REFERENCE GUIDE FOR FOREIGN PHARMACY LICENSING EXAM
(Questions and Answers)

2014-2015

Manan H. Shroff
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DEDICATED TO
KRISHNA
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PREFACE

Reference Guide For Foreign Pharmacy Licensing Exam Questions and Answers - 2014-2015 Edition is specifically written for students preparing for the FPGEE® Exam. It has approximately 1000 FPGEE® TYPE questions with answers and complete explanations.

The FPGEE® exam puts more emphasis on pharmacy management, statistics, immunology, pharmacology, kinetics and biopharmaceutics, therefore an effort was made to include all of these topics in a review guide. To prepare for pharmacology, I would highly recommend that you take advantage of the Reference Guide For Pharmacy Licensing Exam-Theory.

Our preparation guide covers all the important topics you need to be familiar with to pass the FPGEE®. I would recommend that you to go through the FPGEE® review guide sample questions provided by the NABP (you will get one when your approval from the FPGEE® arrives) to evaluate the importance of our review materials.

Each answer is explained thoroughly to refresh your memory on specific topics. Please do not go through only the questions and answers. Try to understand and learn the answer’s explanations. It is the best way to get the most out of this review guide.

I hope my efforts will help you to pass your key exam. I wish you the very best of luck, and any questions or comments are always welcome.

Good Luck,

Manan Shroff
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TABLES 243
1. **Benzyl alcohol** is classified as:
   a. Emulsifying agent
   b. Preservative
   c. Diluent
   d. Suspending agent

2. **Cold cream** is an example of:
   a. Suspension
   b. O/W emulsion
   c. W/O emulsion
   d. O/W/O emulsion

3. **Egg yolk or egg white** is used as:
   a. Emulsifying agent
   b. Suspending agent
   c. Binder
   d. Preservative

4. The transfer of a drug from high concentrated areas to low concentrated areas is generally defined as:
   a. Infusion
   b. Levigation
   c. Diffusion
   d. Dissolution

5. Which of the following is the most suitable route for administration of insulin?
   a. IM
   b. SC
   c. IV
   d. IV bolus

6. **Noyes Whitney equation** is helpful to predict the rate of:
   a. Drug diffusion
   b. Drug dissolution

   c. Drug degradation
   d. Drug oxidation

7. **Polymorphism** is generally defined as:
   a. Substance that may exist in more than one crystalline form.
   b. Substance that may exist only in metastable form.
   c. Substance that has different viscosity time to time.
   d. Substance that reduces interfacial tension.

8. The minimum concentration of a drug at the receptor site to initiate pharmacological action is defined as:
   a. $T_{\text{max}}$
   b. MEC
   c. MTC
   d. $C_{\text{max}}$

9. The area under curve gives useful information about:
   a. The amount of drug systematically absorbed.
   b. The time to reach peak concentration.
   c. The time to reach minimum toxic concentration.
   d. The concentration at which pharmacological actions of drug would be initiated.

10. Which of the following is the major plasma protein involved in drug binding?
a. Globulin  
b. Creatinine  
c. Albumin  
d. Glycoprotein

11. Which of the following equations may be useful to find out the plasma concentration of a drug?
   
a. \(V_d \times P = C_p\)  
b. \(P \times C_p = V_d\)  
c. \(V_d = \frac{P}{C_p}\)  
d. \(V_d = \frac{C_p}{P}\)

12. The initial dose of a drug through IV bolus to achieve desirable plasma concentration at once is known as:
   
a. Loading dose  
b. Maintenance dose  
c. Replacement dose  
d. Degradation dose

13. Which of the following is/are useful to measure glomerular filtration rate?
   
I. Creatinine  
II. Inulin  
III. Albumin
   
a. I only  
b. I and II only  
c. II and III only  
d. All

14. The rapid degradation of a drug by liver enzymes in a liver is defined as:
   
a. Third pass effect of metabolism  
b. First pass effect of metabolism  
c. Rapid degradation  
d. Liver elimination

15. The normal renal creatinine clearance value lies between:
   
a. 200 to 300 ml/min  
b. 80 to 120 ml/min  
c. 30 to 60 ml/min  
d. 10 to 20 ml/min

16. Which of the following is an example of an oligosaccharide?
   
a. Glucose  
b. Sucrose  
c. Starch  
d. Glycogen

17. Which pyrimidine base is found only in RNA?
   
a. Cytosine  
b. Thymine  
c. Uracil  
d. Adenine

18. Heparin is classified as a(n):
   
a. Heteropolysaccharide  
b. Oligosaccharide  
c. Homopolysaccharide  
d. Monosaccharide

19. Ribonucleic acid exists in all of the following forms EXCEPT:
   
a. r RNA  
b. m RNA  
c. q RNA  
d. t RNA

20. Which of the following structures is a host for Kreb’s cycle?
   
a. Mitochondria  
b. Golgi bodies
c. Cytoplasmic membrane
d. Ribosome

21. The synthesis of glucose from sources other than carbohydrates is generally known as:
   a. Glycolysis
   b. Gluconeogenesis
   c. Glycogenolysis
   d. Glucogenesis

22. Which of the following amino acids should be considered an essential amino acid(s) for the body?
   I. Phenylalanine
   II. Leucine
   III. Tryptophan
   a. I only
   b. I and II only
   c. II and III only
   d. All

23. Which of the following enzymes catalyses the coupling of two molecules of nucleotides to form DNA?
   a. Transferase
   b. Ligase
   c. Isomerase
   d. Aldehyde dehydrogenase

24. A nucleotide is a building block of:
   a. Sphingomide
   b. Nucleic acid
   c. Amino acid
   d. Starch

25. Which of the following cells are involved with immune responses of the body?
   I. B lymphocytes
   II. T lymphocytes
   III. Neutrophils
   a. I only
   b. I and II only
   c. II and III only
   d. All

26. Which of the following immunoglobulin levels are elevated during asthma?
   a. IgM
   b. IgD
   c. IgE
   d. IgA

27. All of the following tests are required to check sensitivity of class A weighing prescription balance EXCEPT:
   a. Arm ratio test
   b. Rider graduated beam test
   c. Shift test
   d. U test

28. The ratio of the mass of an object measured in a vacuum at specific temperature to volume (in ml) of an object at the same temperature is defined as:
   a. Absolute density
   b. Specific gravity
   c. Relative density
   d. Apparent density

29. The mean blood pressure of Mr. Ham is:
   
<table>
<thead>
<tr>
<th>Date</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/01/00</td>
<td>80 mm hg</td>
</tr>
<tr>
<td>01/02/00</td>
<td>82 mm hg</td>
</tr>
<tr>
<td>01/03/00</td>
<td>81.5 mm hg</td>
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<tr>
<td>04/04/00</td>
<td>90 mm hg</td>
</tr>
<tr>
<td>01/05/00</td>
<td>85 mm hg</td>
</tr>
<tr>
<td>01/06/00</td>
<td>83 mm hg</td>
</tr>
</tbody>
</table>
a. 81.5  
b. 85.6  
c. 83.58  
d. 84.20

30. The deviation of data from its mean is generally described by:
   a. The average  
   b. The standard deviation  
   c. The precision  
   d. The accuracy

31. The *reproducibility of results* of a number of experiments is generally known as:
   a. Precision  
   b. Bias  
   c. Accuracy  
   d. Closelessness

32. If the value of $p = 0.6$ in binomial distribution, what is the probability of failure ?
   a. 0.2  
   b. 0.4  
   c. 0.3  
   d. 1.0

33. The $\alpha$ error is generally considered significant at:
   a. 1%  
   b. 3%  
   c. 5%  
   d. 10%

34. When the hypothetical value of a parameter is the same as the observed value of a parameter, the error should be considered:
   a. Alfa-error  
   b. Beta-error  
   c. Gema-error  
   d. Infinitive

35. Find out the *degrees of freedom in a Chi-square* test in a 2x2 contingency table (assume tests are independent).
   a. 1  
   b. 2  
   c. 3  
   d. 4

36. The F distribution generally compares:
   a. Two means  
   b. Two variances  
   c. Three means  
   d. Three variances

37. Which of the following elements has the highest *electronegativity*?
   a. Cl  
   b. F  
   c. Br  
   d. I

38. Which of the following molecules has the largest *dipole movement*?

---

FIGURE - I
39. Which of the following molecules has the highest boiling point?

a. $\text{H}_2\text{O}$
b. $\text{H}_2\text{S}$
c. $\text{H}_2\text{Se}$
d. HCN

40. The bond between $\text{NH}_3$ and $\text{CO}_2$ is best described as a:

41. The process of transforming a solid directly to a vapor state is generally defined as:

a. Evaporation
b. Melting
c. Sublimation
d. Levigation

42. The characteristic of solid substances to exhibit more than one crystalline or amorphous form is defined as:

a. Isomerism
b. Polymorphism
c. Zwitter ion
d. Coupling

43. Which of the following molecules represents CIS form?
44. Which of the following drugs is an angiotensin receptor antagonist?
   a. Lisinopril
   b. Losartan
   c. Methyldopa
   d. Captopril

45. According to Fick’s law of diffusion, which of the following is inversely proportionate to the rate of diffusion?
   a. The area of the solid.
   b. The difference between the concentration of solute to concentration of solute in stagnant layer.
   c. Diffusion coefficient.
   d. The length of the stagnant layer.

46. Acetone is classified as a:
   a. Polar solvent
   b. Nonpolar solvent
   c. Semipolar solvent
   d. Dipolar solvent

47. The process of degradation of ionic compounds into cations and anions in the presence of water is defined as:
   a. Solvation
   b. Hydration
   c. Activation
   d. Degradation

48. What happens to the solubility of alcohol as the molecular weight of alcohol increases?
   a. Reduces
   b. Increases
   c. Remain unchanged
   d. Insoluble in water

49. The degradation of Riboflavin by light is classified as:
   a. Oxidation
   b. Reduction
   c. Photochemical degradation
   d. Racemization

50. The degradation of Penicillin G Procaine is highest in:
   a. Solution
   b. Suspension
   c. Elixir
   d. Tablet
51. The rate of oxidation is influenced by all of the following **EXCEPT**:
   a. Temperature
   b. Radiation
   c. Presence of catalyst
   d. Hydrolysis

52. Which of the following are characteristics of **pseudoplastic flow**?
   I. Viscosity of the flow generally decreases with an increase in the rate of shears.
   II. No yield value has been found with flow.
   III. Suspension of tragacanth follows the pseudoplastic’s flow.
   a. I only
   b. I and II only
   c. II and III only
   d. I, II and III only

53. Which of the following is **NOT** true about **microemulsion**?
   a. The mean diameter of a droplet generally lies between 10 to 200 nm.
   b. It is a thermodynamically stable system.
   c. It requires a cosurfactant.
   d. It is intermediate in property between solution and emulsion.

54. A system with considerable interaction between **dispersed phase and dispersion medium** is known as:
   a. Lyophilic
   b. Lipophylitic
   c. Lyophobic
   d. Radioactive colloids

55. To balance the following equation, how many molecules of \( \text{NH}_4 \text{Cl} \) would be required?
   \[
   (\text{NH}_4)_2 \text{S} + \text{NiCl}_2 \rightarrow \text{NIS} + \text{NH}_4 \text{Cl}
   \]
   a. 1
   b. 2
   c. 3
   d. 4

56. The **random motion of solute particles** in colloidal dispersion is known as:
   a. Newtonian flow
   b. Brownian motion
   c. Stoke’s law
   d. Non-Newtonian flow

57. Which of the following about flocculated suspension is **NOT** true?
   a. Particles of suspension form loose aggregates.
   b. Rate of sedimentation is very low.
   c. The time to form sediment is less.
   d. The sedimentation is easy to redisperse.

58. The rate of sedimentation is independent of:
   a. The viscosity of dispersion medium.
   b. The diameter of suspended particles.
   c. The difference in densities between dispersed medium and dispersed phase.
   d. The lipophilic nature of particles.

59. Which of the following compounds is **an acetanilide**?
   a. \( \text{CH}_3 \text{CONHC}_6 \text{H}_5 \)
   b. \( \text{CH}_3 \text{CHO} \)
   c. \( \text{C}_6 \text{H}_5 \text{CH}=\text{N.C}_6 \text{H}_5 \)
   d. \( \text{C}_6 \text{H}_5 \text{N}=\text{NC}_6 \text{H}_5 \)
60. The spontaneous isomerization of two stereoisomers in aqueous solution that causes **specific rotation** is known as:

a. Zwitter ion rotation
b. Micelle rotation
c. Mutarotation
d. Steriorotation

61. Which of the following is a **polysaccharide**?

a. Dextrose
b. Dextran
c. Lactose
d. Sucrose

62. The substance that is isolated from the brain and produces fatty acid, galactose and sphingosine upon hydrolysis is known as:

a. Sterols
b. Phospholipids
c. Glycolipids
d. Saponins

63. Which of the following is NOT a hydrolyzed product of *lecithins*?

a. Fatty acid
b. Glycerol
c. Phosphoric acid
d. Sphingosine

64. Which of the following is an **active moiety** of the above compound?

a. Carboxylic acid
b. Imidazole
c. Pyroline
d. Aniline

65. *Albumin* is an example of a:

a. Simple protein
b. Conjugated protein
c. Derived protein
d. Hydrolysed protein

66. Fluorination of above compound will result into a well known cancer drug known as:

Fluorination of above compound will result into a well known cancer drug known as:

a. Methadone
b. 5-fluorouracil
c. 6-mercaptopurine
d. Procainamide

67. For **microbial assay of vitamin B-12**, the test organism should be:

a. L.leichmani
b. L.plantarum
c. P.aeruginosa
d. S.pneumonia

68. Which of the following is **NOT** classified as a titrimetric method of analysis?

a. Direct titration
b. Gravimetric titration
c. Complexation reaction
d. Redox reaction
69. **Hemolytic anemia** with abnormal hemoglobin is generally found in patients with:

a. Vitamin B-12 deficiency anemia  
b. Sickle cell anemia  
c. Iron deficiency anemia  
d. Folic acid deficiency anemia

70. All of the following drugs may cause hemolysis in a patient with **G6PD deficiency** **EXCEPT**:

a. Chloroquine  
b. Sulfonamide  
c. Dimercaptrol  
d. Penicillin

71. Which of the following drugs is useful in a **Rh negative mother with a Rh positive infant**?

a. Rho gam  
b. Octeroide acetate  
c. Immunoglobulin  
d. Pneu-immune

72. Which of the following is **NOT** true about PKU?

a. It is a disease usually characterized by mental abnormalities.  
b. A high concentration of phenylpyruvic-acid is found in urine.  
c. It occurs due to excessive secretion of Phenylalanine hydroxylase enzyme.  
d. A guthrie test is normally performed to detect it.

