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Time: 1 Hour 30 Mins Total Marks: 100

MHCET

Subjects : Physics, Chemistry

Section :1 Physics

1. Fibre used in making magnetic recording tape is

(a) nylon-6 **(b)** nylon-66

(c) terylene **(d)** viscose rayon

2. Nylon salt is obtained by the interaction of

(a) ε – amino caprolactum and ω – amino caproic acid **(b)** ethylene glycol and DMT

(c) DMT and hexamethylene diamine **(d)** hexamethylene diamine and adipic acid

3. An object moves along a curved path the following quantities may remain constant during the motion.

(a) speed **(b)** both 'a' and 'b'

(c) acceleration **(d)** velocity

4. A heavy small sized sphere is suspended by a string of length *l*. The sphere is rotated uniformly in a horizontal circle with the string making an angle θ with the vertical. The time period of this conical pendulum is

(a) $2\pi\sqrt{\frac{l}{g}}$ **(b)** $2\pi\sqrt{\frac{l\sin\theta}{g}}$

(c) $2\pi\sqrt{\frac{l\cos\theta}{g}}$ **(d)** $2\pi\sqrt{\frac{l\tan\theta}{g}}$

5. The period of simple pendulum is directly proportional to square root of

(a) mass of pendulum **(b)** length of pendulum

(c) radius of pendulum **(d)** gravity of pendulum

6. A particle of mass m is hanging vertically by an ideal spring of force constant K. If the mass is made to oscillate vertically, the total energy is

(a) maximum at extreme position **(b)** maximum at mean position

(c) minimum at mean position **(d)** same at all position

7. Which one of the following example of plasticity?

(a) dough **(b)** clay

(c) gum **(d)** all of these

8. The outward normal force per unit cross sectional area is

(a) tensile stress **(b)** stress

All The Best!!!

(c) normal stress **(d)** shearing stress

9. What will be height of the liquid column in a capillary tube on the surface of moon?

(a) size times that on earth's surface **(b)** $\frac{1}{6}^{th}$ that of the earth's surface

(c) it will remains unchanged **(d)** none of the preceding is true

10. Water can rise upto a height of 12 cm in a capillary tube. If the tube is lowered to keep only 9 cm above the water level then the water at the upper end of the capillary will

(a) overflow **(b)** form a flat surface

(c) form of convex surface **(d)** form a concave surface

11. In a closed organ pipe, the fundamental frequency is 50 Hz. The frequency of the third overtone will be

(a) 200 Hz **(b)** 300 Hz

(c) 400 Hz **(d)** 350 Hz

12. The velocity of propagation of waves on a stretched string will be doubled if

(a) radius of the string is doubled **(b)** radius is halved

(c) density of the string is halved **(d)** density is doubled

13. If M is molecular weight of a gas, the universal gas constant is (g = 285.4 J/Kg^{o}K)

(a) 285.4 M J/kg^{o}K **(b)** 185.4 M J/kg^{o}K

(c) 385.4 M J/kg^{o}K **(d)** 485.4 M J/kg^{o}K

14. The laser beam can be used to measure large distances because it is

(a) not absorbed **(b)** unidirectional

(c) coherent **(d)** monochromatic

15. It is possible to observe total internal reflection when a ray travels from

(a) air into water **(b)** air into glass

(c) water into glass **(d)** glass into water

16. Intensity of two waves, which produces interference are 9 : 4. The ratio of maximum and minimum intensity is

(a) 9 : 4 **(b)** 3 : 2

(c) 25 : 1 **(d)** 5 : 1

17. The aperture of a telescope is increased to

(a) get high resolving power **(b)** get higher magnifying power

(c) reduce the chromatic aberration **(d)** reduce the spherical aberration

18. If we measure the intensity of the electric field (E) at various points between the surface and the centre of a uniformly charged spherical conductor we find that the intensity of electric field

