OJEE M Pharm Sample Paper 03

A) Mode and Time: The exam is a Computer Based Test (CBT) lasting 60 minutes.
B) Total Questions: The exam contains 60 questions.
C) Marking Scheme & Rules:

- +4 marks for each correct answer; -1 mark for each incorrect answer.

Q1. According to Stokes' law, the rate of sedimentation of particles in a suspension is inversely proportional to the:

A. Radius of the particles

B. Density difference between the dispersed phase and dispersion medium

C. Viscosity of the dispersion medium

D. Acceleration due to gravity

Q2. Which of the following pharmaceutical excipients is most commonly used as a glidant to improve powder flow properties during tablet compression?

A. Magnesium stearate

B. Colloidal silicon dioxide (Talc)

C. Croscarmellose sodium

D. Lactose monohydrate

Q3. The tablet coating defect known as "Orange peel effect" is primarily caused by:

A. Poor spreading of the coating solution during application

B. Excessive moisture in the tablet core

C. High pan speed during coating

D. Differences in thermal expansion coefficients

Q4. The most common polymorph of cocoa butter used in suppository formulations, which melts at body temperature (34-35$°C$), $isthe$:

A. Alpha $(\alpha)form$

B. Beta prime $(\beta')form$

C. Beta $(\beta)form$

D. Gamma $(\gamma)form$

Q5. In thermal sterilization, the "D-value" (Decimal reduction time) is mathematically defined as the time required to:

A. Reduce the microbial population by 10%

B. Reduce the microbial population by 90% (1 log cycle)

C. Completely sterilize the product

D. Reach the target temperature of $121°C$

Q6. Which type of ointment base is anhydrous but possesses the ability to absorb significant amounts of water to form water-in-oil (w/o) emulsions?

A. Hydrocarbon bases

B. Water-soluble bases

C. Absorption bases

D. Water-removable bases

Q7. According to the United States Pharmacopeia (USP), Dissolution Apparatus 2 is officially designated as the:

A. Basket apparatus

B. Paddle apparatus

C. Reciprocating cylinder

D. Flow-through cell

Q8. In aerosol terminology, Propellant 114 (Dichlorotetrafluoroethane) operates primarily as a:

A. Compressed inert gas

B. Liquefied fluorocarbon propellant

C. Solvent

D. Foaming agent

Q9. The desirable rheological property for a pharmaceutical suspension, where the apparent viscosity decreases under shear stress and recovers when the stress is removed, is called:

A. Dilatancy

B. Rheopexy

C. Thixotropy

D. Newtonian flow

Q10. The "Angle of Repose" is an empirical method widely used in micromeritics to evaluate the:

A. Particle size distribution of a powder

B. Porosity of a powder bed

C. Flowability of a powder

D. True volume of granules

Q11. What is the approximate fill volume capacity of the smallest standard empty hard gelatin capsule, Size 5?

A. 0.13 ml

B. 0.20 ml

C. 0.37 ml

D. 0.68 ml

Q12. Which equation is utilized to calculate the amount of sodium chloride required to render a pharmaceutical solution isotonic with blood plasma?

A. Henderson-Hasselbalch equation

B. Young's equation

C. White-Vincent method

D. Arrhenius equation

Q13. G-protein coupled receptors (GPCRs), the targets of many modern drugs, typically consist of a single polypeptide chain that crosses the cell membrane how many times?

A. 3 times

B. 5 times

C. 7 times

D. 12 times

Q14. Aspirin exerts its potent anti-platelet and anti-inflammatory effects by irreversibly inhibiting which enzyme?

A. Phospholipase A2

B. Lipoxygenase

C. Cyclooxygenase (COX)

D. Thromboxane synthase

Q15. Which of the following antihypertensive drugs acts by competitively blocking the Angiotensin II Type 1 (AT1) receptor?

A. Captopril

B. Losartan

C. Amlodipine

D. Metoprolol

Q16. The classic adverse effect known as "Red Man Syndrome," characterized by intense flushing and hypotension, is associated with the rapid intravenous infusion of:

A. Penicillin G

B. Tetracycline

C. Vancomycin

D. Gentamicin

Q17. Sulfonylureas, such as Glipizide, lower blood glucose levels in Type 2 Diabetes primarily by:

A. Increasing peripheral insulin sensitivity

B. Stimulating insulin release from pancreatic beta cells

C. Inhibiting hepatic gluconeogenesis

D. Delaying carbohydrate absorption in the gut

Q18. Thiazide diuretics (e.g., Hydrochlorothiazide) exert their primary pharmacological effect by inhibiting the Na+/Cl- symporter located in the:

