**Department: B.Sc. Biotechnology**
**Class: S.Y. B.Sc**
**Semester: III**
**Subject: Biophysics**
**Sample Questions**

**Multiple choice Questions**

1. Image formed by plane mirror is_____.
   A. Real and erect
   B. Real and inverted
   C. Virtual and erect
   D. Virtual and inverted
2. Power of the lens is -40, its focal length is_____.
   A. 4m
   B. -40m
   C. -0.25m
   D. -25m
3. Which process gives the laser its special properties as an optical source?
   A. Dispersion
   B. Stimulated absorption
   C. Spontaneous emission
   D. Stimulated emission
4. _____ in the laser occurs when photon colliding with an excited atom causes the stimulated emission of a second photon.
   A. Light amplification
   B. Attenuation
   C. Dispersion
   D. Population inversion
5. Which of the following can be used in a vibrational analysis of structure?
   A. Laser
   B. Maser
   C. Quarts
   D. Electrical waves
6. Which of the following is an example of optical pumping?
   A. Ruby laser
   B. Helium-Neon laser
   C. Semiconductor laser
   D. Dye laser

7. Which of the following is a unique property of laser?

A. Directional
B. Speed
C. Coherence
D. Wavelength

8. Which is correct about laser
A. monochromatic
B. white
C. bi-chromatic
D. blue

9. When a parallel beam of incident light is reflected as a parallel beam in one direction, this reflection is known as_____.
A. Regular reflection
B. Diffuse reflection
C. Interference
D. Diffraction

10. Angle between incident ray and normal ray is called angle of_____.
A. reflection
B. refraction
C. incident
D. transmission

11. We see the image of our face when we look into the mirror. It is due to_____.
A. Interference
B. Diffraction
C. Polarization
D. Reflection

12. Which of the following components of a monochromator is the dispersing element?
A. The collimating l
B. The entrance slit
C. The diffraction grating
D. Prism

13. Beer's Law states that_____.
A. absorbance is proportional to both the path length and concentration of the absorbing species
B. absorbance is proportional to the log of the concentration of the absorbing species
C. absorbance is equal to P0 / P
D. Absorbance is equal to p/p

14. Which of the following statements is false about single beam absorption instruments?
A. Tungsten bulb is used as a source
B. Beam splitter is used to get parallel beam
C. Test tube is used as sample holder

D. Photovoltaic cell as detector

15. Which of the following statement is false about double beam absorption instruments?
    A. It is similar to single beam instruments except two beams are present
    B. Tungsten bulb is used as a source
    C. Reference beam must have a higher intensity than sample beam
    D. Both the beams after they pass through respective samples are compared
16. Which of the following is not an application of colorimeter?
    A. Paints
    B. Inks
    C. Cosmetics
    D. Composition detection
17. In photometers, the readings of the specimen are initially obtained in the form of which of the following parameters?
    A. Transmittance
    B. Absorption
    C. Wavelengths
    D. Volume
18. In the diagram of single beam photometer given below, identify the component that is not marked_____.
    A. Monochromator
    B. Absorption filter
    C. Sample holder
    D. Interference filter
19. Which of the following is a source used in spectroscopy?
    A. LASER
    B. Tube light
    C. Sodium vapor lamp
    D. Tungsten lamp
20. Which of the following is used in electron microscope?
    A. electron beams
    B. magnetic fields
    C. light waves
    D. electron beams and magnetic
21. The unit of power of lens is_____.
    A. Metre
    B. Centimeter
    C. Diopter
    D. $M^{-1}$
22. Which of the following are true for electron microscopy?
    A. specimen should be thin and dry
    B. image is obtained on a phosphorescent screen

C. electron beam must pass through evacuated chamber
D. specimen should be thin and dry image is obtained on a phosphorescent screen and electron beam must pass through evacuated chamber

23. Degree of scattering in transmission electron microscope is a function of _____
A. wavelength of electron beam used
B. number of atoms that lie in the electron path
C. number and mass of atoms that lie in the electron path
D. mass of atoms that lie in the electron path

24. Which among the following helps us in getting a three-dimensional picture of the specimen?
A. Transmission Electron Microscope
B. Scanning Electron Microscope
C. Compound Microscope
D. Simple Microscope

25. The secondary electrons radiated back in scanning microscope is collected by?
A. specimen
B. anode
C. vacuum chamber
D. cathode

