenol

Answer: (A)

Go Back to Question 75

Q76.

Solution

Concept: The National Family Welfare Programme in India implements demographic strategies that prioritize voluntary, informed choice over coercive population control measures.

Solution: Step 1: Analyze the core operating principles of the National Family Welfare Programme. The program focuses on reproductive health, maternal-child wellness, and voluntary family planning.
Step 2: Evaluate the strategic shift away from historical target-driven or coercive policies. Modern public health frameworks rely on patient autonomy and comprehensive clinical access.
Step 3: Define the "Cafeteria approach". This strategy presents a broad menu of family planning choices, including barrier methods, oral contraceptives, intrauterine devices (IUDs), and permanent sterilization.
Step 4: Determine the programmatic benefit. Offering a wide choice allows individuals to select a family planning method tailored to their reproductive needs, which improves adherence and stabilizes population trends.

Final Answer: Cafeteria approach offering a wide choice of contraceptive methods

Answer: (C)

Go Back to Question 76

Q77.

Solution

Concept: Fluoroquinolone antibiotics disrupt bacterial replication pathways by targeting the essential topoisomerase enzymes required to manage DNA supercoiling.

Solution: Step 1: Identify the chemical class of Ciprofloxacin. Ciprofloxacin is a second-generation synthetic fluoroquinolone antimicrobial agent.
Step 2: Analyze the mechanical challenges of bacterial DNA replication. As helicase unwinds the double helix, it creates positive supercoiling ahead of the replication fork.
Step 3: Examine the specific molecular targets. Ciprofloxacin binds to and inhibits bacterial DNA gyrase (Topoisomerase II) in Gram-negative organisms and Topoisomerase IV in Gram-positive organisms.
Step 4: Identify the downstream bactericidal effect. Inhibiting these enzymes prevents the resealing of DNA strands, blocking replication and transcription, which triggers bacterial cell death.

Final Answer: Inhibition of bacterial DNA gyrase and topoisomerase IV enzymes

Answer: (B)

Go Back to Question 77

Q78.

Solution

Concept: The physical stability of an emulsion depends on keeping its internal droplets uniformly distributed throughout the continuous phase.

Solution: Step 1: Analyze the physical process illustrated in the diagram. The drawing shows dispersed droplets migrating upward to form a concentrated layer at the top of the liquid.
Step 2: Apply Stokes' Law to evaluate droplet migration:

$$v = \frac{2r^2(\rho_1 - \rho_2)g}{9\eta}$$

Step 3: Analyze the role of density differences $(\rho_1 - \rho_2)$. When the dispersed oil phase is less dense than the continuous aqueous phase, the droplets float upward, a process known as upward creaming.
Step 4: Assess the reversibility of this phenomenon. Because the protective surfactant film around the individual droplets remains intact, creaming is a reversible physical phenomenon. The original uniform distribution can be restored by gentle shaking.

Final Answer: Reversible upward or downward movement of dispersed droplets due to density differences

Answer: (B)

Go Back to Question 78

Q79.

Solution

Concept: Managing investigational new drugs (INDs) within institutional medical complexes requires dedicated clinical surveillance and secure tracking workflows.

Solution: Step 1: Define the phases of clinical trials. Phase III trials evaluate therapeutic efficacy and monitor adverse reactions in large patient cohorts before a drug receives marketing approval.
Step 2: Review hospital pharmacy departments. Bulk compounding handles large-scale formulations, while the central sterile supply department manages surgical instruments.
Step 3: Evaluate the duties of the Clinical Pharmacy Service Unit. This specialized team manages the distribution, logging, and monitoring of investigational drugs.
Step 4: Identify the clinical benefits. Keeping investigational tracking under this clinical unit ensures adherence to strict study protocols, proper informed consent, and accurate documentation of adverse events.

Final Answer: Clinical pharmacy service unit

Answer: (B)

Go Back to Question 79

Q80.

