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# DF-1672

## Second Year B. Sc. (Biotechnology)
## (Sem. III) (CBCS) Examination
### March / April - 2016
## Core - I Course - I : Instrumentation & Techniques - I
### (New Course)

Time : **2** Hours] [Total Marks : **50**

**Instructions :**

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
**Fillup strictly the details of ☛ signs on your answer book.**

Name of the Examination :

☛ Second Year B. Sc. (Biotechnology) (Sem. III) (CBCS)

Name of the Subject :

☛ Core - I Course - I : Instru. & Techniques - I (New)

☛ Subject Code No. : 1 6 7 2 ☛ Section No. (1, 2,.....) : NIL

Seat No. :

Student's Signature

(2) This exam contains 50 multiple choice questions, each worth I mark.

(3) Choose only ONE most appropriate answer per question.

(4) Do not crease or fold the answer sheet.

***O.M.R. Sheet* ભરવા અંગેની અગત્યની સૂચનાઓ આપેલ *O.M.R. Sheet*ની પાછળ છાપેલ છે.**

***Important instructions to fillup O.M.R. Sheet is given on back side of the provided O.M.R. Sheet.***

1 What is meant by tendency of particles in suspension to settle out of the fluid in which they are entrained ?

(A) Centrifugation
(B) Electrophoresis
(C) Sedimentation
(D) Rotation

2 Which force is experienced by biological particles moving through a viscous medium ?

(A) Centrifugal force
(B) Frictional force
(C) Electrical force
(D) None

3 Give the relationship between applied centrifugal field (G) and angular velocity $\omega$.

(A) $G = \omega^2 r$
(B) $G = \omega r$
(C) $G = \omega^2 r^2$
(D) $G = \omega r^2$

4 What is the tube angle in near vertical rotors ?

(A) $14^o$ to $40^o$
(B) $10^o$ to $15^o$
(C) $7^o$ to $10^o$
(D) $0^o$ to $10^o$

5 What are the criteria for successful isopycnic separation ?

(A) Density of the sample particle must fall within the limits of the gradient densities.
(B) Any gradient length is acceptable.
(C) The run time must be sufficient for the particles to band at their isopycnic point.
(D) All

6 What is the applied centrifugal field at a point equivalent to 5 cm from the centre rotation and an angular velocity of 3000 rad $s^{-1}$ ?

(A) $4.5 \times 10^7$ cm $s^{-2}$
(B) $4.5 \times 10^7$ m $s^{-2}$
(C) $4.5 \times 10^7$ cm $min^{-2}$
(D) $1.5 \times 10^7$ cm $s^{-2}$

7 Microscopy is refers to the use of _____ or _____ to magnify objects.
(A) Electron, proton
(B) Light, electron
(C) Neutron, light
(D) Proton, light

8 General principles involved in light and electron microscopy include
(A) Wavelength of radiation
(B) Magnification of an image
(C) Resolving power and the instrument
(D) All

9 Contrast refers to_____.
(A) Differences in intensity between two objects
(B) Differences in intensity between incident light and transmitted light.
(C) Differences in intensity between two objects, incident light and transmitted light
(D) None of given

10 Which of the following is not the component of microscope ?
(A) Condenser system
(B) Specimen stage
(C) Objective lens system
(D) Detector

11 When it can be said that light rays are in phase ?
(A) When their crests and troughs are aligned
(B) When their crests and troughs are not aligned
(C) When all rays are parallel
(D) When rays are perpendicular

12 What is used to decrease the numerical aperture ?
(A) Iris diaphragm
(B) Dark field stop
(C) Aperture stop
(D) Phase ring

13 One curie = ?
(A) $3.7 \times 10^{10}$ disintegrations per minute
(B) $3.7 \times 10^{10}$ disintegrations per second
(C) $2.22 \times 10^{12}$ disintegrations per second
(D) $3.7 \times 10^{15}$ disintegrations per minute

14 Which of the following has least penetrating power ?
(A) Alpha particles
(B) Beta particles
(C) Gamma rays
(D) X-rays

15 What can be used to stop alpha particles ?
(A) 0.01 mm thick aluminium foil
(B) 1 cm thick aluminium sheet
(C) 25 mm thick lead plate
(D) Thick concrete block

16 What are gamma rays ?
(A) Electromagnetic radiation with shorter wavelength
(B) Fast moving electron
(C) Fast moving Helium nucleus
(D) Fast moving proton

17 Choose the correct order of the ability to induce ionization in decreasing manner.
(A) $\alpha > \beta > \gamma$
(B) $\beta > \gamma > \alpha$
(C) $\gamma > \beta > \alpha$
(D) All

18 Which gas is generally filled in Geiger counter ?
(A) Nitrogen
(B) Oxygen
(C) Water Vapour
(D) Helium

19 Autoradiography can be used _____.
(A) To determine the sites of $^{45}Ca$ concentrations in growing bone tissue
(B) To know the relative distribution of $^{32}P$
(C) To demonstrate localization of $^{3}H$-labelled thymidine
(D) All given

20 In which fields radioisotopes are used ?
(A) In clinical field
(B) In various research laboratories
(C) In industrial microbiology
(D) In all given fields

21 What is the velocity of electromagnetic radiation in space ?

(A) $3 \times 10^8$ $ms^{-1}$

(B) $3 \times 10^8$ $cms^{-1}$

(C) $3 \times 10^8$ m $minutes^{-1}$

(D) $3 \times 10^8$ cm $minutes^{-1}$

22 What do you meant by frequency ?

(A) The number of waves that passing through a given point per second

(B) The distance between two successive wave crests

(C) The number of waves per unit length

(D) None of these

23 Which of the following factors can influence the absorption of light ?

(A) The basic ability of the absorbing substance to absorb

(B) The amount of absorbing substance in the light path

(C) Path-length

(D) All

24 Which of the following is the correct statement for Lambert's law ?

(A) Light absorbed is directly proportional to concentration of absorbing solute in the solution.