A. Proximal convoluted tubule

B. Thick ascending limb of the Loop of Henle

C. Distal convoluted tubule

D. Collecting duct

Q19. Selegiline is utilized as an adjunct therapy in Parkinson's disease because it acts as a selective inhibitor of:

A. COMT (Catechol-O-methyltransferase)

B. DOPA decarboxylase

C. MAO-B (Monoamine oxidase B)

D. Acetylcholinesterase

Q20. Which antineoplastic agent works as a structural analogue of folic acid, competitively inhibiting dihydrofolate reductase (DHFR)?

A. 5-Fluorouracil

B. Methotrexate

C. Cyclophosphamide

D. Doxorubicin

Q21. The specific, rapidly acting chemical antidote for reversing systemic toxicity caused by unfractionated Heparin is:

A. Vitamin K

B. Tranexamic acid

C. Protamine sulfate

D. Flumazenil

Q22. Montelukast provides prophylaxis against asthma exacerbations by acting as a highly selective antagonist at which receptor?

A. Beta-2 adrenergic receptor

B. Muscarinic M3 receptor

C. Leukotriene receptor (CysLT1)

D. Histamine H1 receptor

Q23. The antiviral drug Acyclovir requires activation by a specific viral enzyme to inhibit viral DNA synthesis. This enzyme is:

A. Reverse transcriptase

B. Viral protease

C. Viral thymidine kinase

D. Neuraminidase

Q24. Which of the following drugs is a pure mu (μ) opioid receptor agonist widely used for severe acute pain management?

A. Buprenorphine

B. Naloxone

C. Morphine

D. Pentazocine

Q25. In the Indian Pharmacopoeia limit test for Chlorides, the opalescence produced is chemically due to the precipitation of:

A. Barium sulfate

B. Silver chloride

C. Lead sulfide

D. Calcium carbonate

Q26. The core active pharmacophore of all Cephalosporin antibiotics consists of a beta-lactam ring fused to a six-membered:

A. Thiazolidine ring

B. Dihydrothiazine ring

C. Pyrrolidine ring

D. Piperidine ring

Q27. Which of the following is considered the most common and quantitatively important Phase II drug conjugation reaction in human metabolism?

A. Acetylation

B. Methylation

C. Sulfate conjugation

D. Glucuronidation

Q28. Stereoisomers that are non-superimposable mirror images of each other and rotate plane-polarized light in opposite directions are defined as:

A. Diastereomers

B. Epimers

C. Enantiomers

D. Geometrical isomers

Q29. The classic Karl Fischer reagent, used for the exact quantitative determination of water content, primarily consists of iodine, sulfur dioxide, methanol, and:

A. Sodium hydroxide

B. Pyridine (or a similar base)

C. Acetic acid

D. Ammonia

Q30. The chemical assay of Aspirin (Acetylsalicylic acid) is most commonly performed using which analytical titration method?

A. Complexometric titration

B. Non-aqueous titration

C. Acid-base back titration

D. Redox titration

Q31. Vitamin B12, a water-soluble vitamin essential for red blood cell formation and neurological function, is chemically named:

A. Pyridoxine

B. Cyanocobalamin

C. Riboflavin

D. Ascorbic acid

Q32. Ibuprofen and Naproxen both belong to which specific chemical subclass of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)?

A. Salicylates

B. Acetic acid derivatives

C. Propionic acid derivatives

D. Enolic acid derivatives (Oxicams)

Q33. The fundamental structural nucleus of Diazepam, Alprazolam, and Lorazepam features a benzene ring fused to a seven-membered ring containing two nitrogen atoms, known as:

A. Phenothiazine

B. Barbituric acid

C. 1,4-Benzodiazepine

D. Quinoline

Q34. Which general qualitative chemical reagent produces a cream or pale-yellow precipitate when added to a solution containing alkaloids?

A. Dragendorff's reagent

B. Mayer's reagent

C. Wagner's reagent

D. Hager's reagent

Q35. Which prominent first-line antitubercular drug acts primarily by inhibiting the synthesis of mycolic acids in the mycobacterial cell wall?