73. The metabolite product of **epinephrine and norepinephrine** is:

a. Gama butyric acid  
b. Vanillymandelic acid  
c. Homovanilllic acid  
d. 5 Hydroxyindoleacetic acid

74. Which of the following is an **anaerobic organism**?

a. L. pneumonphillia  
b. Cl. tetani  
c. N. meningitis  
d. E. coli

75. Which of the following organisms is responsible for causing most of the **UTI**?

a. S. pharyngitis  
b. E. coli  
c. N. gonorrhea  
d. T. palladium

76. The accurate **diagnostic test** for a patient with cystic fibrosis is:

a. Mantoux test  
b. Sweat test  
c. Breath test  
d. Sick test

77. The **allergic skin reaction** characterized by wheel formation is known as:

a. Eczema  
b. Urticaria  
c. Impetigo  
d. Erythema

78. Which of the following about diabetes insipidus is **NOT** true?

a. It is a disease usually characterized by polyuria, polydypsia, and severe thirst.  
b. The urine volume sometimes increases 16 to 24 liters a day.  
c. It is thought to occur due to over-activity of ADH.  
d. A patient should be monitored for dehydration.
79. In which kinetic reaction is the rate of reaction independent from concentration?
   a. First order
   b. Zero order
   c. Pseudo first order
   d. Second order

80. The initial degradation of a drug by liver enzymes after oral administration of the drug is known as:
   a. Enzymatic degradation
   b. First pass metabolism
   c. Relative bioavailability
   d. Fick’s degradation

81. Which of the following factors DOES NOT affect the protein binding of a drug?
   a. The availability of protein for binding.
   b. Binding affinity of protein to the drug.
   c. The presence of competing substances for protein binding.
   d. The concentration of a drug at its receptor site.

82. In which of the following conditions is an increase in plasma protein albumin found?
   a. Severe burns
   b. Cystic fibrosis
   c. Trauma
   d. Hypothyroidism

83. Which of the following drugs is an \( H_2 \) receptor antagonist?
   a. Hydroxyzine
   b. Cimetidine
   c. Diphenhydramine
   d. Omeprazole

84. Which of the following drugs is indicated for reducing elevated blood concentration of ammonia in blood?
   a. Lactulose
   b. Diphenoxylate
   c. Sucralfate
   d. Calcium polycarbophill

85. Patients with hemophilia have a deficiency of:
   a. RhoD
   b. AHF
   c. ADH
   d. ACE

86. Sodium polystyrene sulfonate is found to lower:
   a. Serum K\(^+\) concentration
   b. Serum Na\(^+\) concentration
   c. Serum Al\(^{3+}\) concentration
   d. Serum Ca\(^{2+}\) concentration

87. Which of the following cells are generally found to be elevated in a patient with polycythemia vera?
   a. Reticulocytes
   b. Erythrocytes
   c. Leukocytes
   d. Thrombocytes

88. Which of the following antihypertensive drugs acts by blocking \( \alpha-1 \) receptors?
   I. Doxazosin
   II. Terazosin
   III. Prazosin
   a. I only
   b. I and II only
   c. II and III only
   d. I, II, and III only
89. Which of the following receptor’s stimulation prevents the release of noradrenaline?
   a. Alpha-1 receptors
   b. Beta-1 receptors
   c. Alpha-2 receptors
   d. Beta 2 receptors

90. Hypertrichosis is generally associated with the use of
   a. Hydralazine
   b. Minoxidil
   c. Methyldopa
   d. Clonidine

91. The preferable route for Sodium Nitroprusside is
   a. Intramuscular
   b. Oral
   c. Intravenous
   d. Subcutaneous

92. An overdose of sodium nitroprusside generally causes
   a. Severe hypotension
   b. Hypertension
   c. Renal failure
   d. Severe edema

93. The use of Sodium Nitroprusside should be strictly restricted by:
   a. Adult men
   b. Adult women
   c. Neonates
   d. Children

94. Which of the following hypertensive drugs is known as an inodilator?
   a. Nitroglycerin
   b. Milrinone
   c. Dipyridamole
   d. Digoxin

95. Which of the following is a Class-1A arrhythmic agent?
   a. Lidocaine
   b. Procainamide
   c. Encaainide
   d. Atenolol

96. Which of the following blood cholesterol lowering drugs is an HMG-COA inhibitor?
   a. Gembifrozil
   b. Lovastatin
   c. Cholestyramine
   d. Niacin

97. A patient with acute hypercapnia should be treated with which of the following?
   a. Doxapram
   b. Dopamine
   c. Disopyramide
   d. Ipecac

98. Which of the following drugs is found to be mucolytic or reduces the viscosity of mucous?
   a. Dextromethorphan
   b. Acetylcysteine
   c. Terbutaline
   d. Benzonatate

99. Which of the following drugs is indicated as uterine relaxant for women in labor?
   a. Ephedrine
   b. Terbutaline
100. Which of the following is an atropine-like drug?

a. Retrovir
b. Ipratropium
c. Carvedilol
d. Latanoprost

c. Isoetharine
d. Metaproterenol

101. Which of the following is a centrally acting muscle relaxant?

a. Dantrolene
b. Cyclobenzaprine
c. Bromocriptine
d. Amphetamine

102. Which of the following anti-Parkinson’s drugs is a dopamine receptor agonist?

a. Carbidopa
b. Benztropine
c. Bromocriptine
d. Amantadine

103. Which of the following diuretics acts through inhibition of carbonic anhydrase enzyme?

a. Furosemide
b. Acetazolamide
c. Spironolactone
d. Hydrochlorothiazide

104. Which of the following is a common adverse effect of metolazone?

a. Seizure
b. Electrolyte loss
c. S.L.E.
d. Neuroleptic malignant syndrome

105. Which of the following diuretics cause hyperkalemia when used concurrently with Captopril?

I. Amiloride
II. Spironolactone
III. Triamterene

a. I only
b. I and II only
c. II and III only
d. I, II, and III only

106. Probenecid may competitively inhibit the renal tubular secretion of:

I. Methicillin
II. Methotrexate
III. Dapsone

a. I only
b. I and II only
c. II and III only
d. I, II, and III only

107. Which of the following can be administered for treatment of insulin overdose?

I. Glucagon
II. I.V. Dextrose
III. Lidocaine

a. I only
b. I and II only
c. II and III only
d. I, II, and III only

108. Which of the following sulfonylurea agents is indicated for the treatment of diabetes insipidus?

a. Glyburide
b. Chlorpropamide
c. Glipizide
d. Tolbutamide
109. The deficiency of vitamin A may cause
a. Osteoporosis
b. Night blindness
c. Scurvy
d. Anemia

110. Which of the following can be used for the treatment of Methotrexate overdose?
   a. Mephyton
   b. Leucovorin Ca²⁺
   c. Pyridoxine
   d. Niacin

111. Which of the following benzodiazepines can be safely administered to a geriatric patient?
   a. Chlordiazepoxide
   b. Alprazolam
   c. Oxazepam
   d. Prazepam

112. The active metabolite of Primidone is
   I. Phenobarbital
   II. PEMA
   III. Trimethadione
   a. I only
   b. I and II only
   c. II and III only
   d. I, II, and III only

113. Which of the following drugs should not be used with Fluoxetine?
   a. Tranylcypromine
   b. Digoxin
   c. Amitriptyline
   d. Lidocaine

114. Which of the following is not classified as an insect control chemical?
   a. Insecticides
   b. Repellents
   c. Attractants
   d. Antiseptics

115. Which of the following is NOT true about Barium sulfate?
   a. It is medicinally used in roentgenography for the examination of the stomach and colon.
   b. It is a clear solution.
   c. The principle adverse effect is constipation.
   d. It needs to be mixed well with food or strained through gauze before it is administered to a patient.

116. The addition of Ascorbyl palmitate in the manufacturing process serves as a:
   a. Preservative
   b. Antioxidant
   c. Coloring agent
   d. Flavoring agent

117. Epinephrine hydrochloride solution can be stabilized by adding a small amount of
   a. Sodium metabisulfite
   b. Sodium bisulfite
   c. Sulfur dioxide
   d. Potassium benzoate

118. Which of the following are classified as certified colors?
   I. FD and C
   II. D and C
   III. External D and C
119. Which of the following is not considered a primary taste?
   a. Saline
   b. Sweet
   c. Spicy
   d. Bitter

120. A 500 mg dose of a drug administered via I.V. injection produces a plasma concentration of 2.5 mcg/ml after 16 hours. If the initial plasma concentration of the drug is 10 mcg/ml, bioavailability is 1, and volume of distribution is 120,000 L, what is the half-life of the drug?
   a. 2 hours
   b. 8 hours
   c. 5 hours
   d. 15 hours

121. Sweet taste of a compound is generally attributed to:
   a. Presence of H’ions
   b. Presence of OH’ ions
   c. Presence of cations and anions
   d. Presence of alkaloids

122. The alcohol content of low iso-alcohol elixir is:
   a. 8 to 10 %
   b. 15 to 23 %
   c. 50 to 80 %
   d. 73 to 78%

123. Erythema multiform is generally described as:
   a. The presence of erythematous macules and papules.
   b. The presence of hair on skin.
   c. The presence of large flaccid bullae on skin.
   d. The presence of scaling and sloughing on entire skin.

124. The antidote for Acetaminophen toxicity is:
   a. EDTA
   b. N-acetylcysteine
   c. Mesna
   d. Diazepam

125. Which of the following drugs may cause cholestatic jaundice?
   I. Chlorpromazine
   II. Erythromycin estolate
   III. Indomethacin
   a. I only
   b. I and II only
   c. II and III only
   d. I, II, and III only

126. The principal adverse effect of Clindamycin is:
   a. ARF (acute renal failure)
   b. TEN (toxic epidermal necrolysis)
   c. AAC (antibiotic associated colitis)
   d. ADR (adverse drug reaction)

127. Which of the following is a major adverse effect of Chloramphenicol?
   a. Thrombocytopenia
   b. Aplastic anemia
   c. Hemolytic anemia
   d. Agranulocytosis
387. Which of the following ratios is the best indicator of a pharmacy’s profitability?

a. Net profit to net sales
b. Net profit to net worth
c. Net profit to total asset
d. Net profit to inventory

388. Which of the following ratios generally indicates the efficiency of a pharmacy?

a. Net profit to total assets.
b. Inventory turnover rate
c. Capitalization of net profit
d. Net profit to net sales

389. All of the following indicate the ratio that measures the efficiency of a pharmacy EXCEPT:

a. Inventory turnover rate
b. Net sales to inventory
c. Acid test
d. Net sales to net working capital

390. The acceptable ratio for net profit to net sales would be:

a. Less than 1%
b. 1 to 2 %
c. 2 to 3 %
d. 5 to 7%

391. What would be the acceptable ratio for 10 year old pharmacy’s net profit to net worth?

a. 1%
b. 5%
c. 15%
d. 50%

392. Which of the following is true about net profit to inventory ratio?

I. It indicates profitability as well as the efficiency of pharmacy.

II. It can be used for new and old pharmacies.

III. It increases with an increase in sales of the pharmacy.

a. I only
b. I and II only
c. II and III only
d. I, II, and III only

393. Manan Pharmacy’s net profit to total assets ratio is found to be 15%. This will indicate the pharmacy’s profitability is:

a. Good
b. Excellent
c. Outperform
d. Worst

394. Manan’s Pharmacy’s part of the financial balance sheet is as follows:

**YEAR 2000 SALES**

<table>
<thead>
<tr>
<th>RX</th>
<th>Merchandise</th>
<th>Total</th>
<th>Cost of goods sold</th>
<th>Beginning inventory</th>
<th>Ending inventory</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$600,000</td>
<td>$750,000</td>
<td>$500,000</td>
<td>$200,000</td>
<td>$220,000</td>
</tr>
</tbody>
</table>

What would be the inventory turnover rate for Manan’s Pharmacy?

a. 4.3
b. 2.38
c. 3.5
d. 6.0
395. The inventory turnover rate of the above pharmacy would:
   a. Meet the expectation
   b. Below the expectation
   c. Exceed the expectation
   d. Cannot calculate

396. The net sales of the above pharmacy are 840,000. Find out the ratio of net sales to inventory of the above pharmacy. [Assume inventory of above pharmacy at time of calculation is $210,000]
   a. 8
   b. 4
   c. 10
   d. 12

397. Find out the net worth of Manan’s Pharmacy?
   Total current assets = $150,000
   Total fixed assets = $40,000
   Total liabilities = $75,000
   a. 2.55
   b. 115,000
   c. 35,000
   d. 1.3

398. Which of the following ratios best describes the account receivable collection times?
   a. \( \frac{\text{year end account receivable}}{\text{mean credit sales per day}} \)
   b. \( \frac{\text{annual credit sales}}{\text{total account receivable}} \)
   c. \( \frac{\text{total account receivable}}{365} \)
   d. \( \frac{\text{annual credit sales}}{24} \)

399. Which of the following classes of recalls should be considered a potential hazard to health?
   a. Class I
   b. Class II
   c. Class III
   d. Class IV

400. Which of the following categories indicates the use of a drug is restricted during pregnancy?
   a. A
   b. B
   c. X
   d. C

401. **Liquidity** generally expresses a pharmacy’s ability to meet its:
   a. Assets
   b. Current liability
   c. Inventory
   d. Prepaid expenses

402. The acid test generally measures a pharmacy’s:
   a. Financial position
   b. Liquidity
   c. Profitability
   d. Inventory

403. Which of the following is generally **NOT** included in current assets?
   a. Cash
   b. Accounts payable
   c. Accounts receivable
   d. Inventory

404. Which of the following would generally be considered the **fixed assets** of a pharmacy?
a. Inventory  
b. Fixtures and equipment  
c. Cash  
d. Accounts receivable

405. All of the following can be considered the current liability of a pharmacy EXCEPT

a. Accounts payable.  
b. Notes payable within 1 year.  
c. Accrued expenses.  
d. Notes payable beyond 1 year.

406. Find out the Acid test (quick ratio) of Manancare Pharmacy from Table 1?

a. 202/1  
b. 1.47/1  
c. 13/1  
d. 1/1

407. Which of the following does NOT measure the pharmacy’s liquidity?

a. Acid test ratio  
b. Current ratio  
c. Net sales to inventory  
d. Inventory to its net working capital

408. Total liabilities to net worth ratio of Manancare Pharmacy is:

a. Acceptable  
b. Below expectation  
c. Exceeds the expectation  
d. Cannot be calculated

409. The investment in fixed assets of MananCare Pharmacy:

a. Exceeds the requirement  
b. Is below the requirement  
c. Meet’s the requirement  
d. Cannot be calculated

410. Manancare Pharmacy wants to sell its prescription files. The Manancare Pharmacy owners asks $350,000 for the existing prescription file.