(B) Light absorbed by a solution is directly proportional to the length of the light path

(C) Light absorbed by a solution is inversely proportional to the length of the light path

(D) Light absorbed is inversely proportional to concentration of absorbing solute in the solution

25 Which of the following solution will obey Beer's Law ?

(A) 0.1 M $CuSo_4$ solution

(B) 1.0 M $CuSO_4$ solution

(C) 0.001 M $CuSO_4$ solution

(D) All

26 Which of the following law cannot be verified by colorimeter ?

(A) Beer's law

(B) Combined law

(C) Lambert's law

(D) None of these

27 Which of the following is correct ?

(A) $v = \frac{\lambda}{c}$

(B) $v = \frac{c}{\lambda}$

(C) $\lambda = v \times c$

(D) $\lambda = hc$

28 Which of following is correct with respect to Beer's Law ?

(A) Not applicable for highly concentrated solution

(B) Applicable to highly concentrated solution

(C) Not applicable for diluted solution

(D) Not applicable to coloured solution

29 When the source of radiation extends into the ultraviolet region of the spectrum; the instrument is known as _____.

(A) Spectrophotometer

(B) Colorimeter

(C) Chromatograph

(D) Galvanometer

30 Which of the following can be used as the source of spectrophotometer ?

(A) All

(B) Deuterium lamp

(C) Hydrogen discharge lamp

(D) Tungsten halogen lamp

31 Why is it generally preferable to use absorbance as a measure of absorption rather than % transmittance ?
(A) Becuse %T cannot be measured as accurately as absorbance
(B) Because %T is dependent on the power of the incident radiation
(C) Because absorbance is proportional to the concentration of the analyte, whereas %T is not
(D) None

32 Cuvettes are made from _____ glass.
(A) Simple glass (B) Borosilicate glass
(C) Safety glass (D) Toughened glass

33 The effect of interference of $CO_2$ and $H_2O$ on absorbance can be removed much more by using _____.
(A) Double beam spectrophotometer
(B) Colorimeter
(C) Single beam spectrophotometer
(D) Conductometer

34 Which of the following are the characteristics of fluorescence ?
(A) Fluorescence is instantaneous
(B) Emission occurs within a nanosecond
(C) Fluorescence depends upon nature of solvent
(D) All

35 Re-emission of excess readiation in fluorescence takes place within _____.
(A) $10^{-4}$ to $10^{-8}$ second of absorption
(B) $10^{-8}$ to $10^{-4}$ second absorption
(C) $10^{-4}$ to 20 seconds of absorption
(D) 1 to 2 minutes

36 Identify correct statement from following :
(A) The life time of phosphorescence is much longer than fluorescence
(B) The life time of phosphorescence is much shorter than fluorescence
(C) The excited states are stable
(D) Fluorescence is delayed luminescence

37 In triplet state of excitation spin of electrons _____
(A) Parallel (B) Opposite
(C) Cannot be said (D) Paired

38 What will be the net spin in singlet excited state ?
(A) None of these (B) Nonzero
(C) Negative (D) Zero

39 What is the value of absorbance for the 0.25 molar solution having path length 0.01 m ? (Molar absorptivity = 0.4)
(A) 0.1 (B) 0.2
(C) 0.15 (D) 0.22

40 One given coloured solution has absorbance 0.06, molar extinction coefficient of $6 \times 10^3$ at 270 nm and it is taken in 0.1 cm cell. What will be the concentration of this solution ?
(A) $1.0 \times 10^{-1}$ M (B) $1.0 \times 10^{-2}$ M
(C) $1.0 \times 10^{-3}$ M (D) $1.0 \times 10^{-4}$ M

41 What do you meant by potentiometry ?
(A) Measurement of pH
(B) Measurement of electrical conductivity
(C) Measurement of electrochemical potential
(D) Measurement of reduction potential

42 What are the requirements for the satisfactory reference electrode ?
(A) Stability
(B) Reproducibility
(C) Reversibility
(D) All of these

43 Which types of reference electrodes are known ?
(A) Aqueous
(B) Non aqueous
(C) Pseudo reference electrode
(D) All

44 Which of the following are the components of reference electrode ?
(A) An internal element
(B) Filling solution
(C) A contact frit
(D) All

45 Which solution is filled in calomel electrode ?
(A) KCl solution (B) NaCl solution
(C) $Hg_2Cl_2$ solution (D) Liquid mercury

46 Choose correct option with respect of calomel electrode.
(A) $Hg_2Cl_2 + 2e \rightarrow 2Hg + 2Cl^-$
(B) $HgCl_2 + 2e^- \rightarrow Hg + 2Cl^-$
(C) $Hg + 2Cl^- \rightarrow HgCl_2 + 2e^-$
(D) $2Hg + 2Cl^- \rightarrow HgCl_2 + 2e^-$

47 Why Silver-Silver electrode is widely used ?
(A) It is simple to construct
(B) It is stable
(C) It is non-toxic
(D) Because of all of these

48 How much potential is developed by Silver-Silver electrode, when saturated KCl solution is filled ?
(A) 0.199 Volt (B) 0.299 Volt
(C) 0.000 Volt (D) 1.000 Volt

49 Which of the following are the components of pH meter ?
(A) Reference electrode
(B) pH measuring electrode
(C) None
(D) Reference electrode and pH measuring electrode

50 What is the pH range for the use of fluoride selective electrode ?
(A) 3.5 to 8.0 (B) 0.0 to 7.0
(C) 7.0 to 14.0 (D) 0.0 to 14.0