1. A body falling from rest describes distances S1 , S2 and S3 in the first, second and third seconds of its fall then the ratio S1 : S2 : S3 is

   A. 1: 1: 1 B. 1: 3: 5 C. 1: 2: 3 D. 1: 4: 9

2. The primary winding of a transformer has 50 turns and its secondary has 500 turns. If primary is connected to a.c. supply of 20V-50Hz, then the secondary will have an

   A. 200V – 50 Hz B. 200V – 500 Hz C. 2V – 5 Hz D. 2V – 50 Hz

3. A lift is moving upward with increasing speed with acceleration 'a'. The apparent weight will be

   A. Less than the actual weight

   B. more than the actual weight and have a fixed value

   C. more than the actual weight which increases as long as velocity increases

   D. zero

4. If a vector $2i + 3j + 8k$ is perpendicular to the vector $4j - 4i + \alpha k$ then the value of α is

   A. ½ B. - ½ C. 1 D. -1

5. A satellite is in an orbit around the earth. If its kinetic energy is doubled then

   A. It will maintain its path B. It will fall on the earth

   C. It will rotate with a great speed D. It will escape out of the earth's gravitational field

6. According to the Maxwell, changing electric field gives,

   A. an emf B. electric current C. pressure gradient D. magnetic field

7. A beam of light consisting of two wavelengths 6500 A° and 5200 A° is used to obtain interference fringes in Young's double slit (YDS) experiment. Suppose m^{th} bright fringe due to 6500A° coincides with n^{th} bright fringe due to 5200 A° at a maximum distance from the central maximum. Then

   A. m= 4, n=5 B. m=10, n=8 C. m=8, n=10 D. m=5, n=4

8. In refraction, light waves are bent on passing from first medium to second medium because in the second medium

A. Frequency is different
B. Co-efficient of elasticity is different
C. Amplitude is different
D. Speed is different

9. If kinetic energy increases by 4%, then momentum will increase by

A. 1.5%
B. 9%
C. 3%
D. 2%

10 A wave is represented by the equation $y = A \sin(10\pi x + 15\pi t + \pi/3)$, where x is in meters and t in second. The expression represents

A. A wave travelling in the -ve x direction with a velocity 1.5 m/s
B. A wave travelling in the +ve x direction with a velocity 1.5 m/s
C. A wave travelling in the +ve x direction having a wavelength 0.2m
D. A wave travelling in the -ve x direction having a wavelength 2.0m

11 Two balls A and B having masses 1 kg and 2 kg moving with speeds 11 ms^{-1} and 2 ms^{-1} respectively in opposite directions, collide head on. After collision body A moves with a speed of 1 ms^{-1} in the same direction, then which of the following is incorrect ?

A. The velocity of B after collision is 3ms^{-1}, opposite to the direction before collision
B. The velocity of B after collision is 3ms^{-1}, in the direction before collision
C. The impulse of the force between the two balls is 10 Ns
D. The Co-efficient of restitution is 0.15

12 A wire of diameter 1mm breaks under a tension of 1000 N. Another wire, of same material as that of the first one, but of diameter 2mm breaks under a tension of

A. 500 N
B. 100 N
C. 1000 N
D. 4000 N

13 A bucket full of hot water is kept in a room and it cools from 90° C to 80° C in t1 minutes 80° C to 70° C in t2 minutes and from 70° C to 60° C in t3 minutes, then

A. $t1 = t2 = t3$
B. $t1 > t2 > t3$
C. $t1 < t2 < t3$
D. $t1 < t2 > t3$

14 The magnetic field dB due to a small current element dl at a distance I and element carrying current I is

A. $\vec{dB}=\frac{\mu_0}{4\pi} I(\frac{\vec{dl}\times\vec{r}}{\vec{r}})$

B. $\vec{dB}=\frac{\mu_0}{4\pi} I^2(\frac{\vec{dl}\times\vec{r}}{\vec{r}})$

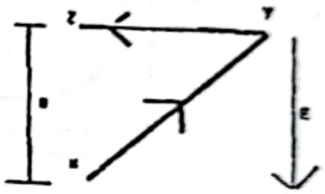
C. $\vec{dB}=\frac{\mu_0}{4\pi} I^2(\frac{\vec{dl}\times\vec{r}}{r^2})$