(a) goes on increasing

(b) goes on decreasing

(c) is zero at all points

(d) remains the same at all points

19. The unit of resistivity is

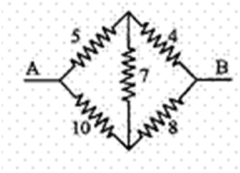
(a) Ohm

(b) Ohm-metre

(c) Siemens

(d) Metre/ ohm

20. Five resistance are connected as shown in the side figure. The effective resistance between A and B is ____



(a) 9 ohm

(b) 27 ohm

(c) 18 ohm

(d) 6 ohm

21. If horizontal and vertical components of the earth's magnetic field are equal at a certain place, then the angle of dip at that place is

(a) 90^o

(b) 60^o

(c) 45^o

(d) 0^o

22. The magnetic flux passing normally through coil is $\phi = t^2 + 50t + 25$ weber, where t is in second. What will be the induced emf at t = 1s ?

(a) 52V

(b) 72V

(c) 100π V

(d) $(100\pi + 50)$ V

23. A photosensitive surface is receiving light of wave length $5000\ \mathring{A}$ at the rate of 10^{-7} J/s. The number of photons received per second is _____

(a) 2.5×10^{12}

(b) 2.5×10^{11}

(c) 2.5×10^{10}

(d) 2.5×10^{9}

24. In a Thomson's set up for e/m the same high tension d.c. supply provides potential to anode for acceleration and also the positive voltage to the deflecting plate in the region of crossed fields. If the supply voltage is doubled, by what factor the magnetic field be increased to keep the electron beam undeflected?

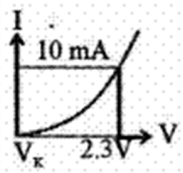
(a) 2 times

(b) $1/\sqrt{2}$ times

(c) $\sqrt{2}$ times

(d) ½ times

25. The resistance of a germanium junction diode whose V-I is shown in figure is (V_k = 0.3 V)



(a) $5\,k\,\Omega$ **(b)** $2.3\,k\,\Omega$

(c) $0.2\,k\,\Omega$ **(d)** $\left(\frac{10}{23}\right)k\,\Omega$

26. The D-layer of ionosphere occurs only during

(a) day-time **(b)** summer season

(c) night-time **(d)** winter season

27. Sound waves can diffract easily because

(a) the wavelength is very small **(b)** the wavelength is more

(c) it can refract **(d)** it can reflect

28. If two tuning forks A and B are sounded together they produce 6 beats per second. A is slightly loaded with wax, they produce 2 beat per second when sounded again. The frequency of A is 256. The frequency of B will be

(a) 259 Hz **(b)** 252 Hz

(c) 260 Hz **(d)** 262 Hz

29. A rectangular coil of sides 8 cm and 4 cm having 2000 turns and carrying a current of 200 mA is placed in a uniform magnetic field of 0.2 tesla directed along the positive X-axis. The maximum torque that the coil can experience

(a) 0.4 N-m **(b)** 0.2 N-m

(c) 0.5 N-m **(d)** 0.25 N-m

30. If the direction of electric current is reversed, the direction of magnetic field will

(a) remain same **(b)** reversed

(c) make an angle **(d)** either 'a' or 'c'

31. Absolute refractive index of any medium is always _____

(a) 1 **(b)** > 1

(c) < 1 **(d)** 0

32. A 30-turn coil of diameter 2 cm carries a current of 10 mA. When it is placed in a uniform magnetic field of induction 0.05 T, the maximum torque that could be exerted on the coil by the magentic induction is

(a) $1.88\times10^{-5}\,Nm$ **(b)** $4.7\times10^{-6}\,Nm$

(c) $4.7\times10^{-7}\,Nm$ **(d)** $1.88\times10^{-8}\,Nm$

33. The rare-earth element, gadolinium, is

(a) diamagnetic **(b)** paramagnetic

(c) ferromagnetic **(d)** nonmagnetic

34. Assuming that the mass m of the largest stone that can be moved by a flowing river depends upon the velocity v of the water, its density □ and the acceleration due to gravity g . Then, m is directly proportional to