The Manancare Pharmacy provides the following data upon request:

Total new RX dispensed in past 2 years: $80,000

The % of Rx that has one or more refill left: 40%
The average RX price $ 50
Net profit % % 15
What would be your answer to the owner of the pharmacy?

a. Price is okay.
b. Price is too high.
c. Price is breaking even.
d. Cannot be calculated.

411. “Manancare Pharmacy” marksdown the price of analgesic balm from $3 to $2. If the mark down of the price increases the sales of analgesic balm from 60 tubes to 80 tubes, what would be the coefficient of elasticity of this product?

a. 1
b. 2
c. 0.25
d. 0.5

412. When relative change in revenue is same as the relative change in price, it is known as:

I. Unitary elasticity
II. Inelastic demand
III. Elastic demand

a. I only
b. I and II only
c. II and III only
d. I, II and III only

413. Find out the retail price of a box of insulin syringes if the cost complement of the product is 55% and the cost of one box of insulin is $9.00.

a. $4.95
b. $16.30
c. $15.11
d. $13.95

414. Find out the % markup of Vasotec prescription if 30 tablets of Vasotec 5 mg retail price is $75 and the cost of the drug is $45.

a. 55%
b. 75%
c. 66%
d. 10%

415. Find out the retail price of one box of insulin syringes if:
The cost of complement = 55%
The known retail markup = 45%
The cost of syringes = $9.00

a. 4.95
b. 13.95
c. 16.30
d. 15.11

416. For Manancare Pharmacy, the total rent for the whole store including the Pharmacy department is $10,000. The size of the pharmacy is 600 ft² and the size of the whole store is 5000 ft². On the basis of above figures, what would be the rent of the pharmacy alone?

a. $ 1000
b. $ 2000
c. $ 1200
d. $ 800

417. The funding for Medicare programs is generally obtained from:

I. Social security taxes
II. Premiums paid by participant
III. State government

a. I only
b. I and II only
c. II and III only
d. I, II and III only
418. In a patient cost sharing plan, when a patient has to pay a specified amount of the cost of prescriptions and a third party will pay the remaining cost of prescriptions, it is known as:
   a. Copayment
   b. Coinsurance
   c. Deductible
   d. Retrospective payment

419. A person who works for an insurance company, provides the statistical data that indicates the risk associated with serving the population, and determines the premiums to cover all the estimated expenses is known as:
   a. Pharmacy manager
   b. Actuary
   c. Sponsor
   d. Vendor

420. The maximum amount that will be paid by a third party to a pharmacy when the drug is available from more than one source is defined as:
   a. Maximum allowable cost (MAC)
   b. Estimated acquisition cost (EAC)
   c. Actual acquisition cost (AAC)
   d. Average wholesale price (AWC)

421. When a patient pays a full predetermined amount to the provider at the beginning of each month it is known as:
   a. Concurrent reimbursement
   b. Prospective reimbursement
   c. Retrospective reimbursement
   d. Cash reimbursement

422. The increase in the number of taking the foreign pharmacy exam is as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Students taking the exam.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>350</td>
</tr>
<tr>
<td>1982</td>
<td>420</td>
</tr>
<tr>
<td>1983</td>
<td>530</td>
</tr>
<tr>
<td>1984</td>
<td>600</td>
</tr>
<tr>
<td>1985</td>
<td>620</td>
</tr>
<tr>
<td>1986</td>
<td>635</td>
</tr>
<tr>
<td>1987</td>
<td>700</td>
</tr>
<tr>
<td>1988</td>
<td>850</td>
</tr>
</tbody>
</table>

Find out the mean of the above data:
   a. 601
   b. 588
   c. 720
   d. 520

423. What would be the median of the above example?
   a. 350
   b. 850
   c. 610
   d. 635

424. A random sample of the blood glucose concentration of 100 patients has a mean of 130 and a median of 155. The frequency distribution of the sample is:
   a. Normally distributed
   b. Positively skewed
   c. Negatively skewed
   d. Cannot be calculated

425. All of the following can be a shape of frequency of distribution EXCEPT:
   a. Bell shaped distribution
   b. Skewed shape distribution
   c. U shape distribution
   d. T shape distribution
426. What would be the Pearsonian coefficient of skewness if a sample has a mean of 55 and a median of 45. The standard deviation of the sample is 35.

a. 0.90  
b. 1.0  
c. 0.85  
d. 0.35

427. Which of the following about a Binomial experiment is NOT true?

a. Each trial results in an outcome that is classified as success or failure.
b. The repeated trials are dependent upon previous experiment.
c. The experiment generally consists of n-repeated trials.
d. The probability of success remains constant from trial to trial.

428. What is the mean binomial distribution if the probability of success is 0.60 in 50 trials?

a. 5  
b. 3  
c. 8  
d. 4

429. If the blood pressure measurement of 5 people is 110, 135, 140, 125 and 115 respectively. What would be the range of the set of the above observations?

a. 110  
b. 30  
c. 125  
d. 140

430. When plotting t distribution curves, if sample size of 20 is taken from a normal population, what would be the degree of freedom in the t distribution?

431. Find out the degree of freedom in a 2 x 3 contingency table Chi-square test when it is applied to test the hypothesis of independence of two variables?

a. 3  
b. 2  
c. 4  
d. 1

432. The average length of time it takes students to finish an exam is 180 minutes, with a standard deviation of 36 minutes. A new examination procedure using modern computers is being tested. A random sample of 50 students had an average examination time of 150 minutes, with a standard deviation of 40 minutes under the new system. Test the hypothesis that the population mean is now less than 180 minutes. This hypothesis would result in?

a. One sided  
b. Two sided  
c. Three sided  
d. Cannot be calculated

433. In protein, Amino acids are joined covalently by:

a. Hydrogen bond  
b. Peptide bond  
c. Oxygen bond  
d. Disulfide bond

434. The secondary structure of protein consists of:

I. Alfa-helix  
II. Beta-sheet  
III. Beta-bend
435. The denaturation of protein can occur in the presence of:

I. Heat
II. Strong acid
III. Organic solvent

a. I only
b. I and II only
c. II and III only
d. I, II, and III only

436. Which of the following about sickle cell anemia is NOT true?

a. It is a genetic disorder resulting from the production of a variant hemoglobin.
b. It is characterized with pain, lifelong hemolytic anemia and tissue hypoxia.
c. The replacement of leucine at the sixth position of the Beta-globulin chain for glutamate is generally responsible for causing it.
d. The form Hbs has an extremely low solubility compared to Hba which results into the aggregation of molecules that form or create sickle shaped red blood cells.

437. The enzyme with its cofactor is generally known as:

a. Coenzyme
b. Holoenzyme
c. Apoenzyme
d. Prosthetic group

438. The process in which the release of energy from energy rich molecules such as glucose and fatty acid occurs in mitochondria is known as:

a. Oxidative decarboxylation
b. Oxidative phosphorylation
c. Oxidative deamination
d. Oxidative dehydrogenation

439. The breakdown of complex molecules such as protein, lipid and polysaccharide into simple molecules such as carbon dioxide, water and ammonia is known as:

a. Aerobic glycolysis
b. Catabolic reaction
c. Anabolic reaction
d. Gluconeogenesis

440. What would be the end product of glycolysis in the cell with mitochondria?

a. Glucose
b. Glycogen
c. Pyruvate
d. Lactate

441. Which of the following substance levels is found to be deficient in a patient with G6PD deficiency?

a. Alfa-antitrypsin in reduced form
b. Bradykinin in reduced form
c. Glutathione in reduced form
d. Trypsin in elevated form

442. Which of the following causes hemolytic anemia in patients with G6PD deficiency?

I. Oxidant drug
II. Ingestion of fava beans
III. Certain types of infections
a. I only  
b. I and II only  
c. II and III only  
d. I, II and III only  

443. Which of the following should be classified as a disaccharide?

a. Ribose  
b. Lactose  
c. Glycoprotein  
d. Glycosaminoglycans  

444. The pairs of structure that are mirror images of each other are known as:

a. Isomers  
b. Enantiomers  
c. Epimers  
d. Muta rotation  

445. In humans, the principle storage of glycogen is found in the:

I. Skeletal muscle  
II. Liver  
III. Spleen  
a. I only  
b. I and II only  
c. II and III only  
d. I, II and III only  

446. Which of the following substances should be classified as a polysaccharide?

a. Glucose  
b. Hyaluronic acid  
c. Sucrose  
d. Glycoprotein  

447. Which of the following agents acts as an emulsifying agent for metabolism of lipid in duodenum?

a. Gastric lipase  
b. Bile salt  
c. Pancreatic juice  
d. Secretion  

448. Which of the following about steatorrhea is **NOT TRUE**?

a. It causes a loss of lipid, essential fatty acid and lipid soluble vitamin in feces.  
b. The oversecretion of bile salt may impair the absorption of fat soluble vitamins.  
c. The inhibition of secretion of pancreatic juice from the pancreas generally results in steatorrhea.  
d. The absorption of vitamins such as vitamin C, thiamine, and riboflavin are not affected by the condition of steatorrhea.  

449. Which of the following is a building block of membrane of nerve tissue?

a. Prostaglandin  
b. Spingomyelin  
c. Thromboxane  
d. Leukotriene  

450. The term cholelithiasis is generally referred to as:

a. Obstruction of the stomach by cholesterol stone.  
b. Obstruction of the pancreas by cholesterol stone.  
c. Obstruction of the gall bladder by cholesterol stone.
451. Which of the following is NOT a function of Luteinizing hormone?

a. It initiates the testosterone synthesis in the Leydig cells of the testis.

b. It simulates the process of spermatogenesis.

c. It induces ovulation in females.

d. It stimulates synthesis of progesterone and estrogen in the corpus luteum.

452. The total energy required by an individual can be found by calculating:

I. BMR
II. Thermic effect of food
III. Physical activity

a. I only
b. I and II only
c. II and III only
d. I, II and III only

453. Which of the following is considered protein deficient malnutrition?

I. Kwashiorkor
II. Marasmus
III. Steatorrhea

a. I only
b. I and II only
c. II and III only
d. I, II and III only

454. Which of the following is NOT a water soluble vitamin?

a. Thiamine
b. Vitamin D
c. Niacin
d. Pyridoxine

455. Which of the following is a good source of Vitamin K?

a. Cabbage and cauliflower
b. Fatty fish and liver
c. Vegetable oils
d. Yellow and green vegetables and fruit

456. The end product of purine catabolism is:

a. Alantoin
b. Uric acid
c. Hypoxanthine
d. Xanthine

457. The small and circular extrachromosomal DNA molecules that carry genetic information for future generations in bacteria are known as:

a. Lysozymes
b. Plasmids
c. Mitochondria
d. Cytoplasm

458. Which of the following RNA types comprises 80% of the RNA in the cell?

I. Ribosomal RNA
II. Transfer RNA
III. Messenger RNA

a. I only
b. I and II only
c. II and III only
d. I, II and III only
I. mRNA  
II. tRNA  
III. rRNA  

a. I only  
b. I and II only  
c. II and III only  
d. I, II and III only  

460. Which of the following codons are generally known as stop or nonsense codons?  
I. UAG  
II. UGA  
III. UAA  

a. I only  
b. I and II only  
c. II and III only  
d. I, II and III only  

461. Which of the following types of microscopy is used to observe the unstained living or difficult to stain organisms?  

a. Dark field  
b. Bright field  
c. Transmission electron  
d. Scanning electron  

462. The mycobacterium species of bacteria is generally stained with:  

a. Gram stain  
b. Schaeffer-fulton stain  
c. Acid fast stain  
d. Flagellar stain  

463. Which of the following classes of cells have no nucleus?  

a. Eukaryotic  
b. Prokaryotic  
c. Homokaryotic  
d. Heterokaryotic  

464. Bacteria with two or more flagella is generally known as:  

a. Monotrichous  
b. Amphitrichous  
c. Lophotrichous  
d. Peritrichous  

465. The moving of bacteria away from the light is known as:  

a. Chemotaxis  
b. Phototaxis  
c. Pili  
d. Escapetaxis  

466. To find out if a substance is carcinogenic which of the following tests should be preformed?  
I. Ames test.  
II. Pyrogen test  
III. Biopsy of cells  

a. I only  
b. I and II only  
c. II and III only  
d. I, II and III only  

467. The synthesis of protein and lipids in cells is generally carried out by:  

a. Mitochondria  
b. Endoplasmic reticulum  
c. Golgi apparatus  
d. Lysozymes  

468. The growth of bacteria remains constant in which of the following phases?  

a. Lag phase  
b. Log phase  
c. Stationary phase  
d. Decline phase
ANSWERS
1 (b) Benzyl alcohol is classified as a preservative. Preservatives prevent the growth of microorganisms and prevent deterioration of pharmaceutical dosage forms. The ideal preservative must have the following characteristics:

- It must be effective against a broad spectrum of microorganisms.
- It must be stable for the lifetime of the product.
- It must be nontoxic, soluble, palatable in test and odor and compatible with other ingredients in the formulation.

Commonly used preservatives:

- phenol
- benzoic acid
- benzyl alcohol
- chlorobutanol
- thiomersal
- benzalkonium
- cresol
- cetylpyridinium

2 (c) Cold cream is an example of W/O emulsion. It is a biphasic liquid dosage form, in which disperse phase and the dispersion medium are liquids. Emulsion is classified by five different categories:

- Water in Oil (W/O): Oil is continuous phase and water is a disperse phase, i.e., lotions and liniments.
- Oil in water (O/W): Water is continuous phase and oil is a dispersed phase, i.e., most of the oral emulsions to unmask the oil taste of a medication.
- Microemulsion: Unlike emulsions, microemulsion is a transparent with a small particle size. It is believed to be thermodynamically unstable. The particle size of microemulsion lies between 10 to 200 nm. It is generally used for the solubilization of the drug in pharmaceutical dosage form.
- Nanoparticles: As the name suggests, the particle size of this kind of emulsion is limited to nanograms. They are useful for the preparation of globulins and toxoids. Tetanus toxoid and human immunoglobulin G are examples of nanoparticles emulsion.

Multiple emulsions: Water in Oil in ware (W/O/W), Oil in water in Oil (O/W/O). The w/o/w emulsions are generally more preferable for preparation of various pharmaceutical dosage forms. They are used to prolong the duration of action of various drugs, to localize drug in the body and to prepare cosmetics.