A. Rifampin

B. Ethambutol

C. Isoniazid (INH)

D. Pyrazinamide

Q36. Chemically, the active substance responsible for the intense pungent taste of black pepper is a piperidine alkaloid called:

A. Capsaicin

B. Piperine

C. Curcumin

D. Gingerol

Q37. In Pharmacognosy, "Dragendorff's reagent" (solution of potassium bismuth iodide) gives an orange-red precipitate indicating the presence of:

A. Tannins

B. Flavonoids

C. Alkaloids

D. Saponins

Q38. The potent cardioactive principles (like Digoxin) found in the leaves of Digitalis lanata are pharmacognostically classified as:

A. Tropane alkaloids

B. Anthraquinone glycosides

C. Cardiac glycosides

D. Volatile oils

Q39. Ergotamine, a powerful vasoconstrictor used to treat migraines, is extracted from the sclerotium of the parasitic fungus:

A. *Saccharomyces cerevisiae*

B. *Aspergillus niger*

C. *Penicillium notatum*

D. *Claviceps purpurea*

Q40. The primary active constituents of Senna leaves, which exert a strong laxative effect, are chemically classified as:

A. Sennosides (Anthraquinone glycosides)

B. Digitoxin (Cardiac glycosides)

C. Atropine (Alkaloids)

D. Eugenol (Volatile oils)

Q41. The widely utilized antihypertensive and tranquilizing alkaloid Reserpine is commercially obtained from the dried roots of:

A. *Catharanthus roseus*

B. *Rauwolfia serpentina*

C. *Cinchona calisaya*

D. *Ephedra sinica*

Q42. Which of the following important antimalarial drugs is isolated from the bark of the Cinchona tree?

A. Artemisinin

B. Chloroquine

C. Quinine

D. Primaquine

Q43. Guggulsterones, known for their powerful lipid-lowering properties, are found in the oleogum resin exudate of:

A. *Commiphora wightii*

B. *Acacia senegal*

C. *Boswellia serrata*

D. *Myroxylon balsamum*

Q44. The highly toxic alkaloid Atropine, a competitive muscarinic antagonist, is a signature compound of which botanical family?

A. Rubiaceae

B. Solanaceae

C. Leguminosae

D. Apocynaceae

Q45. When iodine solution is added to starch mucilage, it forms a characteristic complex that visually appears:

A. Deep red

B. Pale yellow

C. Deep blue-black

D. Bright green

Q46. Menthol, the chief constituent of peppermint oil used for its cooling and mild analgesic effects, is chemically a:

A. Monoterpene alcohol

B. Sesquiterpene lactone

C. Diterpene acid

D. Triterpene saponin

Q47. Colchicine, an alkaloid extracted from the autumn crocus (*Colchicum autumnale*), is highly effective in treating acute flares of which inflammatory condition?

A. Rheumatoid arthritis

B. Osteoarthritis

C. Gout

D. Systemic lupus erythematosus

Q48. The 'Shinoda Test' (using magnesium turnings and concentrated HCl) is a standard chemical identification test to confirm the presence of:

A. Tannins

B. Flavonoids

C. Alkaloids

D. Volatile oils

Q49. In UV-Visible spectroscopy, the mathematical relationship $A = \varepsilon bc$ is universally known as:

A. Raoult's Law

B. Beer-Lambert Law

C. Bragg's Law

D. Planck's Equation

Q50. In Infrared (IR) spectroscopy, the unique "fingerprint region" of a molecule, which is highly specific for structural confirmation, typically lies between:

A. 4000 to 2500 cm^{-1}

B. 2500 to 1500 cm^{-1}

C. 1500 to 400 cm^{-1}

D. 400 to 10 cm^{-1}

Q51. In High-Performance Liquid Chromatography (HPLC), a method where the composition and polarity of the mobile phase remains completely constant throughout the run is called:

A. Gradient elution

B. Isocratic elution

C. Step-wise elution

D. Reverse-phase elution

Q52. Which highly sensitive detector is universally used as the standard in Gas Chromatography (GC) for the analysis of almost all organic compounds?

A. Electron Capture Detector (ECD)

B. Thermal Conductivity Detector (TCD)

C. Flame Ionization Detector (FID)

D. Refractive Index Detector (RID)

Q53. In Mass Spectrometry, the peak corresponding to the most stable and highly abundant fragment ion, which is assigned an arbitrary relative abundance of 100%, is called the:

A. Molecular ion peak

B. Isotope peak

C. Base peak

D. Metastable peak

Q54. The standard glass electrode, universally used in potentiometric analysis, is specifically designed to measure the activity of which ion in a solution?