26. Where do we obtain the magnified image of the specimen in SEM?
A. cathode ray tube
B. phosphorescent screen
C. anode
D. scanning generator

27. Which of the following techniques are used in Transmission Electron Microscopy (TEM) for examining cellular structure?
A. Negative-Staining
B. Shadow Casting
C. Ultrathin Sectioning
D. Negative-Staining, Shadow Casting, Ultrathin Sectioning, Freeze-Etching

28. The electrons of the Scanning Electron Microscope are reflected through_____.
A. glass funnel
B. specimen
C. metal-coated surfaces
D. vacuum chamber

29. Tungsten lamp filament has required how much temperature?
A. 2000k
B. 3000k
C. 4000k
D. 5000k

30. Which radiation source has electrode in its construction ?
   A. Tungsten lamp
   B. Hydrogen discharge lamp
   C. Xenon Discharge Lamp
   D. Mercury lamp

31. I n fluorescence microscopy, which of the following performs the function of removing all light except the blue light?
   A. Exciter filter
   B. Barrier filter
   C. Dichroic mirror
   D. Mercury arc lamp

32. What is the minimum distance for the eye to focus any object?
   A. 11 cm
   B. 25 cm
   C. 32 cm
   D. 4 2 cm

33. Resolving power of a microscope is a function of _____
   A. Wavelength of light used
   B. Numerical aperture of lens system
   C. Refractive index
   D. Wavelength of light used and numerical aperture of lens system

34. Which part of the light microscope controls the intensity of light entering the viewing area?
   A. Coarse adjustment screw
   B. Fine adjustment screw
   C. Diaphragm
   D. Condenser lens

**Unit II**

35. Sound waves are produced by_____.
   A. linear motion
   B. circular motion
   C. vibrating bodies
   D. transitional motion

36. With the increase in temperature, heat will be_____.
   A. increase
   B. constant
   C. decrease
   D. double

37. Heat bring _____ change
   A. Physical
   B. chemical

C. reversible
D. periodic

38. The process of transfer of heat in liquids & gases is called_____.
A. Conduction
B. Radiation
C. Convection
D. Absorption

39. It is the process of heat transfer from a hot body to a colder body without heating the space between the two is called_____.
A. Conduction
B. Radiation
C. Convection
D. Absorption

40. No medium is required for transfer of heat by the process of _____.
A. absorption
B. Conduction
C. Radiation
D. Convection

41. The thermocouple circuit which is used to measure temperature works on ____.
A. See beck effect
B. Peltier effect
C. Thomson effect
D. none of the above

42. Which of the following is chosen as a standard thermometric substance?
A. Gas
B. Thermocouple
C. Electric resistance
D. Mercury

43. Thermometer that is best suited for measuring rapidly changing temperatures is_____.
A. Constant-volume gas thermometer
B. resistance thermometer
C. Thermocouple
D. Mercury-in-glass thermometer

44. A thermocouple thermometer can measure very hot temperatures of up to_____.
A. 3000 °C
B. 2000 °C
C. 1500 °C
D. 2300 °C

45. An instrument that can be used at a distance, which allows scientist to work the instrument at a safer place is called_____.

A. thermocouple thermometer
B. manometer
C. barometer
D. infrared thermometer

46. To find the speed of sound, we use the relation_____.

A. $v = f\lambda$
B. $f = v\lambda$
C. lambda = fv
D. v = f + lambda;

47. The sound can travel in air when_____.
A. a Particles of medium travel from one place to another
B. There is no moisture in the atmosphere
C. Disturbance travel from one place to another
D. Both particles as well as disturbance travel from one place to another

48. Sound is a kind of_____.
A. work
B. energy
C. force
D. pressure

49. The hearing range of human ear is _____.
A. 20 Hz to 20,000 Hz
B. less than 20 Hz
C. more than 20,000 Hz
D. 20 Hz to 25,000 Hz

50. Pitch of sound is determined by its_____.
A. frequency
B. speed
C. amplitude
D. loudness

51. The sound in the audible range is called_____.
A. ultrasonic sound
B. sonic sound
C. subsonic sound
D. light sound

52. The maximum displacement of a body from its mean position is called_____.
A. amplitude
B. oscillation
C. periodic motion
D. frequency

53. The intensity level of the rustling of leaves is_____.

A. 25 dB
B. 0 dB
C. 10 dB
D. 100 dB

54. Sound is produced by_____.

A. Non-Vibrating objects only
B. Vibrating and non -vibrating
C. Vibration has no relation to sound
D. Vibrating objects only

55. sound waves are produced by_____.

