MODEL QUESTIONS

PHYSICS (S.No.1 to 35 ) 35 Questions

Data:

Acceleration due to gravity = 10m/s2, Mass of electron = 9.1 x 10-31kg
Charge of electron = 1.6 x 10-19 C, Velocity of light, c = 3 x 108m/s

1 eV = 1.6 x 10-19 J

1. Which of the following has the dimensionality of farad?

a) A2s4kg-1m -2 b) A-2kg m2s3 c) kg m2 A-1s2 d) kg m3 A-2s2

2. Choose the correct combination of the planet and its average orbital speed(in km s -1 )

a) Earth (29.8); Saturn(9.65); Venus(35.0); Mars(24.2)

b) Earth (9.65); Saturn(29.8); Venus(35.0); Mars(24.2)

c) Earth (24.2); Saturn(9.65); Venus(35.0); Mars(29.8)

d) Earth (29.8); Saturn(9.65); Venus(24.2); Mars(35.0)

3. At a point 3200 km vertically above the surface of the earth, acceleration due to gravity

of earth in SI units is

a) 6.66 b) 3.33 c) 5.55 d) 4.44

4. Two laser beams one of wave length 640 nm and the other 400 nm have same unit flux of

photons. Their powers are in the ratio

a) 64:40 b) 1:1 c) 5:8 d) 25:64

5. The relation, Work Done = Change in internal energy holds for

a) isothermal process b) adiabatic process

c) isobaric process d) isochoric process

6. The rate of flow of volume of a fluid of viscosity  along a horizontal pipe of radius r and

length L due to pressure difference P is (V/t). If a pipe of radius 2r and length 2L is used and P is doubled the rate of flow will increase by a factor

a) 2 b) 4 c) 8 d) 16

7. If the charge Q in a capacitor is doubled, electric field energy stored inside

a) doubles b) increases by factor 4

c) remains unchanged d) increases by factor 8

8. A capacitor with C =0.144 F having charge Q is made to discharge through a resistance

of 1.0 . What is the time taken for the discharge of 50% of the initial charge?

a) 10-7 s b) 0.144 x10-6 s c) 2.1 x 10-7s d) 0.144 x 10-7 s

Rough Work

9. A slab having dielectric constant  = 3 is placed in a region having constant electric field
 E = 10 V m-1. The electric field inside the slab volume is

a) 1.1 V m-1 b) 30 V m-1 c) zero d) 3.33V m-1

10. A parallel plate capacitor is connected to a battery supplying constant voltage difference
 such that it accumulates charge Q. While being connected, if the separation d between
 the plates is increased

a) both electric field inside the capacitor and Q decrease

b) electric field inside the capacitor decreases and Q increases

c) electric field inside the capacitor increases and Q decreases

d) both electric field inside the capacitor and Q increase

11. The sides (in meters) of a box joining at origin are represented by vectors

a= 4i, b= 2i + 3j and c= i+k. The surface area of the box is

a) 20 m2 b) 26 m2 c) 36 m2 d) 40 m2

12. The slant side of a frictionless incline making an angle 60 with the vertical is 1 m.
 Starting from rest the time taken by a mass to slide down the incline from top to the base
 is

a) 0.63 s b) 0.23 s c) 0.2 s d) 0.4 s

13. A mass of 0.01 kg is hung from a series combination of two ideal light springs having

spring constants k1= 10 Nm-1 and k2 =20 Nm-1. The net stretching of this spring-mass

system is

a) 3 cm b) 1.5 cm c) 6 cm d) 2.5 cm

14. A mass m =1 kg located at point (3,4) in x-y plane at time t is subjected to a force of 2 N

in the y direction. All numbers are in SI units. The angular acceleration is

a) 0.24 radians s-2 along z direction b) 0.18 radians s-2 along z direction

c) 0.12 radians s-2 along x direction d) 0.32 radians s-2 along z direction

15. A circuit is operated by a battery of internal resistance 0.2  and emf 6 V. The current
 flowing in the circuit is 0.3 A. The power supplied to the rest of the circuit other than the
 internal resistance is

a) 1.8 W b) 1.74 W c) 1.42 W d) 1.62 W

16. A small magnet of magnetic moment m is placed inside a hollow sphere of radius R; the
 net magnetic flux emerging out of the sphere is

a) proportional to m

b) proportional to the product R2  and magnitude of m

c) zero

d) a function of location and orientation of the magnet

Rough Work

17. What is the magnetic induction flux crossing unit area in xy plane if magnetic induction
 vector is B = 2i + 4j + 6k ? All numbers are in SI units.