A. Chloride ions

B. Sodium ions

C. Hydrogen ions (pH)

D. Potassium ions

Q55. In Fluorimetry, a decrease in the fluorescence intensity of a sample due to specific interactions (like collisions) with other molecules in the solution is known as:

A. Phosphorescence

B. Chemiluminescence

C. Quenching

D. Raman scattering

Q56. The landmark Pharmacy Act, which formally regulated the pharmacy profession and established the Pharmacy Council of India, was enacted in the year:

A. 1940

B. 1945

C. 1948

D. 1970

Q57. According to the Drugs and Cosmetics Rules 1945, biological and special products (like vaccines and sera) are strictly governed under:

A. Schedule C and C1

B. Schedule G

C. Schedule H

D. Schedule X

Q58. A pharmaceutical formulation containing a drug listed in Schedule H of the Drugs and Cosmetics Rules must prominently display which warning on its label?

A. To be sold by retail on the prescription of a Registered Medical Practitioner only

B. Caution: It is dangerous to take this preparation except under medical supervision

C. Warning: May be habit-forming

D. For External Use Only

Q59. The principal legislation passed to consolidate and amend the laws relating to patents for inventions in India is the:

A. Poisons Act 1919

B. Drugs and Magic Remedies Act 1954

C. Patents Act 1970

D. Medical Termination of Pregnancy Act 1971

Q60. According to the standard GMP guidelines (Schedule M), what is the minimum required area for the basic manufacturing premises of a pharmaceutical production unit?

A. 10 square meters

B. 30 square meters

C. 100 square meters

D. 500 square meters

Solutions

1. C
Explanation: According to Stokes' law ($v = \frac{2r^2(\rho_1 - \rho_2)g}{9\eta}$), the sedimentation velocity (v) of suspended particles is inversely proportional to the viscosity (η) of the dispersion medium.

2. B
Explanation: Colloidal silicon dioxide (often alongside talc) is an excellent glidant. It physically separates granules, reduces inter-particulate friction, and massively improves powder flow into the tablet die.

3. A
Explanation: The "Orange peel" effect creates a rough, bumpy tablet surface resembling an orange. It occurs when the coating droplets dry too rapidly before they can properly spread and coalesce on the tablet surface.

4. C
Explanation: Cocoa butter is highly polymorphic. The Beta (β) form is the most stable polymorph, melting exactly at body temperature ($34 - 35^\circ$ C), making it the ideal base for suppositories.

5. B
Explanation: The D-value (Decimal reduction time) is the specific time required at a given temperature to kill 90% of the microorganisms present (representing a 1 log cycle reduction).

6. C
Explanation: Absorption bases (like wool fat or hydrophilic petrolatum) are anhydrous but can absorb significant volumes of water to form robust water-in-oil (w/o) emulsions, making them excellent emollients.

7. B
Explanation: The USP explicitly designates Dissolution Apparatus 1 as the Basket apparatus, and Apparatus 2 as the Paddle apparatus.

8. B
Explanation: Propellant 114 (C2Cl2F4) is a halogenated hydrocarbon. Under pressure in an aerosol can, it exists as a liquefied fluorocarbon propellant, providing a constant vapor pressure.

9. C
Explanation: Thixotropy is a reversible time-dependent decrease in viscosity. A thixotropic suspension becomes fluid when shaken (shear stress applied) for easy pouring, but thickens upon standing to prevent particle sedimentation.

10. C
Explanation: The Angle of Repose ($\tan\theta = h/r$) is an indirect, empirical measurement of inter-particulate friction. A lower angle of repose indicates excellent powder flowability.

11. A
Explanation: Empty hard gelatin capsules range from Size 000 (largest, approx 1.37 ml) to Size 5 (smallest, approx 0.13 ml).

12. C
Explanation: The White-Vincent method calculates the exact volume of water required to dissolve a drug to make it an isotonic solution, which is then diluted to the final volume using an isotonic vehicle.

13. C
Explanation: GPCRs are integral membrane proteins characterized by a single polypeptide chain that winds back and forth across the cellular plasma membrane exactly seven times (7-transmembrane receptors).

14. C
Explanation: Aspirin uniquely irreversibly acetylates a serine residue in the active site of the Cyclooxygenase (COX-1 and COX-2) enzymes, preventing the synthesis of inflammatory prostaglandins and platelet-aggregating thromboxane A2.

15. B
Explanation: Losartan belongs to the class of Angiotensin II Receptor Blockers (ARBs). It selectively and competitively antagonizes the AT1 receptor, inducing vasodilation and lowering blood pressure.