Solution

Concept: Stereoisomerism arises when molecules share the same molecular formula and connectivity but differ in the spatial orientation of their atoms.

Solution: Step 1: Analyze the organic molecule shown in the diagram. The structure features a carbon-carbon double bond (C = C) that restricts rotation.
Step 2: Examine the configuration of substituents. Identical methyl groups ($-CH_3$) are positioned on the same side of the double bond, defining it as a *cis*-isomer.
Step 3: Differentiate between classes of stereoisomerism. Optical isomerism requires a chiral center, whereas conformational isomerism involves rotation around single bonds.
Step 4: Identify the specific stereoisomeric class. The presence of different spatial orientations across a rigid double bond forms *cis-trans* (geometric) isomerism, a subcategory of diastereomers.
Final Answer: Cis-trans (Geometric) isomerism

Answer: (B)

Go Back to Question 80

Q81.

Solution

Concept: The steroid biosynthetic pathway uses a characteristic four-ring cyclopentanoperhydrophenanthrene core structure to synthesize vital lipophilic hormones and digestive acids.

Solution: Step 1: Analyze the structural properties of cholesterol. Cholesterol is an essential structural sterol found in animal cell membranes.
Step 2: Evaluate its role as a metabolic starting material. The liver and endocrine glands use cholesterol as a precursor for downstream synthesis.
Step 3: Trace the steroid hormone pathways. Enzymatic cleavage of cholesterol's side chain yields pregnenolone, which is converted into glucocorticoids, mineralocorticoids, and sex hormones.
Step 4: Identify the pathway for bile acids. Cholesterol is oxidized in the liver to synthesize cholic acid and chenodeoxycholic acid, confirming its role as the direct metabolic precursor for steroid hormones and bile acids.
Final Answer: Cholesterol

Answer: (B)

Go Back to Question 81

Q82.

Solution

Concept: Pediatric dosing models use age-based or weight-based mathematical ratios to scale adult drug dosages down to safe, therapeutic levels for children.

Solution: Step 1: Review the mathematical rules used for pediatric dose calculations. Fried's rule handles infant calculations based on age in months, while Clark's rule uses body weight in pounds.
Step 2: Examine the specific formula for Young's Rule. This model scales pediatric doses for children based on their age in years.
Step 3: Write out the algebraic expression for Young's rule:

$$\text{Child's Dose} = \frac{\text{Age (in years)}}{\text{Age (in years)} + 12} \times \text{Adult Dose}$$

Step 4: Match the corresponding option. This equation assumes an average adult baseline maturation index, using a denominator of Age + 12 to calculate the pediatric dose.

Final Answer: $\boxed{\text{Child's Dose} = \frac{\text{Age in years}}{\text{Age in years} + 12} \times \text{Adult Dose}}$

Answer: (A)

Go Back to Question 82

Q83.

Solution

Concept: Pharmacology is divided into distinct disciplines that study either how a drug acts on the body or how the body processes that drug over time.

Solution: Step 1: Define Pharmacodynamics. This field studies the biochemical and physiological effects of drugs and their mechanisms of action ("what the drug does to the body").
Step 2: Analyze the acronym ADME. It stands for Absorption (entry into circulation), Distribution (dispersion through tissues), Metabolism (biotransformation), and Excretion (elimination).
Step 3: Identify the branch of pharmacology that tracks these processes. Pharmacokinetics quantifies the movement of a drug through the body over time ("what the body does to the drug").
Step 4: Select the corresponding field. The study of ADME pathways forms the foundation of pharmacokinetics.

Final Answer: Pharmacokinetics

Answer: (B)

Go Back to Question 83

Q84.

Solution

Concept: Epidemiology uses observational and analytical methods to study health conditions across defined populations, tracking disease origins to design public health strategies.