D. $\vec{dB}=\frac{\mu_0}{4\pi} I(\frac{\vec{dl}\times\vec{r}}{r^3})$

15 In an experiment on photo electric effect stopping potential is 1.0 V when light of wavelength 6400Å is incident on the emitting surface. The stopping potential is 3.2 V for light of wavelength 3200 Å. The work function of emitting metal surface is

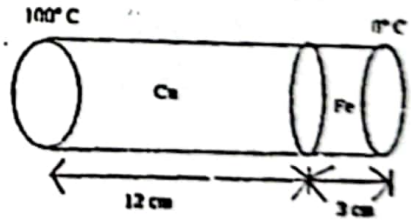
A. 5.4 eV B. 2.2 eV C. 1.2 eV D. None of these

16 The amount of work done in moving a unit positive charge in uniform electric field E along the path xyz is



A. Zero B. Ea C. Ea / 2 D. Ea / 4

17 The coefficient of thermal conductivity of copper may be assumed to be 6 times that of iron. In the composite cylindrical bar as shown in figure, the temperature at the junction of copper and iron will be



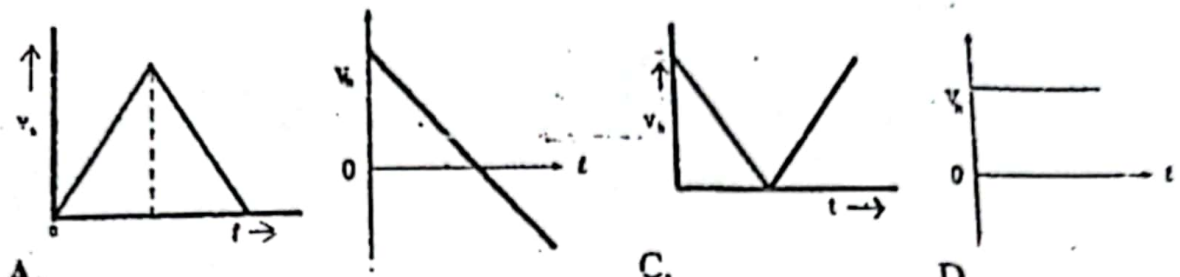
A. 20° C B. 40° C C. 60° C D. 80° C

18 What is the respective number of α and β particles emitted in the following radioactive decay ?

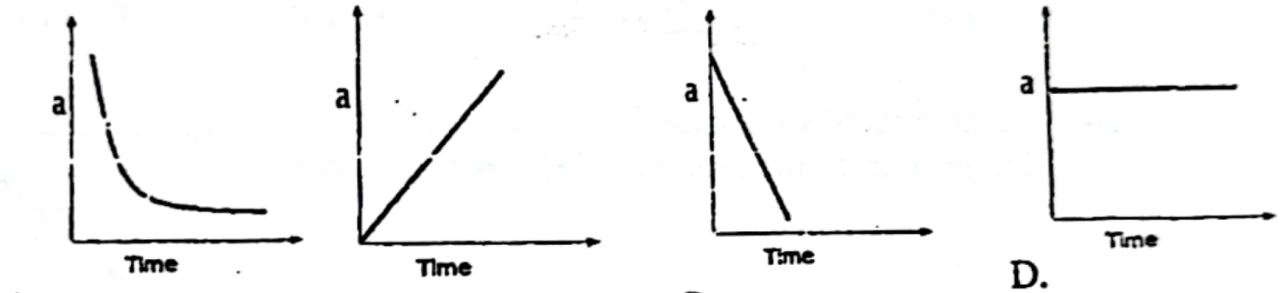
$$_{92}U^{238} \dashrightarrow {}_{82}Pb^{206}$$

A. 8 and 8 B. 8 and 6 C. 6 and 8 D. `6 and 6

19 A projectile is launched with the velocity v that makes an angle θ (θ < 90°) with the horizontal. Which velocity-time graph shows the variation in its horizontal velocity (v_h) with time ?