16. C
Explanation: "Red Man Syndrome" is an infusion-related reaction unique to Vancomycin. Rapid IV administration triggers a massive, non-IgE mediated release of histamine, causing severe flushing, erythema, and hypotension.

17. B
Explanation: Sulfonylureas act on ATP-sensitive potassium channels in pancreatic beta cells. Blocking these channels causes cell depolarization, calcium influx, and the subsequent exocytosis of stored insulin.

18. C
Explanation: Thiazide diuretics target the Na+/Cl- symporter specifically located in the early distal convoluted tubule (DCT) of the nephron, promoting moderate diuresis and lowering blood pressure.

19. C
Explanation: Selegiline is a selective, irreversible inhibitor of Monoamine oxidase B (MAO-B), the enzyme responsible for degrading dopamine in the brain. This preserves endogenous and Levodopa-derived dopamine.

20. B
Explanation: Methotrexate structurally mimics folic acid. It binds tightly to dihydrofolate reductase (DHFR), preventing the formation of tetrahydrofolate, shutting down DNA synthesis and causing cell death in rapidly dividing tissues.

21. C
Explanation: Protamine sulfate, a strongly basic protein derived from fish sperm, binds tightly to the highly acidic, negatively charged heparin molecule, forming a stable, inactive salt complex.

22. C
Explanation: Montelukast is a highly selective, competitive antagonist of the cysteinyl leukotriene receptor (CysLT1), preventing leukotriene-induced bronchoconstriction and airway inflammation in asthma.

23. C
Explanation: Acyclovir is a prodrug. It relies on the viral enzyme thymidine kinase for its initial phosphorylation. This ensures it is only activated inside virus-infected cells, making it highly specific for herpesviruses.

24. C
Explanation: Morphine is the gold-standard pure mu-opioid receptor agonist. It provides profound analgesia but also carries risks of respiratory depression, sedation, and addiction.

25. B
Explanation: The limit test for chlorides is based on the reaction of soluble chlorides with silver nitrate in the presence of dilute nitric acid, producing a white opalescence of Silver chloride ($AgCl$).

26. B
Explanation: While penicillins feature a 5-membered thiazolidine ring, the core nucleus of cephalosporins (7-aminocephalosporanic acid) contains a β-lactam ring fused to a 6-membered dihydrothiazine ring.

27. D
Explanation: Glucuronidation is the most common Phase II conjugation reaction. The enzyme UDP-glucuronosyltransferase transfers a highly water-soluble glucuronic acid molecule to the drug, promoting rapid renal excretion.

28. C
Explanation: Enantiomers are chiral stereoisomers that are perfect, non-superimposable mirror images of each other. They possess identical physical properties but rotate plane-polarized light in opposite directions.

29. B
Explanation: The Karl Fischer reagent is a mixture of iodine, sulfur dioxide, methanol, and a suitable base, traditionally Pyridine (though modern safer bases like imidazole are now common).

30. C
Explanation: Because Aspirin undergoes rapid hydrolysis in water, its assay is conducted using an acid-base back titration. An excess of standard NaOH hydrolyzes the aspirin, and the unreacted NaOH is titrated against standard HCl.

31. B
Explanation: Vitamin B12 is chemically known as Cyanocobalamin. It features a highly complex corrin ring system with a central cobalt atom.

32. C
Explanation: Ibuprofen, Naproxen, and Ketoprofen are all chemically classified as arylpropionic acid derivatives. They share similar pharmacokinetic profiles and are potent non-selective COX inhibitors.

33. C
Explanation: The classic tranquilizer drugs of this class share the 1,4-benzodiazepine nucleus, which consists of a benzene ring structurally fused to a seven-membered diazepine ring containing nitrogens at positions 1 and 4.

34. B

Explanation: Mayer's reagent (potassium mercuric iodide solution) is a standard alkaloidal precipitating reagent. When added to an acidic alkaloid solution, it yields a distinctive cream or pale-yellow precipitate.

35. C
Explanation: Isoniazid (INH) is highly bactericidal against dividing mycobacteria. It specifically inhibits the synthesis of mycolic acids, which are essential, complex lipids forming the unique mycobacterial cell wall.

36. B
Explanation: Piperine is the major bioactive alkaloid extracted from black pepper (*Piper nigrum*). It is responsible for the pungency and acts as a strong bioenhancer, increasing the absorption of other drugs.

37. C
Explanation: Dragendorff's reagent (potassium bismuth iodide) is one of the classic, general chemical identification tests for alkaloids, reliably producing an orange-red to reddish-brown precipitate.