3 (a) Egg yolk or egg white is useful as an emulsifying agent. It lowers the interfacial tension between disperse phase and dispersion medium. It can be classified as natural or synthetic.

Commonly used emulsifying agents:

- Acacia
- Tragacanth
- Gelatin
- Methylcellulose
- Pectin
- Agar
- Spans
- Tweens
- Sodium lauryl sulfate.

4 (c) The transfer of a drug from a high concentrated area to a low concentrated area is defined as “Diffusion”.

The addition of a levigating agent into a solid to blend to make paste is defined as “Levigation” i.e. the addition of glycerine to the powder of sulfa.

5 (b) The most suitable route for administration of insulin is subcutaneous, since it has been found that absorption of insulin via this route is slow and therefore the chance of acute hypoglycemia is very rare.

6 (b) Noyes Whitney equation helps to find out the rate of dissolution of a drug. The rate of dissolution is a rate-limiting step in the drug’s bioavailability.

\[
\frac{dC}{dt} = \frac{DcS}{h} \times (C_s - C)
\]
C : Concentration of drug at time t
Dc : Diffusion coefficient of drug
S : Surface area of drug particles
Cs : Solubility of drug in diffusion layer
h : Thickness of the diffusion layer surrounding the particles

7 (a) A substance that may be exhibited in more than one type of crystal structure is known as Polymorphism and different structures are known as polymorphous i.e. Theobroma oil, diamonds and methylprednisolone.

8 (b) The minimum concentration of a drug at the receptor site which initiates pharmacological action is defined as Minimum Effective Concentration (MEC). Ideally drug concentration should between MEC and MTC. Other terminology includes:

MTC : Defined as the minimum toxic concentration. The concentration above MTC produces adverse and toxic effect.

Tmax : Time to reach maximum concentration (Cmax) in a blood.

9 (a) Area Under Curve (AUC) provides information about the amount of drugs that are systematically absorbed.

10 (c) Albumin is the major plasma protein involved in binding of drugs. Drug binding inhibits the clearance of the drug from the liver and kidney. It limited the availability of free drugs to various receptor sites.

Profound increase in drug binding may reduce the effects of the drug or decrease in drug binding may increase the toxic or adverse effects of drugs.

Drugs having a high affinity for protein binding may displace a low affinity for protein binding, such as oral sulfonylurea displaces the coumadin from protein binding.

11 (c) The hypothetical volume of distribution of drug can be calculated on the basis of following formula:

\[ V_d = \frac{P}{C_p} \]

\( V_d \) = Volume of distribution
\( P \) = Amount of drug in the body
\( C_p \) = Plasma concentration of drug

The volume of distribution is very useful in estimating the plasma concentration of the drug when the amount of drug is known. It helps to establish the dose of drug to achieve the specific plasma concentration of drug. It is a direct measure of the extent of distribution. Drugs that are highly bound to plasma protein have a less \( V_d \) and vice versa. This indicates that drugs with high protein binding capacity may distribute less in tissues and other body fluids. Likewise, if the drug is extensively distributed in the tissues and body fluids, \( V_d \) would be high.

12 (a) The initial dose of a drug through I.V. bolus to achieve desirable plasma concentration at once is defined as the Loading dose of drug. The replacement of metabolic loss of a drug from time to time to sustain the minimum effective concentration of drug (MEC) is defined as a maintenance dose.

13 (b) The creatinine (endogenous substance obtained from creatinine phosphate during muscle metabolism) and Inulin (exogenous substance, a polysaccharide) are useful to measure the rate of glomerular filtration.
The ideal characteristics of a drug to measure glomerular filtration rate:

- It must be nontoxic and non-reabsorbable from the renal tubules.
- It must not affect the renal function.
- It should be actively secreted through renal tubules and should be easily measured in urine or plasma.
- It should not be metabolized by the liver.

Creatinine clearance is the most widely acceptable test to measure the function of kidney. Normal creatinine clearance lies between 80 to 120 cc/min. Creatinine clearance below 60 cc/min indicates renal function impairment.

14 (b) The rapid degradation of drugs by liver enzymes is known as the First Pass Effect of metabolism.

15 (b) The normal creatinin clearance value lies between 80 to 120 cc/min.

16 (b) Sucrose is an example of Oligosaccharide. It consists of a short chain of monosaccharide. It consists of one molecule of glucose and one molecule of fructose. Carbohydrates can be divided into three categories: Monosaccharide, Oligosaccharide and Polysaccharide.

Monosaccharides: They are simple sugar such as glucose or fructose.

Oligosaccharides: Consists of a small chain of monosaccharides. i.e. sucrose, maltose and lactose. They have to degraded into simple sugar in order to be absorb from the intestine. Degradation of sucrose gives one molecule of glucose and fructose, degradation of maltose gives two molecules of glucose, and degradation of lactose gives each molecule of galactose and glucose.

Polysaccharides: They consist of long chains of monosaccharides i.e. starch and glycogen

17 (c) Uracil. It is a pyrimidine base that only found on RNA.

Nucleotides are the building blocks of the nucleic acid. Purines and pyrimidines bases bind to ribose to form nucleoside, which when binded to phosphoric acid forms the nucleotides.

<table>
<thead>
<tr>
<th>DNA</th>
<th>RNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adenine</td>
<td>√</td>
</tr>
<tr>
<td>Guanine</td>
<td>√</td>
</tr>
</tbody>
</table>

Pyrimidine base

| Cytosine | √ | √ |
| Uracil | | √ |
| Thymine | | |

18 (a) Heparin is classified as a heteropolysaccharide. Polysaccharides are classified in two different categories:

I Homopolysaccharide
II Heteropolysaccharide

Homopolysaccharide: Consist of only one type of monomeric units i.e. starch, glycogen, cellulose.

Heteropolysaccharides: Consist of two or more types of monomeric units, i.e. heparin and hyaluronic acid

19 (e) qRNA. Nucleic acids consist of long chains of nucleotides. They can be subdivided into two different categories:

I DNA (Deoxyribose nucleic acid)
II RNA (Ribose nucleic acid)

RNA is subdivided into three categories:
rRNA: It is found in association with a number of proteins as the component of ribosomes. It helps in the synthesis of protein. 80% of RNA in the cell consists of rRNA.

mRNA: It is known as messenger RNA. As its name suggests it conveys the specific genetic information from DNA to the cytosol to prepare the site for specific protein synthesis. 5% of RNA in the cell consists of mRNA.

tRNA: It is known as transfer RNA. It makes about 15% of RNA in the cell. Each tRNA carries the specific amino acid to the site of protein synthesis. Each tRNA molecule contains anticodon (three base nucleotide sequences) that generally recognize the codon on mRNA.

20 (a) Mitochondria is the host for Kreb’s cycle. It is known as the powerhouse of the cell. A series of oxidative reactions occur in mitochondria, and energy from such reactions is stored as ATP. Energy in the form of ATP is usable by cells for their activities.

The Golgi apparatus consists of a stack of flattened membrane sacs. It helps in storing various substances transformed from the endoplasmic reticulum in a small secretory vesicle. These vesicle fuse to the plasma membrane and secrete the contents of vesicles into the extracellular portion of cells. The Golgi apparatus also helps in the formation of plasma and the lysosome membrane.

Lysosomes are extremely small organelles made by the Golgi apparatus. They contain digestive enzymes that help in digestion of starch, glycogen and fat. They fuse with vacuoles (cells that store glycogen, starch and fat) and release digestive enzymes into vacuoles.

21 (b) The synthesis of glucose from sources other than carbohydrates is known as gluconeogenesis. The other choices include:

Glycolysis: Breakdown of sugar into pyruvate or lactate.

Glycogenesis: The synthesis of glycogen from glucose.

Glycogenolysis: The breakdown of glycogen into glucose.

22 (d) All. The lists of the essential amino acids includes:

* Isoleucine
* Arginine
* Methionine
* Leucine
* Lysine
* Threonine
* Tryptophan
* Valine
* Phenylalanine
* Histidine

23 (b) DNA ligase catalyzes the coupling of two molecules of DNA. DNA transferase catalyzes the transfer of various groups such as phosphate and amino groups. DNA hydrolases hydrolyzes the various substances. DNA lyase catalyzes the
removal of various functional groups other than the process of hydrolysis. DNA isomerase catalyzes various isomerizations.

24 (b) Nucleotides are the building blocks of nucleic acid. Nucleic acids consists of long chains of nucleotides.

25 (b) B lymphocytes and T lymphocytes are the primary cells of immune responses of the body.

26 (c) Immunoglobulins are protein of the antibodies class. They can be subdivided into five major categories.

    IgG: It is the major immunoglobulin found in blood. It accounts for 75% of the serum immunoglobulin and 20% of plasma protein. It is the only immunoglobulin that can cross the placental barrier to provide protection to the fetus. It is the only class of immunoglobulin whose Fc region can be recognized by phagocytosis and NK cells.

    IgM: It is the first immunoglobulin produced by the body in response to antigen. It accounts for 5 to 10% of total immunoglobulins. It is the first immunoglobulin that is formed by the fetus, however it cannot cross the placenta due to its large size.

    IgA: It is the major immunoglobulin in external body secretions such as saliva, tears and urine. It accounts for 10% of total immunoglobulins.

    IgE: This immunoglobulin plays an important role in combating helminth and allergy reactions produced such as drugs, pollens or foods. The level of this immunoglobulin is found to be highly elevated in patients with allergy condition such as asthma and hay fever.

    IgD: It accounts for 1% of total immunoglobulins. It serves as an antigen receptor site in the early stages of immune response.

27 (d) U test. Arm ratio test, Rider and graduated beam test and shift test are commonly employed tests for checking sensitivity of class A prescription balance. The minimum weighable quantity for class A prescription balance is 120 mg.

28 (a) The ratio of the mass of an object measured in a vacuum at a specific temperature to the volume (in ml) of an object at the same temperature is defined as Absolute density.

Specific gravity: The ratio of the mass of a substance to the mass of an other substance an equal volume taken as standard.

Relative density: The mass of 1 ml of a standard substance at a specified temperature, relative to water at 4°C.

Apparent density: The ratio of mass of an object measured in air at specific temperature to the volume of the object in ml at the same temperature.

29 (c) The mean blood pressure of Mr. Ham can be calculated as follows:

\[
\frac{80 + 82 + 81.5 + 90 + 85 + 83}{6} = 83.58
\]

30 (b) The deviation of data from its mean or average is defined as standard deviation. The reproducibility of the series of measurements is known as precision. Accuracy is defined as closeness of measurements to the true value.

31 (a) The reproducibility of results of a number of experiments is generally known as precision.

32 (b) The sum of the all probabilities (failure and success) in binomial distribution is equal to 1, therefore if the probability of success is \( p = 0.6 \), the probability of failure \( q \) should be 0.4.
\[ p + q = 1 \]
\[ q = 1 - p \]
\[ = 1 - 0.6 \]
\[ = 0.4 \]

33 (c) The alpha-error in “Null Hypothesis” is also known as level of significance. It commonly is chosen as 5%. This means that the error should be considered as significant if the difference between observed value and hypothetical value is more than 5%. The more conservative approach would be to chose at the level of 1%.

The second type of error is defined as beta error. It is defined as no difference between observed value of parameter and hypothetical value of parameter.

For example, if we assume that Mr. Raj’s blood pressure should be 100 mm Hg, we can say that hypothetical value of experiment is \( H_0 = 100 \).

Alternative is could include all values greater than or less than 100 upon actual measurement of blood pressure. If the measured value of blood pressure is 100, we can say that beta error occurs, and if it is less than 95 or greater than 105 (5% difference), it would be considered as alpha-error.

34 (b) When the hypothetical value of a parameter is the same as the observed value of a parameter, the error should be considered Beta error.

35 (a) The degree of freedom in a chi-square test is defined as \((R-1) \times (C-1)\), therefore the degree of freedom in 2 x 2 contingency table would be \((2-1) \times (2-1) = 1\).

36 (b) The “F” distribution is used to compare two variances. It is defined by the ratio of variances, with \( n_1 - 1 \) in the numerator and \( n_2 - 1 \) in the denominator of the ratio. The “t” distribution is useful for a comparison of two means.

37 (b) Fluorine has the highest electronegativity compared to other given choices.

38 (d) In the figure IV F atom is more negative than the C atom and therefore electrons are displaced more towards F atom. This will make the molecule more polar.

The F atom has more electronegativity than Cl, H and CH3, therefore the correct choice would be “d”.

In the choice “C” two “F” atoms stand opposite to each other and nullify each other effects.

39 (a) The high boiling point of \( H_2O \) (100\(^0\)) compared to \( H_2S \) (-60\(^0\)) and \( H_2Se \) (-41\(^0\)) is attributed the ability of O to make more H-bonds compared to S and Se. The strength of the most H-bond ranges from 1 to 7 kcal/mole.

Hydrogen bonding is also responsible for higher solubility of polyhydroxy compounds.

40 (b) Due to electrostatic attraction, the negative pole of one molecule will try to line up with the positive pole of neighboring molecule.

\[ O=C <........NR_3 \]

This type of attraction is known as dipole-dipole attraction and has a strength of 1 to 7 kcal/mole.

Sometimes electrons are concentrated in one region of the atom or molecule, and this displacement of electrons generally causes a nonpolar molecule to become a polar molecule which results in an instantaneous dipole. Slowly, electrons in a neighboring atom or molecule may be displaced to produce a dipole this is called process of induction. A newly formed dipole is known as an induced dipole or debey force. Debey force has a strength of about 1 to 3 kcal/mole.

The attraction between two induced dipole molecules is known as dipole-induced dipole interaction, dispersion force or London force. This
bond has a strength of about 0.5 to 1 kcal/mole. Ion dipole or ion induced dipole bond: in a polar substance, the positive end of one dipole tries to line up with the negative end of another dipole.

Hydrophobic bond: The association of nonpolar groups in an aqueous solution such as water, due to the tendency of aqueous solvents to exclude nonpolar molecules.

41 (c) The process of transforming a solid to a vapor without intermediate change to the liquid is defined as sublimation. The transform of solid to a liquid is defined as melting and the transfer of liquids to a vapor is defined as evaporation.

42 (b) The characteristic of solid substances to exhibit more than one crystalline or amorphous form is defined as polymorphism.

43 (a) The arrangement of geometric isomers in which two ions (in our case Cl) can either be along the same edge of the square (cis) or on opposite corners (trans).

Generally trans-isomers are more stable compared to cis-isomers.