20 The distance travelled by a body moving along a line in time t is proportional to t^2. The acceleration time (a,t) graph for the motion of the body will be



21 Dimensions of $\frac{1}{\mu_0 \varepsilon_0}$ where symbols have their usual meanings, are

A. $[L^{-1}T]$ B. $[L^2T^2]$ C. $[I^2T^{-2}]$ D. $[LT^{-1}]$

22 A radioactive material has a half life of 10 days. What fraction of the material would remain after 30 days

A. 0:5 B. 0.25 C. 0.125 D. 0.33

23 The wavelength of a 1 keV photon is 1.24×10^{-9} m. What is the frequency of 1 MeV photon?

A. 1.24×10^{15} B. 2.4×10^{20} C. 1.24×10^{18} D. 2.4×10^{23}

24 If a diamagnetic substance is brought near the north or the south pole of a bar magnet, it is

A. repelled by the north pole and attracted by the south pole

B. attracted by the north pole and repelled by the south pole

C. attracted by both the poles

D. repelled by both the poles

25 A heater coil is cut into two equal parts and only one part is now used in the heater. The heat generated will now be

A. doubled B. Four times C. One fourth D. halved

26 A water drop of radius 10^{-2} m is broken into 1000 equal droplets. Find the gain in surface energy. (Surface tension of water = 0.075 N/m)

A. 2.3×10^{-7} J B. 3.9×10^{-6} J C. 5.3×10^{-5} J D. 8.5×10^{-4} J

27 Find the minimum thickness of a film which will strongly reflect the light of wavelength 600nm. The refractive index of the material of the film is 1.25

A. 180 nm B. 120 nm C. 90 nm D. 60 nm

28 Find the maximum energy of a beta particle in the following decay

$$^{176}Lu \dashrightarrow {}^{176}Hf + e + \nu_e$$

A. 1.18 MeV B. 1.43 MeV C. 1.92 MeV D. 2.12 MeV

29 The angle between electric field and equipotential surface is

A. 0° always B. 0° to 90° C. 90° always D. 0° to 180°

30 In the phenomenon of diffraction of light, when blue light is used in the experiment instead of red light, the width of the central maxima will

A. increase B. decrease C. remain same D. None of the above

31 Which of the following contains isoprene units?

A. Natural rubber B. Nylon-6,6 C. Polyethylene D. Dacron

32 The process involving heating of rubber with sulphur is called

A. Galvanisation B. Vulcanisation C. Sulphonation D. Bessemerisation

33 Which of the following compounds on treatment with $NaNO_2$ / HCl and then coupled with Phenol produces p-hydroxyazobenzene ?