Solution: Step 1: Review the etymology of epidemiology, derived from the Greek words meaning "the study of what is upon the people."
Step 2: Analyze the core objectives of this discipline. It aims to determine the frequency, patterns, and underlying causes of diseases within a population.
Step 3: Evaluate its application in public health. Rather than treating individual patients in a clinic, epidemiology studies population-level data to track outbreaks and evaluate health programs.
Step 4: Formulate the primary definition. Epidemiology is defined as the study of the distribution and determinants of health-related states or events in specified populations.

Final Answer: The study of the distribution and determinants of health-related states or events in specified populations

Answer: (B)

Go Back to Question 84

Q85.

Solution

Concept: Water-soluble B-complex vitamins act as essential cofactors in nucleotide synthesis pathways, driving rapid cell division during early embryonic development.

Solution: Step 1: Analyze the chemical classifications of the vitamins listed. Vitamins A, D, and K are lipophilic (fat-soluble) molecules, whereas the B-complex group is hydrophilic (water-soluble).
Step 2: Examine the metabolic function of Folic acid (Vitamin B_9). Folic acid is converted into tetrahydrofolate (THF), an essential cofactor for one-carbon transfer reactions.
Step 3: Evaluate the consequences of a deficiency. A lack of folate impairs DNA synthesis, disrupting erythrocyte maturation and leading to megaloblastic anemia.
Step 4: Correlate with fetal development. Insufficient folate during early pregnancy prevents proper closure of the embryonic neural tube, causing congenital defects like spina bifida. This makes folic acid supplementation essential.

Final Answer: Folic acid (Vitamin B9)

Answer: (C)

Go Back to Question 85

Q86.

Solution

Concept: The heart's intrinsic conduction network relies on a primary cluster of specialized neuromuscular cells to generate rhythmic action potentials without external nervous stimulation.

Solution: Step 1: Trace the path of electrical signaling through the heart. The conduction sequence flows from the sinoatrial node → atrioventricular node → Bundle of His → Purkinje fibers.
Step 2: Analyze the autorhythmic properties of these tissues. While multiple areas can spontaneously depolarize, their natural firing rates differ.
Step 3: Identify the fastest inherent depolarization rate. The Sinoatrial (SA) node, located in the superior wall of the right atrium, fires at an inherent rate of 60 to 100 action potentials per minute.
Step 4: Define the primary pacemaker. Because the SA node depolarizes the fastest, it overrides other latent pacemakers, setting the rhythmic electrical pacing for cardiac contraction.
Final Answer: Sinoatrial (SA) node

Answer: (B)

Go Back to Question 86

Q87.

Solution

Concept: Standardizing herbal formulations requires complex analytical workflows because natural plant extracts contain a wide variety of secondary metabolites.

Solution: Step 1: Compare synthetic pharmaceuticals with herbal crude products. A synthetic tablet contains a single, high-purity active pharmaceutical ingredient (API) that is easy to measure quantitatively.
Step 2: Analyze the composition of botanical drugs. A single plant extract contains hundreds of distinct phytochemicals, including alkaloids, glycosides, flavonoids, and terpenes.
Step 3: Evaluate chemical standardization challenges. The therapeutic activity of an herbal drug is often the result of synergistic interactions among multiple constituents rather than a single molecule.
Step 4: Identify the primary variable. This complex mixture of multiple phytochemicals makes it difficult to establish simple analytical profiles for standardization.
Final Answer: Presence of a complex mixture of multiple phytochemical constituents rather than a single active entity

Answer: (B)

Go Back to Question 87

Q88.

Solution

Concept: Toxic doses of certain medications can overwhelm metabolic clearing pathways, leading to the accumulation of reactive intermediates that cause severe tissue damage.

Solution: Step 1: Analyze the standard metabolism of Acetaminophen (Paracetamol). At therapeutic doses, it is safely metabolized in the liver via glucuronidation and sulfation pathways.
Step 2: Examine the minor oxidative pathway. A small fraction of the drug is processed by cytochrome P450 enzymes into a highly reactive, toxic intermediate called *N*-acetyl-*p*-benzoquinone imine (NAPQI).
Step 3: Evaluate toxic overdose dynamics. In an overdose, primary conjugation pathways become saturated, forcing more drug through the CYP450 pathway and depleting protective liver glutathione reserves.
Step 4: Determine the pathological outcome. Unconjugated NAPQI binds covalently to hepatocellular proteins, causing extensive cell damage and severe hepatic necrosis.