44 (b) Cozaar (Losartan) is classified as angiotensin II receptor antagonist. It blocks the binding of angiotensin II to AT receptors. It is indicated for the treatment of hypertension. The recommended dose of the drug is 50 mg per day with or without food. Hyperkalemia, diarrhea, hypotension, tachycardia and angioedema are reported side effects of the drug.

45 (d) According to Fick’s law of diffusion, the rate of diffusion is directly proportional to the area of the solid, the concentration difference between the concentration of solute in the stagnant layer at the surface of solid and its concentration on the farthest side of the stagnant layer and diffusion coefficient. It is inversely proportional to the length of stagnant layer.

The driving force behind the movement of the solute molecules through the stagnant layer is the difference in concentration of solute at C1 and its concentration at C2.

Rate of solution = \( \frac{D \times A \times (C_1 - C_2)}{L} \)

D = Diffusion coefficient
A = Surface area of solid
C1 = Concentration near to stagnant layer
C2 = Concentration of solute to other side of stagnant layer.
L = The length of the stagnant layer

46 (c) Acetone is classified as a semipolar solvent. Water is classified as a polar and benzene is classified as a non-polar solvent.

47 (b) The process of degradation of ionic salt into cations and anions in the presence of water is known as hydration. If the solvent is other than water, the process is known as solvation.

48 (a) As the molecular weight of alcohol increases, the solubility of alcohol decreases. As the molecular weight of alcohol increases, the chances of formation of hydrogen bonds between
water and OH groups of alcohol decreases, therefore high molecular weight alcohols are poorly soluble in water.

49 (c) The degradation of Riboflavin by light is an example of photochemical degradation. Light generally catalyzes oxidation and reduction of photoexcited species of such drugs. Riboflavin and phenothiazine are examples of such drugs.

50 (a) The degradation of Penicillin G Procaine is the highest in a solution, since the hydrolysis of Penicillin G procaine is catalyzed by hydrogen or hydroxide ions.

51 (d) The rate of oxidation is influenced by temperature, radiation and the presence of a catalyst. It is not affected by hydrolysis. Ephedrine, ascorbic acid, phenothiazine and vitamin A are examples of pharmaceutical products that oxidize very easily.

52 (d) A large number of pharmaceutical products such as liquid dispersion of methyl cellulose, carboxymethylcellulose, tragacanth and sodium alginate follows pseudoplastic flow. The viscosity of the pseudoplastic flow decreases with an increase in rate of shear. It does not have the yield value.

Normally, as shearing stress increases, the disarranged particles of the solute try to get along with the direction of flow. At certain levels with each successive shearing stress, the greater rate of shear can be achieved with minimum stress. In addition, some of the solute molecules (entrapped between solvent molecules) may be released, which reduces apparent viscosity of the flow. Pseudoplastic flow is known as a “shear thinning system”.

Generally, non-newtonian flow can be classified in three classes of flow: plastic, pseudoplastic, and dilatant.

The material that exhibits the plastic flow is known as the Bingham body. Plastic flow has a yield value, which means that it does not start to flow until shear stress exceeds the yield value, and therefore plastic flow curve does not pass through the origin but rather intersects the shearing stress axis.

Concentrated suspension with flocculated particles generally follows the plastic flow. Plastic flow has a yield value because of the presence of van der walls force between flocculated particles, and the need to break such force before it exists in the flow.

The third type of flow is described as Dilatant flow. It is also known as a “shear thickening system” in which the viscosity of the system increases with increase in shear stress. It is generally observed more with suspension that contains a high percentage of dispersed solid (about 50% or greater of small deflocculated particles).

The system that follows conversion from gel to sol upon applying shear stress and reforms back to gel from sol upon resting is defined as Thixotropy. The application of thixotropy is very useful in the formulation of pharmaceutical products. For example, the well formulated thixotropy suspension will not settle out readily and will become fluid upon shaking.

53 (b) Microemulsion is the liquid dispersion of water and oil that is made homogeneous and transparent by the addition of surfactant and cosurfactant. It is not a thermodynamically stable. The droplet size of microemulsions lie between 10 to 200 nm. They are intermediate in property between solution and emulsion.

54 (a) A system with considerable interaction between the disperse phase and dispersion medium is known as Lyophilic dispersion or solvent loving dispersion. If the dispersion medium is water, the system is known as hydrophilic.
Hydrophilic suspension is subdivided into three categories:

I  True solution, i.e. acacia and povidone solution.

II  Gels or jellies, i.e. gels of methylcellulose, gelatin and starch

III  Particulate dispersions, i.e. suspension of bentonite

Lipophilic or Oleophilic dispersions have a high affinity for oily substances such as benzene, vegetable oils, essential oils, and mineral oil etc.

55 (b) 2.

\[(\text{NH}_4)_2\text{S} + \text{NICl}_2 = \text{NIS} + 2 \text{NH}_4\text{Cl}\]

56 (b) The random motion of solute particles in colloidal dispersion is known as Brownian motion.

57 (b) Flocculated suspensions have the following characteristics:

* The rate of sedimentation is high. A sediment generally forms rapidly compared to deflocculated particles. The sediment is loosely packed and can be easily redispersed with minimum stress. Particles in sediment do not bind tightly to each other. The suspension with flocculated particles has a clear supernatant region.

In contrast, the rate of sedimentation of deflocculated suspension is slow, but once the particles settle at the bottom of the container it is very difficult to redisperse them. Sediment forms slowly and particles in sediment are tightly packed. The supernatant remains the cloudy.

In pharmacy practice suspension with flocculated particles is the most acceptable.

58 (d) The relation of the rate of sedimentation with various parameters can be expressed by Stoke’s law.

\[V = \frac{2r^2(P_1 - P_2)g}{9n}\]

59 (a) \(\text{CH}_3\text{CONHCH}_3\text{H}_5\)

60 (c) The spontaneous isomerization of two isomers in an aqueous solution causes specific rotation which is known as mutarotation.

61 (b) Dextran is an example of a polysaccharide. Other polysaccharides include:

* Dextrin
* Inulin
* Starch
* Cotton
* Soy polysaccharides

62 (c) Lipids can be divided into five classes according to their chemical structure.

Glycolipids: Also known as Cerebro-sides. They are isolated from the brain. Upon hydrolysis, they yield fatty acid, galactose and sphingosine. They are also known as galactolipids due to the presence of galactose, such as phrenosin, kerasin.
Phospholipids: Known as Phosphatides. They are esters consist of fatty acid, phosphoric acids and nitrogenous compounds, such as lecithin.

Sterols: The sterols are alcohols structurally related to steroids. They are obtained from plants and animals such as cholesterol and ergosterol.

Waxes: Waxes are defined as high molecular weight esters. They consist of monohydric alcohol and high molecular weight fatty acids, such as spermaceti.

Fixed oils and fats: They are esters of glycerol and fatty acids, such as olive oil. Fixed oils such as lard, which are solid at room temperature are known as fat.

63 (d) Sphingosine is not a hydrolysed product of lecithin. Lecithins are phospholipids and are generally hydrolysed to fatty acid, phosphoric acid and nitrogenous compounds other than sphingosine.

64 (b) Imidazole is an active moiety of the listed compound.

65 (a) Albumin is an example of simple protein.

Protein is generally classified in three different categories:

I Simple protein
II Conjugated protein
III Derived protein

Simple protein: Naturally occurring proteins, which upon hydrolysis yield only alpha-amino acids such as albumins, globulins, prolamines, glutelins and albuminoids.

Conjugated protein: Conjugated proteins are further classified on the nature of prosthetic groups.

66 (b) 5-Fluorouracil. It is classified as a cytotoxic substance. It is a pyrimidine antagonist. It is indicated for the treatment of the rectum, stomach, colon, pancreas and breast cancers. Esophagopharyngitis, myocardial ischemia, angina, photophobia and decreased vision are reported side effects of the drug.

67 (a) L.leichmanni is the most widely used test organism for microbial assay of vitamin B 12. L.plantarum is generally used for microbial assay of Niacin and Calcium pantothenate.

68 (b) Gravimetric analysis is not considered a titrimetric method of analysis. Titrimetric methods of analysis generally include:

I Acid base titrations
II Precipitation reactions
III Redox reactions
IV Complexation reactions
V Large anion and large cation reactions

Gravimetric methods of analysis include:
I Weighing drugs after separation
II Weighing a derivative after separation
III Weighing a residue after ignition

Spectrometric methods of analysis include:
I Colorimetry
II UV absorption
III IR absorption
IV Fluorimetric emission
V NMR absorption
VI Atomic absorption

Electrochemical methods of analysis include:
I Voltammetry
II Potentiometry

Chromatographic methods of analysis include:
I Gas chromatography
II HPLC
III TLC

69 (b) Sickle cell anemia and Beta-thalassemia are hemolytic anemias associated with abnormal hemoglobins. Due to poor solubility of such abnormal hemoglobins in a reduced state, semicrystalline bodies are formed inside of RBC. These crystalline bodies are pointed and elongated inside of the cell, and rupture the red blood cells.

The detection of sickle-cell disease can be done by viewing red cell sickling in the presence of the reducing agent sodium metabisulfite, or by quantitative determination of turbidity produced by dithionite following the reduction of HbS to deoxyHbS in RBC.

70 (d) Except Penicillin, all of the mentioned medications may cause hemolytic anemia in patients with G6PD deficiency.

71 (a) Rho gam is a useful drug for treatment of an Rh negative mothers with an Rh positive infant. In Rh negative mother, Rh positive antigens may transfer from Rh positive fetuses to the mother via placenta. This may lead to production of Rh positive antibodies in the mother’s blood. These same antibodies may transfer back from the mother’s blood into fetus via the placenta, and produce antigen-antibody reactions. This leads to lysis of red blood cells in the fetus, and miscarriage. Rho gam prevents the formation of anti-Rh antibodies in an mother who bears a Rh positive fetus.

72 (c) PKU is a disease characterized by an elevated serum concentration of phenylalanine and the presence of phenylpyruvic acid in urine. The deficiency of enzyme phenylalanine hydroxylase
is responsible for this. Phenylalanine hydroxylase converts the phenylalanine to tyrosine. The disease is associated with mental deficiency.

The Guthrie test is performed to detect PKU. The agar medium with serum or blood on the surface is impregnated with alanine at a concentration sufficient to inhibit the growth of B. subtilis. Phenylalanine reverses this inhibition and bacterial inhibition assay is a direct measure of phenylalanine.

73 (b) The metabolic product of epinephrine and nor epinephrine is vanillylmandelic acid. Homovanillic acid is a metabolic product of dopamine and 5 hydroxyindoleacetic acid is of serotonin.

74 (b) Clostridium tetani is an anaerobic organism that causes tetanus. Below are important organisms and the disease produced by those organisms.

**Gram Positive Microorganisms**

<table>
<thead>
<tr>
<th>Organisms</th>
<th>Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propionibacterium acne</td>
<td>Acne</td>
</tr>
<tr>
<td>Bacillus anthracis</td>
<td>Anthrax</td>
</tr>
<tr>
<td>Streptococcus pneumonia</td>
<td>Meningitis</td>
</tr>
<tr>
<td></td>
<td>Pneumonia</td>
</tr>
<tr>
<td>Streptococcus mutane</td>
<td>Dental caries</td>
</tr>
<tr>
<td>Streptococcus pyogens</td>
<td>Food poison</td>
</tr>
<tr>
<td></td>
<td>Pharyngitis</td>
</tr>
<tr>
<td></td>
<td>Rheumatic fever</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>Food poison</td>
</tr>
<tr>
<td></td>
<td>Skin infection</td>
</tr>
<tr>
<td></td>
<td>Wound infection</td>
</tr>
<tr>
<td></td>
<td>Toxic shock-syndrome</td>
</tr>
<tr>
<td>Enterococcus faecalis</td>
<td>Endocarditis</td>
</tr>
<tr>
<td>Neisseria meningitensis</td>
<td>Meningitis</td>
</tr>
<tr>
<td>Gardenerella vaginitis</td>
<td>Bacterial vaginitis</td>
</tr>
<tr>
<td>Vibrio cholera</td>
<td>Cholera</td>
</tr>
<tr>
<td>Hemophilus aegyptius</td>
<td>Conjunctivitis</td>
</tr>
<tr>
<td>Campylobacteria sp</td>
<td>Food poisoning</td>
</tr>
<tr>
<td>Shigella</td>
<td>Food poisoning</td>
</tr>
<tr>
<td></td>
<td>Shigellosis</td>
</tr>
<tr>
<td>Salmonella</td>
<td>Food poisoning</td>
</tr>
<tr>
<td></td>
<td>Salmonellosis</td>
</tr>
<tr>
<td>Neisseria gonorrhoea</td>
<td>Gonorrhea</td>
</tr>
<tr>
<td>Legionella pneumophilia</td>
<td>Legionnaire’s disease</td>
</tr>
<tr>
<td>Borrelia burgdorferi</td>
<td>Lyme disease</td>
</tr>
<tr>
<td>Helicobacter pyroli</td>
<td>Peptic ulcer</td>
</tr>
<tr>
<td>Yersinia pestis</td>
<td>Plague</td>
</tr>
<tr>
<td>Salmonella typhi</td>
<td>Typhoid</td>
</tr>
<tr>
<td>Treponema pallidum</td>
<td>Syphilis</td>
</tr>
<tr>
<td>Chalmydia trachosis</td>
<td>Trachoma</td>
</tr>
</tbody>
</table>

**Gram Negative Organisms**

<table>
<thead>
<tr>
<th>Organisms</th>
<th>Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemophilus influenza</td>
<td>Meningitis</td>
</tr>
<tr>
<td>Neisseria meningitensis</td>
<td>Meningitis</td>
</tr>
<tr>
<td>Gardenerella vaginitis</td>
<td>Bacterial vaginitis</td>
</tr>
<tr>
<td>Shigella</td>
<td>Food poisoning</td>
</tr>
<tr>
<td>Campylobacteria sp</td>
<td>Food poisoning</td>
</tr>
<tr>
<td>Yersinia pestis</td>
<td>Plague</td>
</tr>
<tr>
<td>Salmonella</td>
<td>Food poisoning</td>
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<tr>
<td>Neisseria gonorrhoea</td>
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</tr>
<tr>
<td>Yersinia pestis</td>
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</tr>
<tr>
<td>Salmonella typhi</td>
<td>Typhoid</td>
</tr>
<tr>
<td>Treponema pallidum</td>
<td>Syphilis</td>
</tr>
<tr>
<td>Chalmydia trachosis</td>
<td>Trachoma</td>
</tr>
</tbody>
</table>
### Bordetella pertussis
**Whooping cough**

### Anaerobic Microorganisms

<table>
<thead>
<tr>
<th>Organisms</th>
<th>Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clostridium botulinum</td>
<td>Botulism</td>
</tr>
<tr>
<td>Corynebacterium diptheria</td>
<td>Diptheria</td>
</tr>
<tr>
<td>Clostridium perfringen</td>
<td>Gas gangrene</td>
</tr>
<tr>
<td>Clostridium difficile</td>
<td>P.colitis</td>
</tr>
<tr>
<td>Clostridium tetani</td>
<td>Tetanus</td>
</tr>
</tbody>
</table>

### Miscellaneous

<table>
<thead>
<tr>
<th>Organisms</th>
<th>Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mycobacterium lepre</td>
<td>Leprosy</td>
</tr>
<tr>
<td>Mycobacterium tuberculosis</td>
<td>Tuberculosis</td>
</tr>
</tbody>
</table>

### Important viral diseases

<table>
<thead>
<tr>
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<th>Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varicella-zoster</td>
<td>Chickenpox</td>
</tr>
<tr>
<td>Epstein Barr</td>
<td>Burkitt, Lymphoma, Infectious Mononucleosis</td>
</tr>
<tr>
<td>Cytomegalovirus</td>
<td>Cytomegalic inclusion disease</td>
</tr>
<tr>
<td>Herpes simplex</td>
<td>Herpes</td>
</tr>
<tr>
<td>HIV</td>
<td>Aids</td>
</tr>
<tr>
<td>Paramyxovirus</td>
<td>Mumps</td>
</tr>
</tbody>
</table>

75 (b) E.coli is responsible for causing most of urinary tract infections (UTI).