A. Nitrobenzene B. Azobenzene C. Aniline D. Phenol

34 Gabriel phthalamide reaction is used for preparation of

A. Primary aromatic amines B. Secondary amines

C. Primary aliphatic amines D. Tertiary amines

35 The major product of nitration of benzoic acid is

A. 3-Nitro benzoic acid B. 4- Nitro benzoic acid

C. 2- Nitro benzoic acid D. 2,4 – Dinitro benzoic acid

36 If formaldehyde and KOH are heated, then we get,

A. Methane B. Methylalcohol C. Ethyl formate D. Acetylene

37 The reaction, $R X + R` O^- Na^+ \dashrightarrow R - O - R` + NaX$ is called

A. Wurtz reaction B. Williamson's synthesis

C. Kolbe's reaction D. Hofmann bromid reaction

38 'Wood Spirit' is common name of

A. Methyl alcohol B. Ethyl alcohol C. Amyl alcohol D. Benzyl alcohol

39 Which of the following alkyl halides is hydrolysed by SN' mechanism?

A. $CH_3 - Br$ B. $CH_3 CH_2 - Br$ C. $CH_3CH_2CH_2 - Br$ D. $(CH_3)_3 C - Br$

40 $C_6H_5N_2Cl \xrightarrow{CuCl/HCl} C_6H_5Cl + N_2$ is called

A. Elard reaction
B. Sandmeyer reaction
C. Wurtz Fittig's reaction
D. Perkin reaction

41 Ethyl bromide reacts with Mg in presence of ether to give

A. Grignard's reagent
B. Tollen's reagent
C. Fehling solution
D. None of the above

42 Which of the following element has zero electron affinity?

A. Ar
B. Na
C. Cl
D. Fe

43 The molarity of a solution containing 5g of NaOH in 450 ml solution is

A. 0.278 M
B. 2.78 M
C. 27.8 M
D. 278 M

44 Which of the following is not the ore of zinc ?

A. Calamine
B. Zincite
C. Cryolite
D. Sphalerite

45 Which of the following oxides of nitrogen does not contain ' N-N ' linkage?

A. N_2O
B. N_2O_3
C. N_2O_4
D. N_2O_5

46 Which of the following complexes has a tetrahedral geometry

A. $[Ni Cl_4]^{2-}$
B. $[Pt Cl_4]^{2-}$
C. $[Pt Cl_2 (NH_3)_2]$
D. $[Ni (CN)_4]^{2-}$

47 Which of the following transition metal ions is an important constituent of Zeiglar-Natta catalyst ?

A. Nickel
B. Iron
C. Titanium
D. Copper

48 Which of the following oxoacids of phosphorus exists in polymeric form only?

A. MetaPhosphoric acid
B. Pyrophosphoric acid
C. Hypophosphoric acid
D. Pyrophosphorous acid

49 The shape of 'BrF_3' molecule on the basis of VSEPR theory will be

A. Trigonal pyramidal
B. T – shape
C. Trigonal planar
D. Trigonal bipyramidal

50 Which of the following exhibits colour due to d – d transition ?

A. $KMnO_4$ B. anhydrous $CuSO_4$ C. Ruby D. $K_2Cr_2O_7$

51 Which of the following vitamins is not a fat soluble one?

A. Vitamin A B. Vitamin E C. Vitamin C D. Vitamin K

52 The correct order of Catenation property for group-14 elements is

A. C >> Si > Ge >> Sn
B. C >> Si > Ge ≈ Sn
C. Sn >> Ge > Si >> C
D. Sn >> C >> Sn > Ge

53 The correct order of hydration energies for the following ions is

A. $Be^{2+} > Mg^{2+} > Ba^{2+} > Ca^{2+}$
B. $Be^{2+} > Mg^{2+} > Ca^{2+} > Ba^{2+}$
C. $Ca^{2+} > Be^{2+} > Ba^{2+} > Mg^{2+}$
D. $Ba^{2+} > Ca^{2+} > Mg^{2+} > Be^{2+}$

54 In Freundlich Adsorption isotherm, the value of 1/n is

A. 1 in case of physical adsorption
B. 1 in case of chemisorption
C. Between 0 and 1 in all cases
D. Between 2 and 4 in all cases

55 The second order rate constant is usually expressed as

A. $mol\ L^{-1}\ s^{-1}$ B. $mol^{-1}\ L^{-1}\ s^{-1}$ C. $mol^{-1}\ L\ s^{-1}$ D. $mol\ L\ s^{-1}$

56 An example of a simple fuel cell is

A. lead storage battery
B. H_2-O_2 cell
C. Daniel cell
D. Lechlanche cell

57 Colligative properties of the solution depend upon

A. nature of the solution
B. nature of the solvent
C. number of solute particles
D. number of moles of solvent

58 What will be the wavelength of a ball of mass 0.1 kg moving with a velocity of $10ms^{-1}$

A. 6.726×10^{-34} m B. 6.626×10^{-34} m C. 6.526×10^{-34} m D. 6.426×10^{-34} m

59 The mathematical form of the first law of thermodynamics when (q) is the heat supplied and w is the work done by the system is

A. $\Delta U = q + w$ B. $\Delta U = q - w$ C. $\Delta U = w - q$ D. $\Delta U = -q - w$

60 In Schottky defect

A. Some of the lattice sites are vacant

B. an ion occupies interstitial position between lattice points

C. a lattice site is occupied by electron

D. the radius ratio, r^+ / r^-, is low

61 The book 'Genera Plantarum' was written in 1737 by

A. Linnaeus B. Bentham and Hooker C. Engler and Prantl D. Hutchinson

62 Cleistogamous flowers are

A. Self Pollinated B. Insect Pollinated

C. Bird Pollinated D. Wind Pollinated

63 Hot Spot area of India occurs in

A. Tropical Andes B. Western Himalayas C. Madagascar D. Mesopotamia

64 Quiescent centre is found in plant at

A. Root tip B. Shoot tip C. Cambium D. Leaf tip

65 Ringed DNA is found in

A. Viruses B. Bacteria C. Fungi D. Higher Plants

66 The formation of coenogametes takes place in

A. Rhizopus B. Yeast C. Volvox D. Ulothrix

67 The plants having vascular tissue but not seeds belong to
A. Bryophyta B. Pteridophyta C. Gymnosperms D. Angiosperms

68 The 'reclamation disease' is caused in plants by the deficiency of
A. Mn B. B C. Ni D. Cu

69 Maleness in plants can be enhanced by applying
A. IAA B. GA C. Cytokinin D. ABA

70 Complex formed by a pair of synapsed homologous chromosomes is known as
A. Kinetochore B. axoneme C. equatorial plate D. bivalent

