Pharmaceutical Sciences- Example Test

1. Which of the following acids is the strongest one?
   a) HClO
   b) $HclO_4$
   c) H_3BO_3
   d) HNO_3

2. What is the hybridization of nitrogen in nitric acid?
   a) sp
   b) sp^2
   c) sp^3
   d) sp^3d

3. Formula of cisplatin (systematic name *cis*–diamminedichloroplatinum(II)) is:
   a) $[Pt(NH_2)_2Cl_2]$
   b) $[Pt(NH_3)_2Cl_2]$
   c) $[(NH_3)_2Cl_2Pt_2]$
   d) $Pt[(CONH_2)_2Cl_2]$

4. Which of the following reactions produces hydrogen gas?
   a) $Cu + HCl \rightarrow$
   b) $Zn + HCl \rightarrow$
   c) $H_2O + HCl \rightarrow$
   d) $NH_3 + HCl \rightarrow$

5. Thermodynamically most stable conformation of cyclohexane is?
   a) Boat
   b) Twist
   c) Chair
   d) Planar

6. 3-Amino-2-hydroxybutanoic acid can exist in the form of?
   a) Four stereoisomers (2 enantiomeric pairs)
   b) Two enantiomers
   c) Four diastereomers
   d) The compound is achiral

7. The hybridization of carbons C2 and C3 in cyclohex-2-ene-1-ol is?
   a) sp
   b) sp^2
   c) sp^3
   d) sp^2d^1

8. As regards acidity/basicity, α-amino acids can be classified as
   a) Acidic

b) Basic
c) Amphoteric
d) Neutral

9. The pKa value of acetic acid is approximately five, while that of phenol is approximately ten. Hence, acetic acid is roughly?
   a) Five times more acidic than phenol
   b) Ten thousand times less acidic than phenol
   c) Hundred thousand times more acidic than phenol
   d) Five times less acidic than phenol

10. The main product obtained upon treatment of phenol with sodium hydroxide followed by ethyl iodide is.
   a) Ethyl phenyl ether
   b) Sodium phenolate
   c) No reaction occurs
   d) 2-ethyl phenol

11. Electrophilic additions across C=C double bond are governed by the Markovnikov's rule. According to the rule,
   a) Nucleophilic part of the reagent is attached to the less substituted carbon of the C=C bond
   b) Electrophile is attached to the more substituted carbon of the C=C bond
   c) The additions proceed via the intermediacy of the most stable carbocation
   d) A mixture of products is obtained, regardless of the substitution of the C=C bond

12. When benzaldehyde is treated with bromine, the major product expected is?
   a) A) 3-bromobenzaldehyde
   b) B) dibromomethyl benzene
   c) C) 2-bromobenzaldehyde
   d) D) 2,4,6-tribromobenzaldehyde

13. The reaction of aniline (benzene amine) with hydrochloric acid can be classified as?
   a) A) Nucleophilic substitution
   b) B) Electrophilic addition
   c) C) Acid-base reaction
   d) D) Nucleophilic addition

14. The reaction of ethyl propanoate with hydrazine will furnish.
   a) Ethyl propyl hydrazone
   b) N^1-ethyl-N^2-propyl hydrazine
   c) No product
   d) Propane hydrazide

15. What is the product when D-glucose reacts with nitric acid?
   a) Glucuronic acid
   b) Glucaric acid
   c) Gluconic acid
   d) Does not react

16. (2*S*, 3*R*)-2-Amino-3-hydroxybutanoic acid is?
    a) L-histidine
    b) D-threonine
    c) L-threonine
    d) D-serine

17. Disaccharide composed from D-galactose and D-glucose is?
    a) Maltose
    b) Saccharose
    c) Lactose
    d) Cellobiose

18. Thiamine
    a) Is the Vitamin B3
    b) Contains thiazolium ring
    c) Is an ester of phosphoric acid
    d) Comprises *ortho*-fused cycle

19. Complete hydrogenation of glycerol trioleate gives
    a) Glyceryl tristearate
    b) CO_2 and water
    c) Glycerol and 3 molecules of oleic acid
    d) Soap