38. C
Explanation: *Digitalis* species yield potent Cardiac glycosides (composed of an aglycone steroid nucleus attached to a sugar moiety). They are used clinically to treat congestive heart failure and atrial fibrillation.

39. D
Explanation: Ergot consists of the dried sclerotium of the fungus *Claviceps purpurea*, which grows on rye. It produces powerful alkaloids like ergotamine (for migraines) and ergometrine (an oxytocic agent).

40. A
Explanation: Senna contains Sennosides A, B, C, and D, which are chemically Anthraquinone glycosides. Once in the colon, bacteria convert them into active aglycones that stimulate massive peristalsis.

41. B
Explanation: Reserpine is extracted from *Rauwolfia serpentina* (Indian Snakeroot). It irreversibly blocks VMAT, depleting neurotransmitters like norepinephrine and serotonin, producing an antihypertensive and calming effect.

42. C
Explanation: Quinine is a highly bitter, crystalline alkaloid extracted from the bark of the Cinchona tree. It was the first effective treatment developed for *Plasmodium falciparum* malaria.

43. A
Explanation: Guggulsterones are the active steroid compounds found in the oleogum resin of *Commiphora wightii*. They are clinically utilized for their hypolipidemic (cholesterol-lowering) activity.

44. B
Explanation: Atropine is the archetypal tropane alkaloid, primarily isolated from members of the Solanaceae (nightshade) family, including *Atropa belladonna* and *Datura stramonium*.

45. C

Explanation: The starch-iodine test is a classic qualitative test. The helical structure of the amylose polymer in starch physically traps iodine molecules (I_5^- ions), creating a deeply intense blue-black complex.

46. A
Explanation: Menthol is a cyclic monoterpene alcohol. Monoterpenes are composed of exactly two isoprene units, meaning they contain 10 carbon atoms.

47. C
Explanation: Colchicine specifically inhibits microtubule polymerization by binding to tubulin. This stops neutrophil migration and phagocytosis, rapidly reducing inflammation in an acute gout attack.

48. B
Explanation: The Shinoda test utilizes magnesium turnings and concentrated hydrochloric acid to chemically reduce flavonoids, resulting in a vibrant pink, red, or magenta colored solution.

49. B
Explanation: The Beer-Lambert Law states that Absorbance (A) is directly proportional to the molar absorptivity (ε), the path length (b), and the concentration of the sample (c).

50. C
Explanation: In IR spectroscopy, the region from 1500 cm^{-1} to 400 cm^{-1} contains highly complex, overlapping bending vibrations unique to the specific molecule, making it the "fingerprint region" for identification.

51. B
Explanation: Isocratic elution means the mobile phase solvent composition remains completely constant throughout the entire chromatographic run. (Gradient elution progressively changes the solvent composition).

52. C
Explanation: The Flame Ionization Detector (FID) is the most widely used GC detector. It combusts the eluting organic compounds in a hydrogen flame, producing ions that generate a highly sensitive measurable electrical current.

53. C
Explanation: In a mass spectrum, the ion that hits the detector with the highest abundance produces the tallest peak. This is designated as the base peak and is assigned a relative abundance of 100%.

54. C
Explanation: A glass electrode is an ion-selective electrode engineered with a thin, fragile glass membrane that generates an electrical potential strictly proportional to the hydrogen ion (H^+) concentration, measuring pH.

55. C
Explanation: Quenching refers to any non-radiative process that decreases the fluorescence intensity of a given substance. This can occur through molecular collisions, complex formation, or energy transfer to other molecules in the solvent.

56. C

Explanation: The Pharmacy Act of 1948 was the first major post-independence legislation in India passed specifically to regulate the profession of pharmacy and enforce standardized educational qualifications.

57. A
Explanation: Schedule C lists biological and special products (like injectables, sera, and vaccines) whose import, manufacture, and sale are strictly governed by special provisions. Schedule C1 lists similar non-parenteral drugs.

58. A
Explanation: Schedule H contains prescription-only drugs. Under the DC Act, their packaging must prominently bear the symbol "Rx" and the warning: "To be sold by retail on the prescription of a Registered Medical Practitioner only."

59. C
Explanation: The Patents Act of 1970 replaced earlier colonial-era patent laws. It was instrumental in shaping the modern Indian pharmaceutical industry by initially allowing process patents rather than product patents.

60. B
Explanation: Under Schedule M (Good Manufacturing Practices), the minimum required floor space for the basic manufacturing area of any standard pharmaceutical drug manufacturing unit is specified as 30 square meters.