A. linear motion
B. circular motion
C. vibrating bodies
D. translational motion

56. The sensation of sound persist in our brain for about_____.

A. 0.001s
B. 0.2s
C. 0.1s
D. 10s

57. The source of a sound moves away from the listener. The listener has the impression that the source is _____.

A. higher in amplitude
B. lower in pitch
C. lower in velocity
D. higher in tone

58. For which of the following is magnetic susceptibility negative?

A. Paramagnetic and Ferromagnetic materials
B. Paramagnetic Materials only
C. Ferromagnetic Materials only
D. Diamagnetic Materials

59. Which of the following materials is the most suitable for making a permanent magnet?

A. Soft Iron
B. Nickel
C. Copper
D. Steel

60. A sensitive magnetic field instrument can be effectively shielded from the external magnetic field by placing it inside which of the following materials?

A. Plastic Material
B. Teak Wood

C. Soft Iron of high permeability
D. A metal of high conductivity

61. Which of the following statements is true about magnetic field intensity?
A. Magnetic field intensity is the number of lines of force crossing per unit volume.
B. Magnetic field intensity is the number of lines of force crossing per unit area.
C. Magnetic field intensity is the magnetic induction force acting on a unit magnetic pole.
D. Magnetic field intensity is the magnetic moment per unit volume.

62. What happens to the magnetic needle kept in a non-uniform magnetic field?
A. It experiences force but not torque
B. It experiences torque but not force
C. It experiences both force and torque
D. It neither experiences force nor torque

63.Which of the following is a diamagnetic material?
A. Sodium
B. Calcium
C. Oxygen (at STP)
D. Nitrogen (at STP)

64. Materials in which magnetization persists even after the field has been removed are called _____.
A. Diamagnetic
B. Paramagnetic
C. Soft Ferro magnets
D. Hard Ferro magnets

65. At high temperature a Ferro magnet becomes _____.
A. Diamagnetic
B. Paramagnetic
C. Hard Ferro magnet
D. Soft Ferro Magnet

66. Which one of the following is not a unit of dynamic viscosity?
A. Pa-s
B. N-s/m2
C. Poise
D. Stokes

67. Beer's law states that the intensity of light decreases with respect to _____.
A. Concentration
B. Distance
C. Composition
D. Volume

**UNIT III**

68. In electrophoresis, DNA will migrate towards_____.
    A. cathode or positive electrode
    B. anode or negative electrode
    C. cathode or negative electrode
    D. anode or positive electrode
69. The speed of migration of ions in an electric field depends on_____.
    A. a magnitude of charge and mass of molecules
    B. magnitude of charge and shape of molecules
    C. shape and size of the molecule
    D. magnitude of charge, shape and mass of molecules
70. Electrophoresis cell or electrophoresis apparatus consists of_____.
    A. a power pack and electrophoresis unit
    B. Electrophoresis unit and DNA separator
    C. buffer chamber and Electrophoresis unit
    D. Gel, buffer chamber and power pack
71. The most common type of gel used for DNA separation is_____.
    A. Agar
    B. Polyacrylamide
    C. Agarose
    D. Gel
72. Which is the technique suited for the separation of large DNA fragments_____.
    A. AGE
    B. PAGE
    C. PFGE
    D. SDS-PAGE
73. What is the role of SDS in SDS-PAGE?
    A. protein denaturing and imparting net negative charge
    B. imparting overall negative charge to the protein
    C. imparting equal mass to all proteins
    D. protein unfolding and imparting net positive charge
74. In SDS-PAGE, separation is based on_____.
    A. molecular weight
    B. shape
    C. charge
    D. size
75. The electrophoresis technique that used isoelectric focusing is_____.
    A. AGE
    B. PFGE
    C. 2D-PAGE
    D. SDS-PAGE