20. Which of the following nucleobases is purine nucleobase?
    a) Guanine
    b) Cytosine
    c) Thymine
    d) Uracil

21. What is major cause for nonerosive chronic gastritis?
    a) Helicobacter pylori
    b) Non-steroid anti-inflammatory drugs
    c) Alcohol
    d) Trauma

22. Cholelithiasis is presence of the stones in:
    a) Gallbladder
    b) Kidneys
    c) Stomach
    d) Salivary glands

23. Which statement is not true? Pancreatitis is:
    a) Inflammatory disease of pancreas

b) Presence of stones in pancreas
c) Description of enlargement of pancreas
d) Cancer of pancreas

24. Ulcerative colitis is described as:
    a) Inflammation in the small intestine
    b) Cancer in the colon
    c) Presence of ulcer in the colon
    d) Cancer in the small intestine

25. Parkinson´s disease is characterized as loss of dopaminergic neurons (production of dopamine) in?
    a) Pons Valori
    b) Cerebellum
    c) Substantia nigra
    d) Spinal cord

26. Multiple Sclerosis is characterized by:
    a) Presence of stones in many places of the body
    b) Inflammation of vessels in the heart
    c) Progressive damage of myelin in the central nervous system
    d) Damage of the acetylcholine receptor at the neuromuscular junction

27. Auditory hallucination and delusion are typical symptoms of:
    a) Depression
    b) Bipolar affective disorders
    c) Schizophrenia
    d) Agoraphobia

28. Presence of amyloid and senile plaque in the brain is typical for:
    a) Depression
    b) Bipolar affective disorders
    c) Schizophrenia
    d) Alzheimer´s disease

29. Which vessel enters the right atrium?
    a) Aorta
    b) Superior vena cava
    c) Aortic artery
    d) Right coronary artery

30. Sinoatrial node is located in:
    a) Right atrium
    b) Left ventricle

c) Left atrium
d) Right ventricle

31. Which of these cells produce hydrochloride acid (HCl)?
    a) Paneth cells
    b) Zymogenic cells
    c) Parietal cells
    d) Smooth muscle cells

32. Common bile duct enters
    a) Duodenum
    b) Jejunum
    c) Stomach
    d) Rectum

33. Renin producing cells are located in:
    a) Proximal tubule
    b) Distal tubule
    c) Loop of Henle
    d) Afferent arteriole

34. Which cells in testes are responsible for the production of testosterone?
    a) Sertoli cells
    b) Leydig cells
    c) Sperm cells
    d) Spermatogonia

35. Aldosterone takes effects in:
    a) Distal tubule
    b) Loop of Henle
    c) Proximal tubule
    d) Glomerulus

36. An increase in number of cells in a tissue resulting in increase of tissue or organ size is defined as:
    a) Hypertrophy
    b) Atrophy
    c) Hyperplasia
    d) Metaplasia

37. Ischemia is defined as:
    a) Decreased blood supply into the tissue as result of the obstruction or occlusion of the vessel (arteria)
    b) Increased blood supply in capillary bed as a result of physiological or pathological state
    c) The shifting of a disease or its local manifestations, from one part of the body to another and formation of a new pathological center
    d) An escape of blood through ruptured or unruptured vessel walls

38. Which of below mentioned is not compensatory mechanism in shock situation:
    a) Activation of sympathetic nervous system
    b) Activation of renin angiotensin aldosterone system
    c) Secretion of ADH (vasopressin)
    d) Activation of parasympathetic nervous system

39. Increased basal metabolism, activity of cardiovascular system, nervousness, insomnia are symptoms of:
    a) Addison disease
    b) Hyperthyroidism
    c) Hypothyroidism
    d) Hypopituitarism

40. Addison disease is characterized by decreased secretion of.
    a) Adrenalin
    b) Cortisol
    c) Aldosterone
    d) Cortisol, aldosterone and sex hormones

41. Ethylenediaminetetra-acetic acid (EDTA) is a polydentate ligand used in volumetric determination of bivalent, tervalent and quadrivalent cations. The molecule of EDTA has:
    a) Two donor atoms
    b) Four donor atoms
    c) Six donor atoms
    d) Eight donor atoms