(a) v^3 **(b)** v^4

(c) v^5 **(d)** v^6

35. A plane mirror refects a pencil of light to form a real image. Then the pencil of light incident on the mirror is

(a) parallel **(b)** convergent

(c) divergent **(d)** None of these

36. Least distance of distinct vision is 25 *cm*. Magnifying power of simple microscope of focal length 5 *cm* is

(a) 1/5 **(b)** 5

(c) 1/6 **(d)** 6

37. A liquid of specific gravity 0.8 is flowing in a pipe line with a speed of 2 m/s. The K.E. per cubic meter of it is

(a) 160 **(b)** 1600

(c) 160.5 **(d)** 1.6

38. A stone is projected with a velocity $20\sqrt{2}$ m/s at an angle of 45° to the horizontal. The average velocity of stone during its motion from starting point to its maximum height is (take g = 10 m/s^2)

(a) 20 m/s **(b)** $20\sqrt{5}\text{m/s}$

(c) $5\sqrt{5}\text{m/s}$ **(d)** $10\sqrt{5}$ m/s

39. A body of mass 0.25 *kg* is projected with muzzle velocity $100\,\text{ms}^{-1}$ from a tank of mass 100 *kg*. What is the recoil velocity of the tank

(a) $5\,\text{ms}^{-1}$ **(b)** $25\,\text{ms}^{-1}$

(c) $0.5\,\text{ms}^{-1}$ **(d)** $0.25\,\text{ms}^{-1}$

40. A body of mass 4 kg weighs 4.8 kg when suspended in a moving lift. The acceleration of the lift is

(a) $9.80\,\text{ms}^{-2}$ downwards **(b)** $9.80_{\text{ms}^{-2}}$ upwards

(c) $1.96_{\text{ms}^{-2}}$ downwards **(d)** $1.96_{\text{ms}^{-2}}$ upwards

41. The relation between r.m.s velocity v_{rms} and the most probable velocity v_{rmp} of a gas is

(a) $v_{rms} = v_{mp}$ **(b)** $v_{rms} = \sqrt{\frac{3}{2}}v_{mp}$

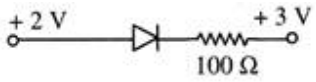
(c) $v_{rms} = \sqrt{\frac{2}{3}}v_{mp}$ **(d)** $v_{rms} = \frac{2}{3}v_{mp}$

42. Waves having frequency greater than 30 MHz are

(a) sky waves **(b)** ground waves

(c) space waves **(d)** ultrasonic waves

43. In the circuit shown, the current is



(a) 20 mA **(b)** 1 mA

(c) 10 mA **(d)** zero

44. The energy required to excite an electron from the ground state of hydrogen atom to the first excited state, is

(a) 1.602 x 10^{-14} *J* **(b)** $1.619 \times 10^{-16}\ J$

(c) $1.632 \times 10^{-18}\ J$ **(d)** $1.656 \times 10^{-20}\ J$

45. The functions of moderators in nuclear reactor is to

(a) Decrease the speed of neutrons **(b)** Increase the speed of neutrons

(c) Decrease the speed of electrons **(d)** Increase the speed of electrons

46. A rectangular loop of sides 6 cm and 2 cm with a small cut is moving out of a region of uniform magnetic field of magnitude 0.4 T directed normal to the loop. The voltage developed across the cut if velocity of loop is 2 cm s^{-1} in a direction normal to the longer side is

(a) 3.8 ´ 10^{-4} V **(b)** 4.8 ´ 10^{-4} V

(c) 2.2 ´ 10^{-2} V **(d)** 3.2 ´ 10^{-4} V

47. A solenoid carrying a current is oscillating in a horizontal place about is centre in a uniform horizontal magnetic field with a period T. If the current is increased to 4i, the period of oscillation would be

(a) 4 T **(b)** 2 T

(c) 0.5 T **(d)** 0.25 T

48. The additional energy required to increase the charge from 5 μC to 10 μC of a 20 pF capacitor is

(a) 2.5 J **(b)** 0.625 J

(c) 1.875 J **(d)** –0.625 J

49. If M.I. of a rigid body is I and it rotates with an angular velocity ω about a given axis of rotation, then the angular moment about the given axis of rotation is,