71 Arrangement of nuclei in normal dicot embryo sac is
A. 3 + 3 + 2 B. 2 + 4 + 2 C. 3 + 2 + 3 D. 2 + 3 + 3

72 The product of which of the following organisms has been commercialised as blood cholesterol lowering agent
A. Trichoderma polysporum B. Monascus purpureus
C. Saccharomyces cerevisial D. Aspergillus niger

73 Inheritance of human complexion is an example of
A. Codominance B. Incomplete dominance
C. Sex-linked inheritance D. Multiple Allelism

74 The number of species of birds estimated to be in tropical Amazonian rain forest in South America is
A. 1300 B. 2100 C. 3500 D. 10000

75 On the basis of ABO blood groups, in human being, there are :
A. Two genotypes B. Four genotypes C. Six genotypes D. Eight genotypes
A, B, AB, O

76 The subunits of protein coat of virus are called
A. Ribosomes B. Mesosomes C. Capsomeres D. Chromomers

77 Stored food-floridean starch is found in one of the following classes of Algae

A. Rhodophyceae B. Phaeophyceae C. Chlorophyceae D. None of these

78 Vegetative propagation by bulbul occurs in

A. Agave B. Ginger C. Potato D. Bryophyllum

79 A typical angiosperm embryo sac, at maturity is

A. 7-celled 7-nucleate B. 8-celled 8-nucleate

C. 4-celled 8-nucleate D. 7-celled 8-nucleate

80 Which of the following codon codes for Methionine and also acts as initiator codon?

A. AUG B. UUU C. UGA D. AAG

81 Tissue grade organization of body is found in

A. Ctenoplana B. Sycon C. Spongilla D. Gonyaulax

82 The functions of respiration as well as excretion are performed by feather like gills in

A. annelids B. molluscs C. Crustaceans D. hemichordates

83 The lining of buccal cavity consists of

A. simple columnar epithelium B. simple cuboidal epithelium

C. Compound squamous epithelium D. Ciliated epithelium

84 The dorsal side of body of cockroach is covered with chitinous exoskeletal plates called

A. Sternites B. Pleurites C. Tergites D. arthrodial membrane

85 Which cells of gastric glands secrete the intrinsic factor of castle

A. Zymogen cells B. Chief Cells C. Goblet cells D. Parietal cells

86 In adult man, the residual volume is about

A. 500 ml B. 1200 ml C. 2500 ml D. 4500 ml

87 Which hormone is secreted by ovary only during pregnancy
A. hCG B. hPL C. relaxin D. Progesterone

88 The cranial capacity of neanderthal man was about
A. 1600 cc B. 1400 cc C. 900 cc D. 700 cc

89 Which is an ex-situ method of biodiversity conservation
A. Biodiversity Hotspots B. Zoological Parks
C. Biosphere Reserves D. Wildlife Sanctuaries

90 Genetic disorder aneuploidy can be represented by
A. Haemophilia B. Thalassemia
C. PhenylKetonuria D. Down's Syndrome

91 In global biodiversity, highest number of species is of
A. Fishes B. Amphibians C. Reptiles D. Birds

92 Proenzyme trypsinogen is changed to enzyme trypsin by
A. Gastrin B. Enterogastrone C. Enterokinase D. Secretin

93 Worm blooded animals of cold climate have small extremities. This was stated by
A. Allen B. Darwin C. Lamark D. Gause

94 Animals which can tolerate a wide range of salinity are called
A. Euryhaline B. Stenothermal C. Eurythermal D. Stenothermal

95 Which of the following bone does not articulate with any other bone
A. Humerus B. Malleus C. Phalanges D. Hyoid

96 Which of the following joints would allow no movement
A. Fibrous joint B. Cartilage joint
C. Synovial joint D. Ball & Socket joint

97 The true coelom is present in phylum
A. Ctenophora B. Pletyhelminthes C. Porifera D. Annelida

98 Which of the following is a steroid

A. Insulin B. Cortisoi C. Epinephrine D. Glucagon

99 Which one of the following is now being commercially produced by Biotechnological procedures

A. Nicotine B. Morphine C. Quinine D. Insulin

100 The most abundant protein in animal world is

A. Insulin B. Trypsin C. Haemoglobin D. Collagen

Space for Rough work :