42. Analytical concentration of aqueous solution of sulphuric acid c(H_2SO_4) is 0.005 mol/L. The pH of this solution is:
    a) 0.005
    b) 2
    c) 2.3

d) 5

43. The solubility product values Ks are $1x10^{-6}$ for calcium sulphate, $1.6x10^{-9}$ for calcium oxalate, $5x10^{-9}$ for calcium carbonate and $1.5x10^{-8}$ for barium oxalate. The most soluble precipitate is:
    a) Calcium sulphate
    b) Calcium carbonate
    c) Calcium oxalate
    d) Barium oxalate

44. An acetate buffer solution containing 0.5 mol/L acetic acid and 0.5 mol/L sodium acetate has pH 4.7. The acidity constant pKa of acetic acid:
    a) Is equal to 1.0
    b) Is equal to 0.025
    c) Is equal to 4.7
    d) Cannot be calculated from the data given

45. Titration of Br^- with a standard solution of silver nitrate belongs to:
    a) Oxidimetric titrations
    b) Acid-base titrations
    c) Bromatometric titrations
    d) Precipitation titrations

46. Determination of the melting point of organic compound is used to:
    a) Evaluate the polarity of organic compound
    b) Identify the organic compound
    c) Evaluate the solubility of the organic compound
    d) Evaluate the thermal stability of the organic compound

47. The degree of linearity of calibration curve in spectrophotometry is determined by the value of:
    a) Slope and intercept
    b) Number of calibration points
    c) Slope only
    d) Correlation coefficient

48. In thin-layer chromatography (TLC) the distance of the center of the zone of compound X from the starting line was 10.0 cm. The length of the chromatographic plate was 25 cm, the width of the plate was 5 cm and the distance of the front line of the mobile from the starting line was 20.0 cm. The Rf value (retardation factor) of the compound X:
    a) 0.50
    b) 0.40

c) 1.00
d) Cannot be calculated from the data given

49. Spectrophotometry in the UV region is using the spectral range of:
a) 400 – 800 nm
b) 200 – 400 nm
c) 200 – 800 nm
d) 100 – 800 nm

50. Typical gas chromatograph does not contain:
a) A flame-ionization detector
b) Thermostat
c) Peristaltic pump
d) Katharometer

51. Infra-red spectrophotometry belongs to optical methods based on:
a) The emission of electromagnetic radiation by thermally excited molecules
b) The emission of electromagnetic radiation by thermally excited atoms
c) Absorption of electromagnetic radiation by atoms
d) Absorption of electromagnetic radiation by molecules

52. Analytes separated by high-performance liquid chromatography (HPLC) are qualitatively characterized by the value of:
a) Retention time
b) Retardation factor
c) Peak height
d) Peak area

53. Raman spectroscopy of organic compounds is based on:
a) Absorption of infra-red radiation by the molecules of analyte
b) Interaction of high-energy photons with the chiral center of the molecule
c) Elastic scattering of polychromatic photons
d) Inelastic scattering of monochromatic photons

54. Secondary radiation emitted in photoluminescence methods has:
a) Higher energy and higher wavelength than the excitation radiation
b) Lower energy and higher wavelength than the excitation radiation
c) Higher energy and lower wavelength than the excitation radiation
d) Lower energy and lower wavelength than the excitation radiation

55. Organic analyte that can be analyzed by voltammetry must:
a) Have a chiral center in the molecule

b) Not have a negative or positive charge
c) Have an oxidizable or reducible functional group in the molecule
d) Be completely ionized in the background electrolyte

56. In potentiometric oxidimetric titration of Fe^{2+} with standard solution of potassium dichromate in acidic medium the appropriate indicator electrode is:
a) Platinum electrode
b) Silver electrode
c) Glass electrode
d) Saturated calomel electrode

57. Silver electrode:
a) Cannot be used as an indicator electrode in potentiometric titration of Cl^- with silver nitrate
b) Consists of silver metal and Hg_2Cl_2
c) Can be used as a reference electrode in any potentiometric titration
d) Can be used as indicator electrode in potentiometric titration of a mixture of Br- and I- with silver nitrate

58. The Nernst equation defining the dependence of potential E on the concentration of analyte does not contain the following parameter:
a) Diffusion coefficient D of the analyte
b) Thermodynamic gas constant R
c) Faraday constant F
d) Thermodynamic temperature T