76. Which is not a type of zone electrophoresis?
    A. Gel electrophoresis
    B. paper electrophoresis
    C. Cellulose active electrophoresis
    D. Micro electrophoresis
77. Which technique separates charged particles using electric field?
    A. Hydrolysis
    B. Electrophoresis
    C. Protein synthesis
    D. Protein denaturing
78. Which of the following statements is true about migration of biomolecules?
    A. The rate of migration is directly proportional to the resistance of medium
    B. Rate of migration is directly proportional to current
    C. Low voltage is used for separation of high mass molecules
    D. Rate of migration is inversely proportional to current
79. What does the electrophoresis apparatus consist of?
    A. Gel, buffer chamber and fire pack
    B. Buffer chamber and electrophoresis unit
    C. Electrophoresis unit and gel separator
    D. Power pack and electrophoresis unit
80. Which technique separates charged particles using electric field?
    A. Hydrolysis
    B. Electrophoresis
    C. Protein synthesis
    D. Protein denaturing
81. When is electrophoresis not used?
    A. Separation of proteins
    B. Separation of amino acids
    C. Separation of Lipids
    D. Separation of nucleic acids
82. What cannot be a reason for using electrophoresis?
    A. Comparing two sets of DNA
    B. Organizing DNA by shape of backbone
    C. Organizing DNA fragments from largest to smallest
    D. Organizing DNA in order we can see
83. Which of the following cannot be used for the separation of nucleic acids?
    A. SDS – PAGE
    B. PAGE
    C. Northern blotting
    D. PAGE

84. The polymerization of the gel used in PAGE occurs between polyacrylamide and _____.

A. N, N – acrylamide
B. Bisacrylamide
C. N – methylene acrylamide
D. N, N – methylene bisacrylamide

85. If DNA is digested by endonucleases in four sites giving rise to fragments of which two are equal in length how many bands would be seen after electrophoresis?

A. 3
B. 4
C. 5
D. 6

86. The fluorescent dye such Ethidium is used for visualizing DNA. How do ethidium binds to DNA?

A. Stacked between histone molecules
B. Binds to the nucleotide base
C. Intercalated between the stacked bases
D. Binds to the phosphodiester backbone

87. Pulse field gel electrophoresis separates DNA molecules of size _____.

A. 10 – 20 bp
B. 20 – 30 Kb
C. 30 – 50 Kb
D. 40 – 50 bp

88. For the separation of DNA by electrophoresis, which of the following method is commonly used?

A. Agarose – vertical
B. Agarose – horizontal
C. PAGE – vertical
D. PAGE – horizontal

89. Agarose can be extracted from which of the following?

A. Gracilaria esculentus
B. Lycazusican esculentum
C. Ficum benghalensis
D. Agrostis stolonifera

90. Electrophoresis cannot be used to separate _____.

A. DNA
B. RNA
C. Amino acid
D. Protein

91. Which of the following is not a character of polyacrylamide gel?

A. Inert
B. Ionic strength
C. Stable over a wide range of pH
D. Separate upto a few 100 bp of DNA

92. To remove negatively charged molecules through matrix of agarose, nucleic acid molecules are separated by applying_____.
A. electric current
B. electric field
C. magnetic field
D. UV radiations

93. Agarose is composed of long unbranched chains of uncharged_____.
A. proteins
B. vitamins
C. carbohydrates
D. RNA

94. For the better resolution of minute protein bands in SDS-PAGE, which of the following staining method is advised?
A. A.CBB Staining
B. Silver staining
C. Avidin staining
D. positive staining

95. In isoelectric focusing, proteins are separated on the basis of their_____.
A. relative content of positively charged residue only
B. relative content of negatively charged residue only
C. size
D. relative content of positively and negatively charged residue

96. The role of urea in PAGE separation of DNA is to _____.
A. Act as anion
B. Act as cation
C. Helps to denature the DNA
D. Provide buffer stability of the gel

97. Function of β-mercaptoethanol in SDS-PAGE is_____.
A. To give negative charges to amino acids in the proteins
B. For the oxidation of disulfide bonds in the proteins
C. For breaking hydrogen bonds in the proteins
D. For the reduction of disulfide bonds in the proteins

98. In SDS-PAGE of protein separation, one SDS molecule will binds to _____.
A. Every amino acid
B. Every two amino acids
C. Every three amino acids

D. Every Four amino acids

99. Glycerol is added to protein samples before they are loaded to the 'wells' of PAGE. The function of glycerol is to _____.

A. Stabilize protein structure
B. Provide density to the sample
C. Helps to bind SDS to the protein
D. Helps to reduce disulfide bonds by β-mercaptoethanol

100. Which of the following will migrate faster? The condition is the molecular weight of the following is equal_____.

A. Nicked circular DNA
B. Double stranded DNA
C. Single stranded DNA
D. Supercoiled circular DNA