(a) $I\omega$ **(b)** I

(c) $I^2\omega$ **(d)** $(1/2)I\omega^2$

50. At any instant, a rolling body may be considered to be in pure rotation about an axis through the point of contact. This axis is translating forward with speed :

(a) equal to centre of mass **(b)** zero

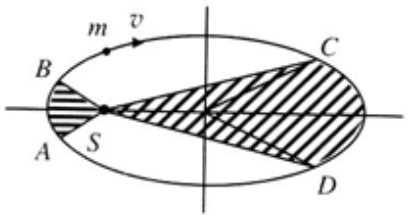
(c) twice of centre of mass **(d)** no sufficient data

51. A satellite is orbiting at a certain height in a circular orbit. If the mass of the planet is reduced to half the initial value, the satellite would

(a) fall on the planet **(b)** go the orbit of smaller radius

(c) go to the orbit of larger radius **(d)** escape from the planet

52. The figure shows elliptical orbit of a planet m about the sun S. The shaded area SCD is twice the shaded area SAB. If t_1 is the time for the planet to move form C to D and t_2 is the time to move from A to B, then



(a) $t_1 > t_2$ **(b)** $t_1 = 4t_2$

(c) $t_1 = 2t_2$ **(d)** $t_1 = t_2$

Section :2 Chemistry

53. Solvent is the substance in solution which is _____

(a) present in large amount **(b)** present in small amount

(c) present in small or in large amount **(d)** present in large or in small amount

54. 2N sulphuric acid are mixed with 100 ml of 1 M sodium hydroxide, the solution will be

(a) acidic **(b)** basic

(c) neutral **(d)** slightly acidic

55. For an adiabatic change the first law of thermodynamics can be states as,

(a) dE = dW **(b)** $-dE = PdV$

(c) dE = dP.dV **(d)** $-dE = dq$

56. Enthalpy of a system is same as

(a) Heat of the system **(b)** heat content at constant volume

(c) temperature of the system **(d)** heat content at constant pressure

57. The chemical reactions in which reactants require high amount of activation energy are generally

(a) slow **(b)** fast

(c) instantaneous

(d) spontaneous

58. In 3d series Zn does not show variable oxidation state because

(a) it has d-orbitals completely filled

(b) two electrons are present in the 4s subshell

(c) of both the above

(d) of none of the above

59. The last electron which enters the atom of transition element is called

(a) s-electron

(b) p-electron

(c) f-electron

(d) d-electron

60. Some statements are given below :
(A Carbonion can behave as a nucleophile
(B) Carbonium ion can behave as a nucleophile
(C) In a carbanion all carbon atoms possess a full octet
(D) Carbanion and methane molecule have same geometry
Among the above, the incorrect statement (s) is/are

(a) Only B

(b) Only B, C and D

(c) Only B and D

(d) Only D

61. Some statements are given below about electrophiles
(1) They are electron rich
(2) They are Lewis acids
(3) PCl_5 is an example of it
(4) They are neutral molecule with atoms with incomplete or complete octet. Among the above, the false statement (s) is/are

(a) only 3 and 4

(b) only 1 and 3

(c) only 1

(d) only 4

62. Which of the following is used in the preparation of Bakelite polymer?

(a) ethanol

(b) phenol

(c) picric acid

(d) o-nitrophenol

63. Due to presence of a lone pair of electrons on oxygen, ethers form stable compounds with

(a) NaOH

(b) BF_3

(c) HNO_3

(d) water

64. The compound ($C_5H_{10}O$) gives a crystalline product with hydroxylamine but does not reduce Fehling's solution. The compound gives iodoform reaction. The compound may be

(a) pentan-3-one

(b) pentanal

(c) pentan-2-one

(d) pentan-2-ol

65. In presence of HCN, carbonyl compounds undergo ____

(a) electromeric effect

(b) inductive effect

(c) resonance effect

(d) all of these

66. Two organic compounds have the same formula, C_4H_8O and are isomeric with each other. They are

(a) aldehydes and ketones
(b) butanol and butanone
(c) alcohols and phenols
(d) tert-butyl alcohol and butan-1-ol