59. Typical stationary phase used in thin-layer chromatography (TLC) is:
a) Silica-gel
b) Aluminium foil
c) Calcium carbonate
d) Starch

60. Isocratic elution in high-performance liquid chromatography (HPLC) means:
a) Separation of a mixture of isomers
b) Successive elution of analytes with two distinct mobile phases of different polarity
c) The use of a single mobile phase during the whole analysis
d) Separation of analytes under constant temperature of the separation column

61. The process of the escape of liquid from the tip of uninjured leaf is called
a) Transpiration
b) Osmosis
c) Guttation
d) Evaporation

62. Botanical name of bread (common) wheat is:
a) *Triticum aestivum*

b) *Digitalis purpurea*
c) *Ricinus communis*
d) *Nerium oleander*

63. Fungal cell wall is composed of:
    a) Cellulose
    b) Hemicellulose
    c) Chitin and cellulose
    d) Chitin

64. Which of the following plants is designated as living fossil?
    a) Cycas (*Cycas*)
    b) Basil (*Ocimum*)
    c) Pine (*Pinus*)
    d) Snowdrop (*Galanthus*)

65. Which plant family is important source of essential oils?
    a) Amaryllidaceae
    b) Lamiaceae
    c) Papaveraceae
    d) Lycopodiaceae

66. A vascular bundle in which phloem occurs on both sides of xylem is known as:
    a) Collateral vascular bundle
    b) Bicollateral vascular bundle
    c) Amphicribral (hadrocentric) vascular bundle
    d) Amphivasal (leptocentric) vascular bundle

67. Plants of family Solanaceae belong to the important toxic plants. Which types of secondary metabolites are responsible for their toxicity?
    a) Alkaloids
    b) Terpenes
    c) Cardioactive glycosides
    d) Amatoxins

68. The basic unit in systematic botany is:
    a) Family
    b) Genus
    c) Order
    d) Species

69. Photosynthetic pigments of plants are stored in:
    a) Mitochondria
    b) Vacuole
    c) Chloroplasts
    d) Cell nucleus

70. Vascular cambium produces:
    a) Primary medullary rays
    b) Secondary phloem and secondary xylem
    c) Secondary covering tissues
    d) Parenchymatous cells of medullary rays outside and secondary wood inside
71. Pharmaceutically important substance of natural origin morphine is produced by:
    a) Chelidonium majus
    b) Papaver somniferum
    c) *Ruta graveolens*
    d) *Vinca minor*

72. In the Z-Scheme of photosynthesis, electrons are transferred in which order?
    a) H_2O-PSII-cytochrome b6/f complex-PSI-NADP
    b) NADP-PSI-cytochrome b6/f complex-PSII-H_2O
    c) H_2O-cytochrome b6/f complex-PSII-PSI-NADP
    d) H_2O-PSI-cytochrome b6/f complex-PSII-NADP

73. The precursor in the biosynthesis of diterpenoids is:
    a) Squalene
    b) Phytoene
    c) Geranylgeranyldiphosphate
    d) Farnesyldiphosphate

74. Within primary metabolites belong:
    a) Artemisinine
    b) Vincamine
    c) Ibotenoic acid
    d) Pyruvate

75. Arteminisine is used in therapy of:
    a) Neurodegenerative diseases
    b) Oncological diseases
    c) Diabetes mellitus
    d) Malaria

76. The typical type of leaf venation in monocotyledonous plants is:
    a) Palmate
    b) Parallel
    c) Pinnate
    d) Dichotomous

77. What type of stomata is characterized by this description – stomata are surrounded by three subsidiary cells, one of them is significantly smaller than the others:
    a) Anomocytic
    b) Diacytic
    c) Anisocytic
    d) Paracytic

78. Radial vascular bundle can be found in:
    a) Primary structure of root

b) Secondary structure of root
c) Primary structure of stem
d) Structure of leaf

79. Sclerenchyma fibers are formed by:
a) Elongated cells with thin cell walls
b) Elongated cells with irregularly thickened cell walls
c) Isodiametric cells with regularly thickened cell walls
d) Elongated cells with regularly thickened cell walls

80. Sieve tubes can be found in:
a) Xylem of most Angiosperms
b) Phloem of most Angiosperms
c) Cortex of most Angiosperms
d) Pith of most Angiosperms