Final Answer: Severe hepatotoxicity and hepatic necrosis due to NAPQI metabolite accumulation

Answer: (B)

Go Back to Question 88

Q89.

Solution

Concept: Counseling patients on antimicrobials requires explaining expected side effects to ensure treatment compliance and prevent unnecessary alarm.

Solution: Step 1: Analyze the chemical and metabolic profile of Rifampin, a primary macrocyclic antibiotic used to treat tuberculosis infections.
Step 2: Examine its physical properties. Rifampin is an intensely red-crystalline lipophilic compound.
Step 3: Trace its elimination pathways. The drug and its active metabolites are excreted into bodily fluids, including urine, feces, saliva, sweat, and tears.
Step 4: Formulate key patient advice. Pharmacists must inform patients that Rifampin causes a harmless reddish-orange discoloration of bodily fluids. This warning prevents patients from confusing the color change with blood and stopping their medication prematurely.

Final Answer: Expect a harmless reddish-orange discoloration of urine, sweat, and tears

Answer: (B)

Go Back to Question 89

Q90.

Solution

Concept: Inhaled general anesthetics rely on rapid diffusion across alveolar membranes and the blood-brain barrier to disrupt neural transmission in the central nervous system.

Solution: Step 1: Analyze the anatomical barriers an inhaled anesthetic must cross. The molecule moves from the lungs into the bloodstream, and must then cross the lipid-rich blood-brain barrier (BBB).
Step 2: Apply the Meyer-Overton correlation. This pharmacological principle shows a direct relationship between an anesthetic's lipid solubility and its therapeutic potency.
Step 3: Evaluate physical property requirements. To cross the hydrophobic endothelial membranes of the BBB and concentrate in central neural tissues, the agent must be highly lipophilic.
Step 4: Link physical properties to function. A high oil/gas partition coefficient (indicating high lipid solubility) is an absolute requirement for these gases to induce anesthesia.

Final Answer: High lipid solubility (high oil/gas partition coefficient) to cross the blood-brain barrier

Answer: (B)

Go Back to Question 90

Q91.

Solution

Concept: The urinary system coordinates fluid excretion and solute reabsorption to maintain homeostatic balance in blood pressure, extracellular fluid volume, and ionic osmolarity.

Solution: Step 1: Review the physiological roles of major organ systems. The digestive system processes nutrients, while the lymphatic system manages fluid balance and immune responses.
Step 2: Analyze the regulatory mechanisms of the kidneys. The kidneys filter blood plasma, generating an ultrafiltrate that is modified as it passes through the nephrons.
Step 3: Evaluate hormonal feedback loops. Working with systems like the renin-angiotensin-aldosterone axis, the kidneys adjust the reabsorption of water and sodium.
Step 4: Identify the primary regulatory system. The urinary system filters plasma and alters urine volume to regulate blood pressure, blood volume, and plasma osmolarity.

Final Answer: Urinary system

Answer: (B)

Go Back to Question 91

Q92.

Solution

Concept: Carbohydrates are classified based on the number of simple sugar units formed when the molecule undergoes acid-catalyzed or enzymatic hydrolysis.

Solution: Step 1: Define monosaccharides. These are simple sugars, like glucose or fructose, that cannot be broken down into smaller carbohydrates.
Step 2: Analyze the chemical structure of Sucrose (common table sugar). Sucrose is composed of one glucose unit joined to one fructose unit via a glycosidic bond (α-1, 2-glycosidic linkage).
Step 3: Evaluate its behavior during hydrolysis. Breaking this glycosidic bond yields exactly two monosaccharide molecules.
Step 4: Determine the carbohydrate classification. Because it yields two simple sugar units upon hydrolysis, sucrose is classified as a disaccharide.
Final Answer: Disaccharide

Answer: (B)
Go Back to Question 92

Q93.