76 (b) A sweat test helps to confirm cystic fibrosis. The sweat of patients with cystic fibrosis usually contains 3 to 5 times higher concentrations of chloride ions than patients without the disease.

77 (b) Urticaria or hives is a skin reaction characterized by wheal formation. The lesions are well-circumscribed discrete wheals with erythematous raised serpiginous borders and blanched centers. The lesion is associated with intense pruritus or burning. Urticaria or formation of wheals is not a life-threatening condition itself, but it may indicate the patient is more susceptible to anaphylactic reactions.

Eczema: It is also known as Atopic dermatitis and is characterized by itching. The appearance and distribution of lesions depend on the age of the patient. It can be further subdivided into infant-type atopic dermatitis, childhood-type atopic dermatitis and adult-type atopic dermatitis.

Allergic contact dermatitis: It is a common skin disease caused by direct contact with substances such as acid and alkali, or by excessive use of soap.
Exfoliative Dermatitis: It is also known as erythroderma syndrome. It is a fatal complication that occurs due to other poorly controlled dermatitis reactions.

Erythema multiform: It is a skin reaction result of systematic allergic reaction to various agents such as Stevens-Johnson syndrome.

Impetigo: It is a superficial bacterial infection of the skin. The causative organisms are coagulase -positive staphylococci and beta hemolytic streptococci. It is more common in children.

78 (c) Diabetes insipidus is a disorder that usually occurs due to a decrease in production of Antidiuretic Hormone (ADH). It is characterized by a severe increase in thirst, polyuria and polydipsia. The urine volume increase is up to 16 to 24 liters per day. Patients should be watched for dehydration.

79 (b) The rate of reaction is independent of concentration in zero order kinetic.

Zero order reaction: The rate of change in the concentration of reactants and products depends on factors other than concentration of reactants, e.g. photochemical reactions.

\[ V = - \frac{dc}{dt} = k , \ t_{1/2} = \frac{a}{2k} \]

First order reaction: The rate of change in the concentration of reactants is proportional to the first power of the concentration of a single reactant.

\[ V = \frac{-dx}{dt} = k (a - x) \]

\[-dx = k (a - x) \]

Second order reaction: The rate of change in the concentration of reactants and products is proportional to either the second power of concentration of one reactant or a single power of concentration of two reactants.

\[-dx = k (a - x) (b - x) \]

\[ kt = \frac{x}{a (a - x)} \]

\[ t_{1/2} = \frac{1}{ka} \]

Pseudo First order reactions: In second order reaction, if one of the reactant present in a very large amount then, rate of such reaction usually depends on the concentration of large reactant and independent of the concentration of the second reactant, this type of reaction is usually described as a pseudo first order reaction, such as hydrolysis of ethyl acetate in the presence of an excess amount of water.

\[ CH_3COOC_2H_5 + H_2O \text{ (excess)} \rightarrow CH_3COOH + C_2H_5OH \]

80 (b) The initial degradation of drugs by the liver after oral administration the of the drug is defined as First Pass Effect of metabolism.

81 (d) The concentration of a drugs at the receptor site does not affect the protein binding of the drug. The factors that affect the protein binding of drugs are:
* Type of proteins available for binding.

* The protein binding affinity and capacity of the drug.

* The presence of competing substances for protein binding.

* The disease condition that may alter the amount of protein available for binding.

The lists of the conditions or diseases that may decrease albumin levels in plasma and thereby decrease the protein binding includes:

* Burns
* Pregnancy
* Cystic fibrosis
* Chronic liver disease
* Chronic renal failure
* Trauma

The conditions that may increase albumin levels in plasma and thereby increase the protein binding includes:

* Hypothyroidism

82 (d) In hypothyroidism, the plasma albumin level is found to be elevated.

83 (b) Tagamet (Cimetidine) is an H₂ receptor antagonist indicated for treatment of GERD and heartburn. It has a powerful cp450 inhibition property. The recommended dose of the drug is 400 mg b.i.d. Diarrhea, pancreatitis, and headache are reported side effects of the drug.

84 (a) Lactulose is indicated for treatment of hyperammonia. It is degraded into organic acid which decrease the pH of the colonic contents. The acidic contents of the colon entraps the ammonia as ammonium ions and reduces the concentration in the blood.

85 (b) A patient with hemophilia has a deficiency of coagulation factor VIII, known as Antihemophilic factor (AHF). The deficiency of this enzyme will result in severe coagulation defect. It is indicated for treatment of hemorrhage in patients with Hemophilia A or to prevent bleeding in various surgical procedures.

86 (a) Sodium polystyrene sulfonate reduces the elevated serum concentration of potassium (hyperkalemia). It is an ion exchange resin that replaces the potassium ions for sodium ions. The recommended dose of the drug is 15 grams, one to four times a day. Constipation, anorexia, and gastric irritation are reported side effects of the drug.

87 (b) Polycythemia and erythrocytosis are conditions in which there is an increase in the number of erythrocytes found. In contrast, leukemia is a condition in which there is an increase in the number of leukocytes. Thrombopenia is associated with a decrease in thrombocytes counts.

88 (d) Doxazosin, Terazosin and Prazosin are specific alpha-1 blockers. They are indicated for treatment of hypertension and BPH. The major side effects of these agents are first dose syncope and tachycardia.

89 (c) The stimulation of alpha-2 receptors prevents the release of noradrenaline i.e. clonidine and methyldopa.

The function of other receptors:

Alpha-1 receptors: Stimulation of these receptors may result in the constriction of blood vessels that supply to skeletal muscles, therefore alpha-1 blockers are very good vasodilators. These include Prazosin and Terazosin, Doxazosin.

Beta-1 receptors: Stimulation of these receptors may increase the cardiac rate. Agents
of this class are helpful in the treatment of cardiogenic shock. Inhibition of these receptors helps in controlling hypertension, therefore beta blockers are indicated for treatment of hypertension i.e. propranolol and atenolol.

Beta-2 receptors: Stimulation of these receptors dilate vascular smooth muscles, therefore most of the bronchodilators are good Beta-2 stimulators. These include albuterol, and salmeterol.

90 (b) Hypertrichosis (increase in hair growth) is a side effect associated with the use of Loniten (Minoxidil). This adverse effect of Minoxidil has been used for treatment of male pattern baldness. Minoxidil is classified as an antihypertensive agent. It is indicated for the treatment of hypertension and male pattern baldness. The recommended dose of the drug is 5 mg per day. Hypotension, tachycardia, edema, nausea and vomiting are reported side effects of the drug.

91 (c) The most preferable route for the administration of Sodium nitroprusside is intravenous because of the short half life of the drug.

92 (b) Overdose of sodium nitroprusside generally results in hypertension instead of hypotension. The overdose of this agent results in cyanide poisoning, which in turn stimulates the carotid chemoreceptors, responsible for causing hypertension and tachycardia.

93 (c) The use of Sodium nitroprusside should be strictly restricted in infants due to a lack of enzyme rhodanase that converts the cyanide into sodium thiocyanate.

94 (b) Primacor (Milrinone) is known as an inodilator since it has inotropic as well as vasodilatation properties. It is a selective inhibitor of cAMP phosphodiesterase enzymes in cardiac and vascular muscles. It is indicated for the treatment of CHF. The recommended dose of the drug is 50 mcg/kg administered slowly via I.V. infusion, over ten minutes. Arrhythmia, tachycardia, hypotension, and thrombocytopenia are reported side effects of the drug.

95 (b) Procainamide is a class IA arrhythmic agent. Here is the classification of antiarrhythmic agents:

Class IA: Procainamide, quinidine, disopyramide

Class IB: Phenytoin, lidocaine, mexiletin, tocainide

Class IC: Propafenone, Flecainide, Moricizine

Class II: All the beta blockers

Class III: Sotalol, Bretylium, Amiodarone

Class IV: All the calcium channel blockers.

96 (b) Mevacor (Lovastatin) is a lipid lowering drug that acts by inhibition of the HMG COA reductase enzymes. This enzyme is responsible for the conversion of 3-hydroxy 3 mehtylglutaryl-coenzyme A to mevalonate, the precursor for sterols including cholesterol. The inhibition of biosynthesis of cholesterol reduces the cholesterol in hepatic cells, which stimulates the synthesis of LDL receptors. These will all reduce the synthesis of cholesterol. It is indicated for the treatment of hypercholesterolemia. Abdominal cramps, pain, diarrhea, constipation, dyspepsia, myalgia, and arthralgia are reported side effects of the drug. The recommended dose of the drug is 20 mg once daily with an evening meal. The other agents in the same class are:

* Fluvastatin
* Atrovastatin
* Pravastatin
* Cerivastatin
**97 (a)** Doxapram is indicated as the respiratory stimulant agent in postanesthesia and in chronic obstructive pulmonary disease associated with acute hypercapnia. The respiratory stimulant to effect of this agent is attributed to its ability to stimulate the respiratory center in the medulla via carotid chemoreceptors.

Ipecac is widely used as an emetic in accidental poisoning. It is also used as an expectorant.

Dopamine is formed by the decarboxylation of 3,4-dihydroxyphenylalanine (DOPA). It is a precursor to noradrenalin and is also itself a neurotransmitter in CNS. It is indicated for treatment of cardiac shock. The vasodilation offered by dopamine is very important in drawing the blood in the kidney and small bowel during an ischemic attack. The diuretic property of dopamine helps to preserve the renal tubules. The cardiac stimulation improves the deteriorated cardiac function. Hypotension is a principal adverse effect of the drug.

Disopyramide is classified as a class IA antiarrhythmic agent. It has profound anticholinergic side effects with severe A.V. node suppression properties. It should be carefully used in patients with congestive heart failure with glaucoma and urinary hesitancy. The major adverse effects reported are dry mouth, constipation, urinary retention and blurred vision.

**98 (b)** Acetylcysteine is classified as an expectorant, an agents that loose as and liquefying the mucous, soothes irritated mucosa and make coughs more productive. It generally decreases the viscosity of bronchial secretions and facilitates the excretion of cough. It is also indicated as an antidote to minimize hepatic toxicity in acute acetaminophen overdose. Other expectorants include: guaifenesin, ipecac, potassium iodide and sodium iodide, terpin hydrate.

Dextromethorphan and benzonatate are classified as antitussive agents, the substances that specifically inhibit or suppress the act of coughing. Benzonatate acts peripherally by anesthetizing stretch receptors in the respiratory passage and reducing the cough reflexes. Dextromethorphan and codeine act centrally by depressing the cough center in the medulla.

Terbutaline is indicated as a bronchodilator for asthma patients and as a uterine relaxant in premature labor.

**99 (b)** Terbutaline is indicated as uterine relaxant for women in labor.

**100 (b)** Ipratropium is an atropine-like drug. It is indicated for the treatment of asthma and chronic obstructive pulmonary disease. Dryness of mouth, irritation in the throat, blurred vision and mild bradycardia have been reported with the drug.

Retrovir is indicated for treatment of HIV. Anemia and neutropenia have been reported. Retrovir induced anemia can be treated by the use of Epogen.

Carvedilol is a new beta blocker just recently introduced in the market. It is indicated for treatment of CHF.

Latanoprost is a prostaglandin analog indicated for treatment of glaucoma. It should be refrigerated.

**101 (b)** Cyclobenzaprine is indicated for treatment of muscle spasm associated with acute, painful musculoskeletal conditions. It is ineffective in treating muscle spasm due to a central nervous system disease.

Dantrolene sodium is indicated in controlling treatment of spasticity resulting from upper motor neuron disorders such as spinal cord injury, stroke, cerebral palsy or multiple sclerosis. It is not indicated for skeletal spasm resulting from rheumatic disorders. The major adverse effect reported with Dantrolene is hepatotoxicity.

Bromocriptine is indicated for treatment of Parkinsons. It is a dopamine receptor agonist. The principal adverse effect associated with the use of Bromocriptine is lung toxicity.
Amphetamine is indicated for treatment of Attention Deficit Hyperactivity Disorder. It is a controlled II drug. Central system stimulation and insomnia have been reported with use of Amphetamine.

102 (c) Parlodel (Bromocriptine) is classified as an antiparkinsons drug. It is indicated for the treatment of Parkinsonism. It is a dopamine receptor agonist. The recommended dose of the drug is 2.5 mg to 5 mg twice daily with meals. Pulmonary dysfunction is the principal side effect of the drug.

103 (b) Diamox (Acetazolamide) acts through the inhibition of carbonic anhydrase enzymes. It is indicated for treatment of glaucoma, epilepsy and edema. The recommended dose of the drug is 250 mg to 1000 mg per day. Nausea, vomiting, seizure, bone marrow depression, electrolytes loss, hemolytic anemia, and toxic epidermal necrosis are reported side effects of the drug.

104 (b) Zaroxolyn (Metolazone) is classified as a thiazide diuretic. It increases the excretion of Na, Cl, and H2O. It is indicated for the treatment of edema associated with CHF, renal disease and nephrotic syndrome. The recommended dose of the drug is 5 to 20 mg once daily. Electrolyte loss is a common complication of Metolazone therapy.

105 (d) ACE inhibitors therapy associated with an increase in serum concentrations of potassium. Amiloride, Spironolactone and Triamterene are potassium sparing diuretics and may cause hyperkalemia if used simultaneously with ACE inhibitors.