a) 2 b) 4 c) 6 d)

18. The direction of a ray of light from a plane wave is along unit vector n = i + j. The

corresponding wave front is

a) parallel to z axis b) parallel to n

c) perpendicular to z axis d) parallel to y-z plane

19. Electric potential in a region is given by 4x2+3. All numbers are in SI units. The Electric
 field magnitude at a point (-5,1,2) is

a) 40 b) 20 c) 80 d) 10

20. When a glass prism of refracting angle 60o is immersed in a liquid, its angle of minimum
 deviation is 30o. The critical angle of glass with respect to the liquid medium is

a) 45o b) 30o c) 60o d) 55o

21. Choose the group of incorrect statement formed from the following

(i) The ammeter used to measure current in a circuit is to be connected in series.

(ii) An ammeter should have very low resistance.

(iii) An ammeter should have very high resistance.

(iv) Connecting ammeter in series will not lead to any change in the current present
 before.

a) (i) and (ii) b) (ii) and (iii) c) (iii) and (iv) d) (iv) and (i)

22. Let Ei, Ni,, Ii with i=1,2 denote respectively the emf, number of turns , and the current in

the primary and secondary coils of an ideal transformer. Then

a) E1/E2 = N1/N2 = I1/I2

c) E2/E1 = N1/N2 = I1/I2

23. Which of the following are unrelated?

a) Fermat’s principle and propagation of light

b) Huygen’s principle and speed of light

c) Law of gravitation and Kepler’s laws

d) Alpha decay and Coulomb force

b) E1/E2 = N2/N1 = I1/I2

d) E1/E2 = N1/N2 = I2/I1

24. A tiny electric dipole of dipole moment p k is placed at the origin. The electric fields at
 two far away point (b,0,0) and (0,0,b) are

a) equal in magnitude

b) equal

c) equal in direction only

d) unequal in magnitude and opposite in direction

Rough Work

25. A compound telescope have two lenses A and B. Lens A is closer to object than lens B.
 Which statement is correct?

a) Both A and B form real images.

b) Both A and B form virtual images.

c) A forms real image and B forms virtual image.

d) A forms virtual image and B forms real image.

26. Assume that the wave length of yellow light in crown glass of refractive index 1.5 is
 600 nm. Its frequency is

a) 0.5 x1015 Hz b) 0.33 x1015 Hz c) 1.5 x1015 Hz d) 0.5 x1015 Hz

27. The energies of two photons are in the ratio 1:4. The corresponding ratio of their

momenta is

a) 1:2 b) 1:4 c) 2:1 d) 4:1

28. At a given kinetic energy which of the following has the highest speed?

a) neutrino b) electron c) muon d) photon

29. The time taken by light to travel over a length equal to the radius of nucleus 64Ni is of the
 order of

a) 10-21 s b) 10-23 s c) 10-25 s d) 10-19 s

30. Water in a porcelain container is placed in a microwave oven to heat it. The temperature
 of the water rises, but the container temperature does not rise much. This is because

a) porcelain is a bad conductor of heat.

b) water is a liquid and can set up convection currents but the container is solid non
 conductor.

c) preferential absorption of microwaves of certain frequencies by water.

d) microwaves are more energetic than infrared waves.

IN COMPLETE

Rough Work

CHEMISTRY (S.No. 36 to 70 ) 35 Questions

36. 20 g of a solute whose density is 2.0 g/cc is dissolved in water and the solution is made
 upto one litre. If the molecular weight of the solute is 100, what is the molality of the
 solution?

a) 0.2020 b) 0.4040 c) 0.2000 d) 0.0200

37. The velocity of infra red radiation in vacuum compared to ultra violet is

a) twice b) half c) equal d) four times

38. Which one of the following statements is true?

a) An orbit and orbital mean the same thing.

b) An orbit and orbital contain the same number of electrons always.

c) The energies of the orbit and the orbital are the same.

d) The maximum number of electrons present in an orbit and an orbital will be different.