Solution

Concept: Industrial size reduction processes apply specific mechanical forces, such as impact, attrition, compression, or shearing, to break down crude solids into fine powders.

Solution: Step 1: Evaluate different milling machines. Hammer mills rely primarily on high-speed impact, while cutter mills use shearing forces to cut fibrous materials.
Step 2: Analyze the mechanics of a Ball Mill. This machine features a hollow, rotating horizontal steel drum filled with metallic or porcelain balls.
Step 3: Examine the moving forces inside the drum. As the cylinder rotates, the balls are carried upward and cascade downward.
Step 4: Identify the combined mechanism of size reduction. The impact of the falling balls breaks large particles apart, while the rubbing action between the rolling spheres produces attrition, making the ball mill effective for fine grinding.
Final Answer: Ball mill

Answer: (B)
Go Back to Question 93

Q94.

Solution

Concept: The endocrine system coordinates fluid balance via hypothalamic neurosecretory pathways that control water reabsorption in the distal segments of the nephron.

Solution: Step 1: Analyze the neurosecretory pathway of the posterior pituitary gland. Hormones are synthesized in the supraoptic and paraventricular nuclei of the hypothalamus and travel down axons to be stored in the posterior pituitary.
Step 2: Evaluate the action of Antidiuretic Hormone (ADH, or Vasopressin). This peptide hormone is released in response to increased plasma osmolarity or decreased blood volume.
Step 3: Examine its physiological mechanism in the kidney. ADH binds to V_2 receptors on the basolateral membrane of principal cells in the collecting ducts, triggering the insertion of aquaporin-2 water channels.
Step 4: Identify the endocrine response. This insertion increases the permeability of the ducts, promoting water reabsorption and concentrating the urine to preserve blood volume.
Final Answer: Antidiuretic Hormone (ADH / Vasopressin)

Answer: (B)

Go Back to Question 94

Q95.

Solution

Concept: The legal and quality control definitions for crude drugs identify different types of quality degradation, ranging from natural spoilage to intentional fraud.

Solution: Step 1: Differentiate between quality control terms. Deterioration refers to the natural loss of active constituents over time due to poor storage conditions.
Step 2: Analyze the concept of substitution. Substitution occurs when an entirely different botanical species is used in place of the genuine drug.
Step 3: Evaluate adulteration. Adulteration is the intentional or accidental addition of inferior, exhausted, or look-alike cheap foreign material to a genuine crude drug.
Step 4: Match the definition. This deliberate debasement lowers the therapeutic value of the product, fitting the definition of adulteration.
Final Answer: Adulteration

Answer: (B)

Go Back to Question 95

Q96.

Solution

Concept: Chemical bonds are formed through different arrangements of valence electrons, which can be shared equally, shared coordinately, or transferred between atoms.

Solution: Step 1: Analyze covalent bonding, where non-metal atoms share valence electrons to achieve a stable octet structure.
Step 2: Examine the mechanism of ionic bonding. This configuration occurs between atoms with large differences in electronegativity, typically a metal and a non-metal.
Step 3: Trace electron movement during bond formation. The electropositive atom transfers one or more valence electrons completely to the electronegative atom.
Step 4: Identify the binding force. This electron transfer creates oppositely charged ions (cations and anions) that are held together by strong, non-directional electrostatic attraction, defining an ionic bond.

Final Answer: Ionic bond

Answer: (B)

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Q97.

Solution

Concept: The structural anatomy of an immunoglobulin monomer features distinct protein domains that manage either systemic immune signaling or antigen binding.

Solution: Step 1: Analyze the structural segments of an antibody molecule. An antibody is a Y-shaped protein consisting of two heavy chains and two light chains.
Step 2: Evaluate the function of the constant (Fc) region. The Fc stem domain binds to immune cell receptors and activates the complement cascade.
Step 3: Examine the variable region (F_{ab} fragment). The tips of the Y-shaped molecule contain highly variable amino acid sequences.
Step 4: Identify the antigen binding site. These variable domains on both the light and heavy chains form a unique geometric shape that binds directly to a specific antigenic determinant (epitope).