106 (d) All. Probenecid may competitively inhibit the renal tubular secretion of penicillin, sulfonylurea, sulfonamide, naproxen, indomethacin, clofibrate, aminosalicylic acid and pantothenic acid.

107 (b) The I.V. dextrose and glucagon can be administered for the treatment of insulin overdose. Glucagon and dextrose cause an increase in blood glucose concentration and helps in relieving hypoglycemia and insulin overdose toxication.

108 (b) Diabinese (Chlorpropamide) is classified as a sulfonylurea agent. It is indicated for the treatment of diabetes and as a secondary therapy to treat partial central diabetes insipidus. It has been successfully used as an antidiuretic to reduce polyuria in patients with this disorder. Hypoglycemia, severe diarrhea, and water retention are reported side effects of the drug. The recommended dose of the drug is 200 mg to 500 mg per day for treatment of diabetes insipidus. Desmopressin is considered as primary therapy for treatment of diabetes insipidus.

109 (b) A deficiency of vitamin A generally causes night blindness. Below are vitamins and their deficiency induced diseases.

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Sources</th>
<th>Diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vit A</td>
<td>carrots, milk, fish, liver, oil, eggs</td>
<td>night blindness</td>
</tr>
<tr>
<td>Vit B1 (Thiamin)</td>
<td>germinated cereals</td>
<td>beriberi</td>
</tr>
<tr>
<td>Vit B2 (Riboflavin)</td>
<td>milk, yeast, eggs, meat, green veg.</td>
<td>cheilitis</td>
</tr>
<tr>
<td>Vit B12 (Cyanocobalamin)</td>
<td>milk, liver</td>
<td>pernicious anemia</td>
</tr>
<tr>
<td>Nicotinic acid (Niacin)</td>
<td>leafy veg., wheat, nuts, pulses</td>
<td>pellagra</td>
</tr>
<tr>
<td>Folic acid</td>
<td>green veg., curd, liver</td>
<td>macrocytic anemia</td>
</tr>
</tbody>
</table>
Vit C citrus fruits scurvy  
(Ascorbic) lemon, amla tomato, green veg.

Vit B6 liver, meat, peripheral  
(Pyridoxine) green veg neuropathy

Vit D butter, eggs, rickettsia  
(Calciferol) cod liver oil, osteoporosis  
shark liver oil

Vit E leafy veg., milk  
(Tocopherol) soybean

Vit K veg, tomato, bleeding  
(phytomenadione) disorder

110 (b) Methotrexate overdose can be treated by administering Wellcovorin (Leucovorin Ca). It is a derivative of tetrahydrofolic acid. It is indicated to reduce the toxicity associated with overdose of folic acid antagonists, such as Methotrexate, Pyrimethamine, and Trimethoprim. Allergic reactions such as urtica and anaphylaxis are reported side effects of the Leucovorin. It should be carefully used with 5 FU since the latter enhances the toxicity of the later.

111 (b) Alprazolam, Lorazepam, Temazepam, Zolpidem, Zaleplon and Triazolam are short acting benzodiazepines and are more preferable to use for older or geriatric patients because of their short half lives.

112 (b) Mysoline (Primidone) is a prodrug metabolites to phenobarbital and phenyl ethyl malonamide. Its sedative, hypnotic and anticonvulsion effects are attributed to its ability to increase the concentration of GABA in the brain. It is indicated for the treatment of tonic-clonic seizure. Ataxia, vertigo, drowsiness, diplopia, nystagmus, nausea and vomiting are reported side effects of the drug. The recommended dose of the drug is 100 to 125 mg at bed time.

113 (a) Prozac (Fluoxetine) is classified as an SSRI. It has a prolonged half life. It takes 3 to 5 weeks to get the drug completely out of the body. It should be carefully prescribed with MAO inhibitors. Insomnia is the principal side effect of the drug. The recommended dose of the drug is 20 to 40 mg per day. The concurrent use of these two medications will result in severe hypertensive crisis. Tranylcypromine is an MAO-A inhibitor and should be avoided by patients taking Fluoxetine.

114 (d) Antiseptic controls the growth of microorganisms and should not be classified as an insect control chemical. Insect control chemicals may be classified in to four different categories: insecticides, fumigants, repellents, and attractants.

Insecticides: They are further classified according to the type of action that results in the destruction of insects.

I Stomach poison
II Contact insecticide
III Fumigant

Stomach poison: In this method, the insecticides are mixed with food that is consumed by insects, such as in the control of leaf feeding insects.

Contact insecticides: This is the most common use for control of insecticides. In this method, insecticides should be placed where the contact of insects with the insecticide can be easily achieved.

Fumigants: They are gases or vapors of insecticides for the control of insects, usually in closed spaces.

Repellants: Certain insecticide chemicals possess the repellant action. This will cause insects to avoid such places treated with such insecticides.

Attractants: In this method, the insects are attracted by various means such as foods particles such as sugar, milk and molasses to feed poison them.
115 (b) It is a suspension form of Barium sulfate medically used in roentgenography for the examination of the stomach and colon. The principal adverse effect of Barium sulfate is constipation. It should be mixed well with food or strained through gauze before administered to the patient.

The solution form of Barium ion is highly toxic, therefore it is recommended to indicate the full name of the drug when prescribing. For example “Barium sulfate” instead of “Barium.”

116 (b) Ascorbyl palmitate is classified as an antioxidant agent that prevents or inhibits the oxidations in various pharmaceutical formulations and therefore prevents the deterioration of various formulations. These include butylated hydroxyanisole, ethylendiamine, potassium metabisulfite, sodium bisulfite and sodium metabisulfite.

A preservative is a substance that inhibits the growth of microorganisms and prevents the various formulations to get deteriorated from various microbes such as chlorobutanol, dehydroacetic acid, potassium benzoate and potassium sorbate.

Coloring agents may be defined as substances used for the purpose of imparting color, such as red ferric oxide, carbon black, titanium dioxide and alizarin.

Flavoring agents may be defined as compounds used for the purpose of imparting flavors. There are four basics or primary tastes—sweet, bitter, sour and saline. Mannitol, lemon oil, orange oil, peppermint oil, sucrose, vanilla and wild cherry syrup are used for flavoring purposes.

117 (b) Epinephrine hydrochloride solution can be stabilized by the addition of a small amount of sodium bisulfite, which is an antioxidant.

118 (d) All mentioned choices (FD and C, D and C, external D and C dyes) are classified as certified colors.

119 (c) Spicy is not classified as a primary taste. Sweet, sour, bitter and saline are primary tastes.

120. (b) The initial plasma concentration of the drug is 10 mcg/ml, therefore:

<table>
<thead>
<tr>
<th>Mcg/ml</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 mcg/ml</td>
<td>0</td>
</tr>
<tr>
<td>5 mcg/ml</td>
<td>8 hours</td>
</tr>
<tr>
<td>2.5 mcg/ml</td>
<td>8 hours</td>
</tr>
</tbody>
</table>

Total = 16 hours

The half-life of the drug should be 8 hours.

121 (b) The sweet taste of a compound is attributed to the presence of polyhydroxy groups. The sweetness of a compound increases with an increase in the number of hydroxy groups such as amino and amide groups that contain compounds.

The sour taste of a compound is attributed to the presence of hydrogen ions and lipid solubility of compounds such as acid, tannins, phenol, lactones and alum.

The presence of cations and anions in the same compound imparts the saltiness to the compound, i.e. KBr, NHCl and NaCl.

Free bases such as alkaloid and amides (molecular weight greater than 300) may impart a bitter taste to the compound, i.e. amphetamines.

122 (a) The alcohol content of low alcoholic elixir is 8 to 10%, and for high alcoholic elixir it is 73 to 78%.

123 (a) Erythema multiform (EM) is classified as a dermatological reaction. It is characterized by the presence of erythematous macules and papules peripherally, i.e. hands, feet, trunk, legs and forearms.

Toxic epidermal necrolysis (TEN) is generally caused by drugs and group II staphylococci. It is also known as Lyell’s syndrome. It is characterized by the presence of erythema all over the
body. Drugs that may cause this are: penicillin, phenylbutazone, allopurinol, chloramphenicol and sulfonamide.

Steven-johnson syndrome is a severe variant form of erythema multiform (EM). It is characterized by the presence of erythematous macules and papules peripherally, as well as on the mucous membrane. The skin becomes hemorrhagic. The drugs that may cause this are sulfonamide, penicillin, phenytoin, allopurinol, phenobarbital and chlorpropamide.

Hirsutism or hypertrichosis is defined as the presence of hair all over the body. It is a principle adverse effect of Minoxidil. It is now used for the treatment of baldness.

124 (b) N-acetylcysteine is found to be an effective antidote for the treatment of acetaminophen overdose. The toxic metabolic product of acetaminophen damages the liver by binding to the cells of the liver. The normal dose of acetaminophen does not cause this since only a small amount of metabolites form, which may be easily conjugated with glutathione in the liver.

125 (b) Chlorpromazine, erythromycin estolate, chlorpropamide, trazodone, certain tricyclic antidepressants, sulindac and methyldopa may produce cholestatic jaundice. The disease is usually characterized by the presence of fever, chills, nausea, vomiting, anorexia and myalgias.

126 (c) The principal adverse effect of Clindamycin is AAC (antibiotic associated colitis). It is classified in the macrolide group of antibiotics. Severe diarrhea is a reported side effect of the drug.

127 (b) Aplastic anemia is a major adverse effect of Chloramphenicol. The bone marrow toxicity of chloramphenicol is further classified as dose related or not dose related. The dose related effects of chloramphenicol can be reversed by withdrawing the drug. The second type, dose not related, is fatal and life-threatening. It does not depend on the duration or dose of therapy and cannot be prevented by withdrawing the drug.

128 (d) Drugs that may cause hemolysis in a patient with G6PD deficiency include: quinine, sulfonamide, nitrofurantoin, primaquine, aspirin, phenacetin, quinidine and isosorbide dinitrate.

Immune hemolytic anemia is most commonly found with methyldopa. Anemia usually begins 18 weeks to 4 years after treatment. Mefenamic acid, levodopa and streptomycin are also reported to cause immune hemolytic anemia. Hemolytic anemia is induced by drugs, and returns to normal rapidly with discontinuation of therapy.

Erythromycin does not produce hemolytic anemia in patients with G6PD deficiency.

129 (b) Ringing or buzzing (tinnitus) in the ear is associated with salicylate. It is dose related and generally appears at a serum concentration of 20 mg/dl or higher. Salicylate induced hearing loss may return to normal within 3 days after discontinuation of the drug.

Permanent hearing loss is reported with aminoglycoside antibiotics. Neomycin is the most oto and nephro toxic among the aminoglycosides.

Minocycline, a derivative of tetracycline is also an ototoxic drug and its use requires great caution in older patients.

Loop diuretics such as furosemide, bumetanide and ethacryninc acid also possess the ability to produce ototoxicity.

130 (b) Mellaril (Thioridazine) is classified as an antipsychotic drug. It is indicated for the treatment of schizophrenia. Pigmented retinopathy is the most common side effect of the drug. The severity of this side effect is dose and therapy
study of a particular drug after the common adverse effects reported by number of patients is such a review. In this review method, there is no scope to modify the patient’s therapy (since the event has occurred).

Prospective utilization review is generally carried out before the patient receives the drug. Such as checking a patient’s profile before the patient receives the drug.

Concurrent utilization review is carried out at the time when the patient is receiving the drug.

378 (b) Nolvadex (Tamoxifen) is an estrogen receptor antagonist indicated for treatment of breast cancer. Pulmonary embolism, thromboembolic order, hepatic necrosis, nausea, vomiting, and diarrhea are reported side effects of the drug. The recommended dose of the drug is 10 to 20 mg b.i.d.

379 (b) Carrots are a good source of vitamin-A.

380 (c) Bleeding from the gums, hemorrhage and retarded healing are important signs of scurvy. Defective bones and teeth are generally reported with osteomalacia and ricketsia due to a deficiency of Vitamin D.

381 (b) The deficiency of thiamine generally causes the disease Beri-Beri. The patient’s weight and appetite generally decreases and the patient gets easily tired. Neuritis may occur.

382 (c) The deficiency of Vitamin B12 generally causes pernicious anemia.

383 (b) Green vegetables, liver, curd and pulses are good sources of folic acid.

384 (c) Abnormal destruction of RBC is generally classified as hemolytic anemia.

385 (a) Deficiency of Iron normally causes hypochromic anemia. Hyperchromic anemia is normally reported with a deficiency of folic acid and vitamin B12.

386 (c) Ferrous fumarate contains a high amount of elementary iron (33%). Below is the list of iron salts and their iron contents.

- Ferrous sulfate: 20%
- Dried ferrous sulfate: 30%
- Ferrous gluconate: 12%
- Ferrous fumarate: 33%

387 (b) Net profit to net worth ratio is the best indicator of a pharmacy’s profitability, because it compares the net profit to net investment in the pharmacy.

388 (b) Inventory turnover rate generally describes the efficiency of a pharmacy. It is generally calculated by dividing the cost of the goods sold by the average of beginning and ending inventory.

389 (c) An acid test generally measures the liquidity of the pharmacy. It can be calculated by dividing the sum of cash and accounts receivable by the current liabilities.

390 (d) The acceptable ratio of Net profit to net sales generally lies between 5 to 7%.

391 (c) The acceptable Net profit to net worth ratio for a 10 year old pharmacy would be 15%. The target value for this ratio would be 20%. A 40% figure can be achieved in a new pharmacy.

392 (d) All. This ratio is calculated by dividing profit by inventory. It is a good indicator of profitability as well as efficiency. It can be used for new and old pharmacies. It increases with an increase in sales of a pharmacy.
393 (a) The normal target value for net profit to total asset ratio is between 10 to 20%. Manan Pharmacy’s net profit to total asset ratio is 15%, so it would be considered good.

394 (b) The inventory turnover rate can be calculated by dividing cost of goods sold by the average of beginning and ending inventory.

\[
\text{IN TOR} = \frac{\text{cost of goods sold}}{\frac{\text{beg inv} + \text{end inv}}{2}}
\]

\[
= \frac{5,00,000}{\frac{200,000 + 220000}{2}}
\]

\[
= 2.38
\]

The inventory turnover rate should be a minimum of 4 with a target of 6 or higher. Manan Pharmacy’s turnover rate is below expectations.