39. Which one of the following has electronic configuration in violation of Aufbau
 principle?

a) calcium b) titanium c) chromium d) manganese

40. Which one of the following changes is spontaneous?

a) A matchstick on strike burns.

b) Camphor packed in a container without over space catches fire on its own.

c) Petrol kept in an open beaker reduces in quantity slowly.

d) Water in a beaker surrounded by ice and salt freezes.

41. For a substance A2B the first dissociation constant is 5x10-5 and the second dissociation
 constant is 1x10-9 at 25oC. The value of the equilibrium constant for the following
 reaction

A2B ↔ 2A+ + B2-

at the same temperature is

a) 5 x104 b) 2 x10-5 c) 4 x10-4 d) 5 x10-14

42. In ice-liquid water equilibrium, increase of pressure leads to

a) increase in melting point of ice b) decrease in melting point of ice

c) no change in melting point of ice d) disappearance of one phase

43. A silver rod dipped in a solution of silver nitrate of a particular concentration shows a
 potential of 0.75 V vs standard hydrogen electrode. If the standard potential for silver is

0.8V, at what molar concentration of the solution the potential will become zero?

a) 2.76 x 10-14 b) 2.76 x 1014 c) 7.6 x 10-28 d) 7.6 x 1028

Rough Work

44. What is the theoretical quantity of hydrogen required to generate 53.6Ah in a Proton
 Exchange Membrane Fuel Cell?

a) 1.0 g b) 1.0 kg c) 2.0 g d) 2.0 litre

45. For a reaction, X + Y + Z → Products

the concentration of X is doubled keeping that of Y and Z constant. The rate of the reaction increases by four times. What is the order of the reaction?

a) 2 b) 4 c) 1 d) 0

46. Which one of the following exhibits Schottky defect?

a) nickel oxide b) potassium bromide

c) ferrous sulphide d) silver chloride

47. Which one of the following is anti ferromagnetic?

a) titanium dioxide b) nickel

c) oxygen d) ferrous oxide

48. The gas that is produced through catalytic reforming of sewage is

a) producer gas b) syngas

c) natural gas d) carbon monoxide

49. Which one of the following hydrides is non-stoichiometric?

a) ammonia b) nickel hydride c) sodium hydride d) diborane

50. The order of energy released on combustion of the following fuels per litre is

a) LPG > octane > liquid hydrogen > gaseous hydrogen

b) liquid hydrogen > gaseous hydrogen > LPG > octane

c) octane > LPG > liquid hydrogen > gaseous hydrogen

d) gaseous hydrogen > liquid hydrogen > octane > LPG

51. Density of the following alkali metals is in the order of

a) lithium < sodium < potassium < rubidium

b) rubidium < potassium < sodium < lithium

c) sodium < potassium < lithium < rubidium

d) lithium < potassium < sodium < rubidium

52. The discontinuity in ionization enthalpy values of group 13 elements in the periodic table
 is due to

a) irregular variation in ionic radii

b) irregular variation in electronegativity

c) poor shielding effect of ‘p’ and ‘d’ electrons

d) poor shielding effect of ‘d’ and ‘f’ electrons

Rough Work

53. The reduction of germanium tetrachloride with lithium aluminium hydride gives

a) digermane b) di and tri germanes

c) monogermane d) mixture of all germanes

54. Which one of the following is used as cathode in lithium primary battery?

a) liquid sulphur dioxide b) thionyl chloride

c) poly ethylene oxide d) methyl cyanide

55. What type of isomerism is possible in pentaamminenitrocobalt(II)chloride?

a) linkage b) optical c) position d) ionisation

56. A coordination compound has trigonal bipyramidal distribution of hybrid orbitals. What
 is the type of hybridisation present?

a) dsp2 b) sp3 c) sp3d d) d2sp3

57. 0.3 g of an organic compound gave 60 mL of nitrogen collected over water at 730 mm

pressure and 27oC. Aqueous tension at 27oC is 20 mm. What is the percentage

composition of nitrogen in the compound?

a) 21.25 b) 2.125 c) 212.5 d) 42.5

58. Predict the products formed on passing acetylene through acetic acid followed by

distillation in presence of mercuric sulphate.