67. Some statement about amines are given below
(A) Amines occur in plants and animals
(B) They are the components of amino acids, proteins and nucleic acids
(C) Many drugs and anaesthetics contain amine functional group
(D) Nylon and plastics are manufactured from amines among the above incorrect statements are

(a) A and B
(b) B and C
(c) A, B and C
(d) none

68. After hydrolysis of starch, glucose is obtained, which is purified using

(a) CH_3OH
(b) HCHO
(c) CH_3COCH_3
(d) $C_2H_5OC_2H_5$

69. Glycerol tristearate contains carbon atoms.

(a) 51
(b) 54
(c) 57
(d) 60

70. Excess of aspirin in stomach causes

(a) septicaemia
(b) bronchitis
(c) blood loss in stool
(d) amoebiasis

71. Dehydration method is used to

(a) induce sleep
(b) hypnotic
(c) food preservation
(d) relieve pain

72. Analysis of a sample of iron oxide shows that it has the formula $Fe_{0.9}O$. The fraction of iron present as Fe^{2+} will be about

(a) 90%
(b) 60%
(c) 78%
(d) 70%

73. Which of the following oxides exist as individual molecules?

I. Al_2O_3 II. SiO_2 III. P_4O_{10}

(a) II only
(b) III only
(c) I and II only
(d) I and III only

74. The atomic radius in a face-centred cubic unit cell is

(a) $\frac{a}{2}$
(b) $\frac{\sqrt{2}a}{4}$

(c) $\frac{\sqrt{3}a}{4}$ **(d)** $\frac{a}{4}$

75. During electrolytic refining of copper, some metals present as impurity settle as 'anode metals mud' . These are

(a) Sn and Ag **(b)** Pb and Zn

(c) Ag and Au **(d)** Fe and Ni

76. Thermally most stable oxide among the following is

(a) N_2O_5 **(b)** NO_2

(c) NO **(d)** N_2O

77. $S_2O_3^{2-}$ has

(a) S -S linkage **(b)** S - O linkage

(c) Both (A) and (B) **(d)** None of these

78. Which is the strongest oxidizing agent out of the following?

(a) I_2 **(b)** Br_2

(c) Br_3 **(d)** F_2

79. The oxidation number of cobalt in $K[Co(CO)_4]$ is

(a) +1 **(b)** -1

(c) +3 **(d)** -3

80. The protecting power of lyophilic colloidal sol is expressed in terms of

(a) Critical miscelle concentration **(b)** Gold number

(c) Coagulation value **(d)** None of these

81. Old paintings can be restored through an oxidizing agent

(a) H_2S **(b)** H_2O_2

(c) H_2PO_4 **(d)** H_3O

82. Formula of Chile saltpetre is

(a) $NaNO_3$ **(b)** $CaCO_3$

(c) $Ba(NO_3)_2$ **(d)** NH_4Cl

83. The geometrical shape of carbocation is

(a) Linear **(b)** Pyramidal

(c) Tetrahedral **(d)** Planar

84. A mixture contains 9.2 g of ethanol (C_2H_5OH) and 18 g of water (H_2O). Thus, mole fraction of ethanol in the mixture is

(a) 0.2 **(b)** 0.1

(c) 0.25 **(d)** 0.167

85. Which one has minimum (nearly zero) dipole moment

(a) Butene-1 **(b)** *cis* butene-2

(c) trans butene-2 **(d)** 2-methyl-1-propene

86. H_2O_2 will oxidise

(a) $KMnO_4$ **(b)** PbS

(c) MnO_2 **(d)** H_2S

87. K_a of H_2O_2 is of the order of

(a) 10^{-12} **(b)** 10^{-14}

(c) 10^{-16} **(d)** 10^{-10}

88. The principle involved in differential extraction is

(a) Adsorption **(b)** Partition

(c) Solubility **(d)** Volatility

89. The standard emf of a cell, involving one electron change is found to be 0.591 V at 25°C. The equilibrium constant of the reaction is (F = 96,500 C mol^{-1}, R = 8.314 J K^{-1} mol^{-1})