81. In all enzymes the active site:
a) Contains the substrate-binding site
b) Lies in a region of the primary sequence distant from the substrate-binding site
c) Contains a metal ion as a prosthetic group
d) Contains the amino acid side chains involved in catalyzing the reaction

82. Cell membranes typically:
a) Are about 90% phospholipid
b) Have both integral and peripheral proteins
c) Contain free carbohydrate such as glucose
d) Contain large amounts of triacylglycerols

83. A cell surface receptor:
a) Reacts only with molecules too large to cross the plasma membrane
b) When bound to its ligand could result in activation of an enzymatic cascade
c) Always open an ion channel when bound to its ligand
d) Must produce a second messenger when it binds to its ligand

84. All of the following tricarboxylic acid cycle intermediates may be added or removed by other metabolic pathways except:
a) Citrate
b) Fumarate
c) Isocitrate
d) Oxaloacetate

85. The inner mitochondrial membrane contains a transporter for:
a) NADH
b) Acetyl CoA
c) NADPH
d) ATP

86. 6-phosphofructo-1-kinase activity can be decreased by all of the following except:

a) ATP at high concentrations
b) AMP
c) Citrate
d) Low pH

87. Beta-oxidation of fatty acids:
a) Generates ATP only if acetyl CoA is subsequently oxidized
b) Is usually suppressed during starvation
c) Uses $NADP^+$
d) Occurs by a repeated sequence of four reactions

88. The high glucagon/insulin ratio seen in starvation:
a) Promotes mobilization of fatty acids from adipose stores
b) Leads to increased concentrations of ketone bodies in the blood
c) All of the above
d) None of the above

89. In biosynthesis of cholesterol:
a) 3-hydroxy-3-methyl glutaryl CoA (HMG CoA) is synthesized by mitochondrial HMG CoA synthase
b) HMG CoA reductase catalyzes the rate-limiting step
c) The conversion of mevalonic acid to farnesyl pyrophosphate proceeds via condensation of 3 molecules of mevalonic acid
d) Condensation of 2 farnesyl pyrophosphates to form squalene is freely reversible

90. Carbamoyl phosphate synthetase I:
a) Is a flavoprotein
b) Is controlled primarily by feedback inhibition
c) Requires N-acetyl glutamate as an allosteric effector
d) Requires ATP as an allosteric effector

91. Diabetes mellitus type I is characterized by:
a) Hyperglycemia
b) Hypoglycemia
c) Increased protein synthesis
d) Decreased plasma levels of ketoacids

92. In Parkinson's disease, the main affected neurotransmitter system is:
a) Dopamine
b) Serotonin
c) Norepinephrine
d) Acetylcholine

93. Phenylketonuria is caused by enzyme deficiency of:
a) Phenylalanine hydroxylase
b) Tyrosine hydroxylase
c) Tryptophan hydroxylase
d) Dopamine hydroxylase

94. The lipoprotein fraction exerting antiatherogenic properties is:

a) High-density lipoprotein
b) Low-density lipoprotein
c) Very-low-density lipoprotein
d) Lipoprotein (a)

95. Inflammatory mediators, which does NOT belong to the group of eicosanoids, are:
a) Cytokines
b) Thromboxanes
c) Leukotrienes
d) Prostaglandins

96. Which one of the following enzymes belongs to the antioxidant enzymes?
a) Superoxide dismutase
b) Myeloperoxidase
c) Xanthine oxidase
d) NADPH-oxidase

97. Hyperuricemia is caused by:
a) Increased production of uric acid
b) Decreased synthesis of uric acid
c) Decreased renal clearance of xanthine
d) Xanthine oxidase deficiency

98. Cushing's disease is characterized by:
a) Increased levels of cortisol
b) Decreased levels of cortisol
c) Increased levels of aldosterone
d) Decreased levels of aldosterone

99. Porphyria is a group of disorders affecting:
a) Synthesis of hem
b) Synthesis of glycosaminoglycans
c) Synthesis of uric acid
d) Synthesis of proteins

100. Protein p53:
a) Belongs to tumor-suppressor genes
b) Stimulates cell division and inhibits apoptosis
c) Belongs to (proto)oncogenes
d) Its cellular levels decrease during oxidative stress