395 (b)

396 (b) The ratio of net sales to inventory can be calculated as:

\[
= \frac{750,000}{210,000}
\]

\[
= 4
\]

397 (b) Net worth can be calculated by subtracting total liabilities from total assets.

\[
\text{Net worth} = \text{Total assets} - \text{total liabilities}
\]

\[
= 190,000 - 75,000
\]

\[
= 1,15,000
\]

398 (a)

399 (a) Class I type of recalls should be considered a potential hazard to health. The product in question may cause temporary or medically reversible adverse health consequences should be classified as a class II type recall. The product in question is not likely to cause any adverse health consequences should be classified as a class III type of recall.

400 (c) Category X is contraindicated in pregnancy. Below are the categories and their effect on pregnancies.

A = Controlled studies show no risk.

B = No evidence of risk in humans.

C = Risk cannot be ruled out.

D = Positive evidence of risk.

401 (b) Liquidity generally expresses a pharmacy’s ability to meet its current liabilities.

402 (b) The acid test generally measures a pharmacy’s liquidity.

403 (b) Accounts payable are generally not included in current assets. Cash, accounts receivable and inventory are part of current assets.

404 (b) Fixtures and equipment would be considered fixed assets of a pharmacy.

405 (d) Notes payable beyond 1 year are considered Long-term liabilities of the pharmacy. Accounts payable, accrued expenses and notes payable within 1 year are considered current liabilities of the pharmacy.

406 (b) Acid Test ratio can be calculated by dividing the sum of cash and accounts receivable by the current liabilities.

\[
= \frac{50,000 + 75,000}{85,000}
\]

\[
= 1.47
\]
407 (c) Net sales to inventory measures the efficiency of the pharmacy.

408 (b) Below expectation.

= \frac{\text{Total liabilities}}{\text{Net worth}}

= \frac{105,000}{165000}

= 63.63\%

The target value for Total liabilities to net worth ratio would be 50% or less.

409 (c) The investment of Manan Pharmacy in a fixed asset meets requirements. The target value for this ratio would be 20% or below.

= \frac{\text{Fixed assets}}{\text{Net worth}} \times 100

= \frac{35000}{165000} \times 100

= 21\%

410 (b) The price of a prescription file can be calculated by the following equation:

V = [ (F \times R) \times P] \times N where

V = Price of prescription file.

F = Total new prescription is dispensed in past two years.

R = The % of prescriptions with one or more refill left.

P = The pharmacy’s average prescription price.

N = Net profit %

\[ V = \frac{(80,000 \times 0.4) \times 50}{0.15} = \frac{240,000}{1.5} \]

The owner of the Manan Care Pharmacy is asking $350,000 for an existing prescription file, therefore the asking price is too high.

411 (a) \[ E = \frac{Q}{P} \] where

E = Coefficient of elasticity

Q = % of sales quantities change

P = % of price change

In our example, the sales quantities of analgesic balm has been changed from 60 to 80 (33% change), and the price of balm has changed from 3 to 2 (33%). Therefore elasticity of coefficient would be:

\[ E = \frac{33}{33} = 1 \]

412 (a) When a relative change in revenue is the same as relative change in price, it is known as unitary elasticity.

When the relative change in revenue is less than the relative change in price, it is known as inelastic demand.

If the relative change in revenue is greater than the relative change in price, it is said to be elastic demand.

413 (b) $16.30

R = \frac{C}{P}

R = Retail price of drug

C = Cost of drug

P = Cost complement in %
Therefore the retail price of insulin would be

\[
= 9.00 \\
0.55
= \$ 16.30
\]

Cost complements $% + %$ mark up $= 100$

414 (c)  

66%

The retail price of a drug is $75$, therefore the mark up on prescriptions would be $30$ ($75 - $45$).

For a $45$ drug, $30$ would be the mark up.

For a $100$ drug ?

\[
30 \times 100/45 = 66\% \text{ make up}
\]

415 (c)  

$16.30$

\[
\text{MU/C} = \frac{\text{Known retail mark up}}{\text{cost of complement}}
\]

\[
= \frac{45/55}{0.81} = 81\%
\]

\[
R = \text{cost of drug} \times (100 + \text{MU/C})
\]

\[
= 9 \times (181\%)
\]

\[
= 9 \times 1.81 = \$ 16.30
\]

416 (c)  

$1200$

\[
\text{Rx rent} = \text{Total rent} \times \text{space ratio}
\]

\[
= 10,000 \times 600/5000
\]

\[
= \$1200
\]

417 (b)  

The funding for Medicare programs is generally obtained from social security tax and premiums paid by the participants.

418 (a)  

Copayment: It is a patient cost sharing plan in which the patient has to pay a specified amount (normally $10$ to $15$) of the cost of prescriptions and a third party will pay the remainder.

419 (b)  

A person who works for an insurance company and provides the statistical data that indicates the risk associated with serving the population, and determines the premiums to cover all the estimated expenses, is known as an actuary.

420 (a)  

The maximum amount that will be paid by a third party to a pharmacy when the drug is available from more than one source is defined as MAC, or maximum allowable cost

Estimated acquisition cost (EAC): The third party’s estimate of the prices paid by a pharmacist for a particular drug product.

Actual acquisition cost (AAC): The actual price paid by a pharmacy after all trade, volume and cash discounts.

Average wholesale price (AWP): The published list price of a particular product.
421 (b) If a patient pays a full predetermined amount to the provider at the beginning of each month is known as Prospective reimbursement.

422 (b) Mean = 588

\[
\frac{350 + 420 + 530 + 600 + 620 + 635 + 700 + 850}{8} = 588
\]

423 (c) The median of a sample is the middle value of an experiment. If the sample is even then calculate the average of the middle values, for example in our experiment the middle values are 600 and 620, therefore the median would be:

\[
\frac{600 + 620}{2} = 610
\]

424 (c) Negatively skewed. The frequency distribution of a sample is calculated by

\[
= \text{Mean} - \text{Median (Mode)}
\]

\[
= 130 - 155 = -25
\]

If the value of (mean-mode) is negative, the frequency distribution of the sample would be negatively skewed. If the value is positive then the frequency distribution of the sample would be positively skewed.

425 (d) The frequency of distribution can be bell shaped, skewed, U shaped and or J shaped.

426 (c) The Pearsonian coefficient can be calculated by the following formula:

\[
3 \frac{(\text{Mean} - \text{Median})}{\text{Standard deviation}}
\]

\[
= 3 \frac{(55 - 45)}{35} = 0.85
\]

427 (b) Each trial in a Binomial experiment comes out a success or failure. The repeated trial are independent of previous experiments. The experiments generally consists of “n” repeated trials. The probability of success remains constant from trial to trial.

An example of this is tossing a quarter for “n” times to get heads (tails would be considered a failure) each time.

428 (b) The mean of binomial distribution can be calculated by:

\[
\text{Mean} = n \times p
\]

\[
= 50 \times 0.6 = 3
\]

429 (b) The range of a set can be calculated by the difference between the highest value and the lowest value of the experiment.

\[
= 140 - 110 = 30
\]

430 (b) The degree of freedom for a t distribution can be calculated by \(= n-1\):

\[
= 20-1 = 19.
\]

431 (b) The degree of freedom for chi-square test can be calculated by

\[
= (R-1) \times (C-1)
\]

\[
= (2-1) \times (3-1) = 2
\]

432 (a) One sided.

433 (b) Amino acids are joined by peptide bonds in proteins.

434 (d) The secondary structure of protein consists of alfa-helix, beta helix and beta-bend.

435 (d) The denaturation of protein can occur in the presence of heat, strong acid or organic solvent.
Sickle cell anemia is a genetic disorder resulting from the production of variant hemoglobin. It is characterized by pain, lifelong hemolytic anemia and tissue hypoxia. The replacement of valine at the sixth position of the beta-globulin chain for glutamate is responsible for this. The formation of HbS has extremely low solubility compared to HbA, and results in aggregation of molecules to form or create sickle shaped red blood cells.

The enzyme with its cofactor is known as Holoenzyme. Apoenzyme refers to the protein portion of the holoenzyme. Nonprotein cofactors (i.e. Zn$^{+2}$, Fe$^{+2}$) required for the activities of certain enzymes are known as Coenzymes.

The process in which the release of energy from energy-rich molecules such as glucose and fatty acid occurs in mitochondria is commonly referred to as Oxidative phosphorylation.

The breakdown of complex molecules such as protein, lipid and polysaccharide into simple molecules such as carbon dioxide, water and ammonia is known as catabolic reaction.

Pyruvate is the end product of glycolysis in cells that contain mitochondria. The cells that lack mitochondria produce lactate instead of pyruvate as the end product of glycolysis.

Glutathione in reduced form is deficient in patients with G6PD deficiency. Certain oxidant drugs such as sulfamethoxazole and primaquine produce hemolytic anemia in patients with G6PD deficiency.

All. Oxidant drug, ingestion of fava beans, and certain types of infections may cause hemolytic anemia in patients with G6PD deficiency.

Lactose is classified as a disaccharides. It consists of glucose and galactose.

The pairs of structure that are mirror images of each other are known as enantiomers.

The principal storage of glycogen in the body is found in the skeletal muscles and liver.

Hyaluronic acid, heparin and chondroitin are classified as polysaccharides.

Bile salts act as an emulsifying agent for metabolism of lipid in duodenum

Steatorrhea is a result of improper secretion of bile salts from the liver and pancreatic juice from the pancreas. It normally causes a loss of lipid, fatty acid and lipid soluble vitamins in feces. The water soluble vitamins such as vitamin C, thiamine and riboflavin have no effect on their absorption.

Sphingomyelin is a building block of membrane of nerve tissue.

An obstruction of the gall bladder by a cholesterol stone is defined as cholelithiasis.

Luteinizing hormone induces testosterone synthesis in Leydig cells of the testis and ovulation in females. It also stimulates synthesis of estrogen and progesterone in the corpus luteum. Follicle stimulating hormone (FSH) and testosterone stimulate spermatogenesis in the testis.

All. BMR, thermic effect of food and physical activity help in the calculation of energy required by an individual.
Kwashiorkor is a protein-deficient malnutrition disorder. It is usually seen in children. Skin lesions, edema, anorexia, depigmented hair and a decrease in plasma albumin concentration are common symptoms associated with this disease.

Marasmus is also known as a protein deficit disorder. It occurs due to chronic deficiency of calories and can occur even in the presence of intake of adequate protein. Weakness, anemia and extreme muscle weakness are common symptoms associated with this disease.

Vitamin D is not a water soluble vitamin. It plays an important role in increasing the uptake of calcium by the intestine. Deficiency of this vitamin causes osteoporosis, ricketsia and hypocalcemia.

Cabbage, spinach, cauliflower, liver and egg yolk are principal sources of vitamin K. The deficiency of this vitamin causes bleeding disorder.

The end product of purine catabolism is uric acid. The serum concentration of uric acid plays an important role in precipitating gout. Certain mammals further oxidize uric acid into allantoin, and this further degrades (only in animals) to urea or ammonia.

The small and circular extrachromosomal DNA molecules in bacteria that carry genetic information for future generations are known as plasmids.

Ribosomal RNA comprises 80% of total RNA. Transfer RNA comprises 15% of total RNA and Messenger RNA comprises 5% of the total RNA.

Messenger RNA (mRNA) carries genetic information from the DNA to cytosol for protein synthesis.

All. UAG, UGA and UAA are known as Termination codons, Stop codons or Nonsense codons. When one of these codons appears in an mRNA chain, it indicates that the peptide chain synthesis coded by the mRNA is about to be complete.

AUG is classified as Initiation codon in the process of peptide chain synthesis.

Dark field microscopy is indicated to observe microorganisms that do not stain or are difficult to stain.

Bright field microscopy is the mostly employed microscopic method. It uses visible light. The microorganism generally appears colored on a light background.

Phase contrast microscopy is used to observe the internal structure of unstained microorganisms. The specimen should be visualized in different degrees of brightness and darkness.

Normarski microscopy is also useful for the observation of finer details of internal structures of unstained organisms. It produces three dimensional images. It has better resolution than Phase contrast microscopy.

Transmitting electron microscopy uses electron beams instead of light rays. It is used to study a thin section of cells for the details of internal structure, and is very expensive.

Scanning electron microscopy also uses electron beams instead of light rays, however it produces three dimensional views of the surfaces of specimens.

Acid fast stains generally stain the mycobacterium species of bacteria, such as M. leprare and M.tuberculosis.
All living cells can be classified as prokaryotic or eukaryotic. Most of the prokaryotic cells such as bacteria are unicellular organisms. These cells lack a nucleus and other membrane bound structures.

Eukaryotic cells have a nucleus and membrane bound structures. Most plants, animals and fungi fall into this class.

Most bacteria are able to move through the long, thin, helical structure known as flagella. Bacteria with only one flagella located at one end are known as monotrichous, bacteria with two flagella located at each end are known as amphitrichous, bacteria with two or more flagella located at one or both ends are known as lophotrichous and bacteria with flagella all over the body are known as peritrichous.

Bacteria that can move away from (negative phototaxis) or move towards (positive phototaxis) the light are known as phototaxis.

The movement of bacteria toward or away from certain substances in their environment by an unknown mechanism is known as chemotaxis.

An AMES test can be used to find out whether a substance has the capability to produce carcinogen. A cancer producing property is usually associated with the mutagenic (capability of a substance to alter DNA) property of a substance, so determining that a substance is capable of producing mutagenicity is the first step to identify carcinogenicity of the substance.

In an AMES test, the growth medium that lacks histidine is inoculated with salmonella that requires histidine to grow. A solution of substance that needs to be tested should be placed on the plate. If colonies of salmonella (that means the substance has a mutagen ability to grow salmonella without histidine) appear then the test substance has the ability to produce mutagenicity and vice versa.

The synthesis of protein and lipids in cells is generally carried out by endoplasmic reticulum.

The growth of bacteria remains constant in the stationary phase, it dramatically increases in the log phase and decreases in the decline phase.

Moisture, pH, temperature, oxygen, hydrostatics pressure, osmotic pressure and radiation are the physical factors needed for the growth of the bacteria.

Carbon source, nitrogen source, vitamins, trace elements, sulfur and phosphorus are nutritional factors for the growth of bacteria.

When the transfer of genetic information from one cell to another cell is carried out by the plasmid, it is known as conjugation.

A Genome (a component of the bacteriophage) carries the genetic informations necessary for replication of new phage particles. The tail sheath of bacteriophage normally helps in the transformation of genome from the head into the cytoplasm of the host cell. The plate and tail fibers normally help the bacteriophage to attach to the specific receptor site on the cell wall of the susceptible host bacterium.

The reduction of the numbers of pathogenic microorganisms, up to such an extent they are not able to produce any kind of disease, is known as disinfection.

Sterilization is defined as the complete removal of all microorganisms from the material or an object.