(a) 1.0×10^1 **(b)** 1.0×10^{30}

(c) 1.0×10^{10} **(d)** 1.0×10^5

90. The equivalent conductance of NaCl at concentration C and at infinite dilution are Λ_c and Λ_∞ respectively. The correct relation between Λ_c and Λ_∞ is given as (where the constant B is positive)

(a) $\Lambda_c = \Lambda_\infty + (B)C$ **(b)** $\Lambda_c = \Lambda_\infty - (B)C$

(c) $\Lambda_c = \Lambda_\infty - (B)\sqrt{C}$ **(d)** $\Lambda_c = \Lambda_\infty + (B)\sqrt{C}$

91. When 9.65 coulomb of electricity is passed through a solution of silver nitrate (atomic mass of Ag = 108.0 g mol^{-1}). The amount of silver deposited is

(a) 16.2 mg **(b)** 21.2 mg

(c) 10.8 mg **(d)** 6.4 mg

92. A radioactive isotope has a half-life of 10 days. It today 125 mg is left over, what was its original weight 40 days earlier?

(a) 2 g **(b)** 600 mg

(c) 1 g **(d)** 1.5 g

93. Which metals has greater tendency to form meatal oxide?

(a) Al **(b)** Ca

(c) Cr **(d)** Fe

94. The rates of diffusion of SO_2, CO_2, PCl_3 and SO_3 are in the following order

(a) $PCl_3 > SO_3 > SO_2 > CO_2$ **(b)** $CO_2 > SO_2 > PCl_3 > SO_3$

(c) $SO_2 > SO_3 > PCl_3 > CO_2$ **(d)** $CO_2 > SO_2 > SO_3 > PCl_3$

95. The aqueous solution of the following sales will be coloured in the case of

(a) $Zn(NO_3)_2$ **(b)** $LiNO_3$

(c) $Co(NO_3)_2$ **(d)** Potash alum

96. According to IUPAC nomenclature, sodium nitroprusside is named as

(a) sodium nitro ferricyanide **(b)** sodium nitro ferrocyanide

(c) sodium pentacyanonitrosy lferrate(II) **(d)** sodium pentacyanonitrosylferrate(III)

97. Which of the following is the most likely structure of $CrCl_3.6H_2O$, if 1/3 of total chlorine of the compound is precipitated by adding $AgNO_3$ to its aqueous solution?

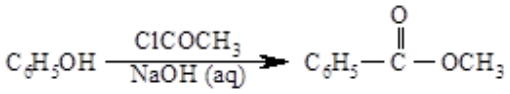
(a) $CrCl_3.6H_2O$ **(b)** $[Cr(H_2O)_3Cl_3](H_2O)_3$

(c) $[Cr(H_2O)_4Cl_2]Cl.2H_2O$ **(d)** $[Cr(H_2O)_5Cl]Cl_2.H_2O$

98. Which of the following undergoes nucleophilic substitution exclusively by S_N1 mechanism?

(a) Benzyl chloride **(b)** Ethyl chloride

(c) Chlorobenzene **(d)** Isopropyl chloride

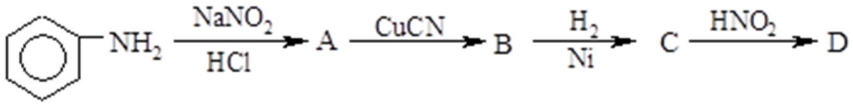
99. 

Is an example of

(a) Reimer – Tiemen reaction **(b)** Benzoylation

(c) Schottem – Baumann reaction **(d)** Acetylation

100. Aniline in a set of reactions yielded a product D.



The structure of the product D would be

(a) $C_6H_5NHCH_2CH_3$ **(b)** $C_6H_5CH_2NH_2$

(c) $C_6H_5CH_2OH$ **(d)** C_6H_5NHOH