Final Answer: Variable region (Fab fragment) consisting of light and heavy chains

Answer: (B)

Go Back to Question 97

Q98.

Solution

Concept: Physical testing parameters for volatile oils use precise, standardized experimental conditions to verify drug purity and detect adulteration.

Solution: Step 1: Define the refractive index. This physical property measures how much a beam of light bends as it passes through a liquid substance compared to air.
Step 2: Evaluate sample requirements for refractometry. Modern optical refractometers (such as the Abbe refractometer) require only a tiny volume of sample.
Step 3: Analyze the effect of temperature on the measurement. The refractive index is sensitive to temperature changes because thermal expansion alters the density of the liquid.
Step 4: Identify the standard testing conditions. Pharmacopoeias require measurements to be taken using a few drops of the volatile oil at a stabilized reference temperature of either 20°C or 25°C to ensure consistency.

Final Answer: A few drops at a stabilized temperature of 20°C or 25°C

Answer: (B)

Go Back to Question 98

Q99.

Solution

Concept: Scientific inventory classification systems group pharmaceutical stock based on operational criticality to prevent shortages of essential medical supplies.

Solution: Step 1: Review the structure of VED inventory analysis. This method classifies medical inventory items into Vital (V), Essential (E), and Desirable (D) categories based on clinical priority.
Step 2: Define the "V" classification. "V" stands for Vital items.
Step 3: Evaluate the clinical importance of vital items. These are critical life-saving medications, antidotes, or medical gases that must be stocked at all times.
Step 4: Identify the operational consequences of a shortage. A stockout of a vital item can cause an immediate halt to hospital operations or compromise patient survival, requiring strict safety stock margins.

Final Answer: It indicates the item is 'Vital', meaning its absence will completely halt hospital operations

Answer: (B)

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Q100.

Solution

Concept: Organic nitrogen compounds are classified as primary, secondary, or tertiary based on the number of carbon substituents attached directly to the central nitrogen atom.

Solution: Step 1: Analyze nitrogen bonding patterns. A primary amine features a nitrogen atom bonded to one organic carbon group ($R - NH_2$).
Step 2: Examine secondary amines. A secondary amine contains a central nitrogen atom bonded to two organic carbon substituents ($R_2 - NH$).
Step 3: Evaluate the given molecular layout (R_3N). This configuration features a nitrogen atom bonded to three distinct alkyl or aryl organic substituents, with no remaining hydrogen atoms.
Step 4: Determine the correct classification. This structural arrangement defines a tertiary amine, distinguishing it from a quaternary ammonium salt which carries a fourth bond and a positive charge (R_4N^+).
Final Answer: Tertiary amine

Answer: (C)

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Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	D	2	B	3	B	4	B	5	B
6	B	7	B	8	C	9	B	10	D
11	A	12	A	13	C	14	B	15	B
16	B	17	B	18	C	19	B	20	B
21	C	22	C	23	B	24	B	25	B
26	B	27	B	28	B	29	B	30	B
31	C	32	B	33	B	34	B	35	C
36	B	37	C	38	A	39	B	40	B
41	A	42	B	43	B	44	B	45	B
46	C	47	B	48	B	49	B	50	C
51	B	52	C	53	B	54	C	55	B
56	B	57	B	58	A	59	B	60	B
61	B	62	B	63	B	64	B	65	B
66	B	67	B	68	B	69	C	70	A
71	B	72	B	73	B	74	C	75	A
76	C	77	B	78	B	79	B	80	B
81	B	82	A	83	B	84	B	85	C
86	B	87	B	88	B	89	B	90	B
91	B	92	B	93	B	94	B	95	B
96	B	97	B	98	B	99	B	100	C