a) acetic anhydride and acetone b) acetic anhydride and ethanol

c) propionic anhydride and methanol d) acetic anhydride and ethanal

59. The order of reactivity of the following for an SN2 reaction is

a) alkyl fluoride > alkyl chloride > alkyl bromide > alkyl iodide

b) alkyl fluoride > alkyl bromide > alkyl chloride > alkyl iodide

c) alkyl iodide > alkyl bromide > alkyl chloride > alkyl fluoride

d) alkyl bromide > alkyl fluoride > alkyl iodide > alkyl chloride

60. An organic compound A of molecular formula C3H8O is treated with 85% phosphoric
 acid at 170oC to give B which on ozonolysis, followed by hydrolysis with lithium
 aluminium hydride gave rise to a set of products. Predict the correct set of products from
 the following

a) acetaldehyde and formaldehyde b) ethanol and methanol

c) acetic acid and formic acid d) ethanol and formaldehyde

IN COMPLETE

Rough Work



MATHEMATICS( S.No. 71 to 120 ) 50 Questions

71. Let and

of is , then

72. The complex numbers
 positive real part and

73. The maximum value of

. If is any complex number such that the argument

is equal to

and are such that and . If has

has negative imaginary part, then may be

where ‘ ’ satisfies the condition is

74. If ‘ ’ is a non real cube root of unity, then is

75. If , then, lies in the interval

76. Let denote the number of triangles which can be formed by using the vertices of a

regular polygon of sides. If , then the value of is

77. If , then the value of is

78. The inverse of the function is

Rough Work



79. The sum of the first terms of the series is

80. If , and are three consecutive terms of an A.P., then the

values of ‘ ‘ are given by

81. If are in H.P., then the value of is

82. Let , where are positive. Then

83. If , then the value of is

84. The quadratic expression takes

85. Three vectors are given by and

respectively. Then the vector which satisfies the relation and

is

Rough Work

86. If the magnitude of moment about the point of a force acting

through the point is , then the value of is

87. The arithmetic mean of odd natural numbers is

88. A car completes the first half of its journey with a velocity and the remaining half with

velocity . The average velocity of the car for the whole journey is

89. An integer is chosen at random from the numbers to . The probability that

is

90. Let be a nonzero real number. A determinant is chosen from the set of all

determinants of order two with entries and only. The probability that the value of

the determinant is nonzero is

91. Two candidates A and B are seeking admission in AMRITA UNIVERSITY. The

probability that A is selected is and the probability that both and B are selected is

atmost . Then the probability of B getting selected cannot exceed

92. The curve satisfying the differential equation and passing through

the point is

Rough Work



93. The solution of the differential equation , given when

is

94. is equal to

95. The value of is equal to

96. If the orthocentre of a triangle bisects the altitude of the triangle ,

then the value of is

97. The remainder got by dividing by is

98. If and , then is

99. If and are two functions such that

and , then the derivative of at is

100. If is a

polynomial of degree three which attains its maximum value at and

minimum value at , then the polynomial is

Rough Work



101. Part of the domain of the function lying in the interval

is

102. If the matrix is orthogonal, then

103. Let be positive real numbers. The following system of equations

, and has

104. If the quadratic equation and ,

have a common root, then is equal to

105. A helicopter is to fly directly from a helipad at the origin in the direction of the point

at a speed of The position of the helicopter after
is

106. Let be the number of times heads occur in tosses of a fair coin. If ,

and are in A.P., then the least value of is

Rough Work



107. The solution of the differential equation is

108. The solution of the differential equation is

109. The equation is solvable for

110. Given that and satisfy the equations

and , then at is

111. Two ships are steaming away from a point ’ along routes that make an angle of

12 . Ship A moves at and ship B at . The ships are moving apart

at a rate of when and ,

where is

112. If , then the value of is

Rough Work



113. The value of is

114. The pair of tangents drawn from the point to the two circles

and coincide. Then the point P is

(

115. Two circles pass through and touch the straight line . If

the two circles are orthogonal, then the value of is

116. A force is applied to a spacecraft with velocity . Then the

force expressed as a vector which is both parallel and orthogonal to is

117. If is the normal to the curve at the point ,

then the pair is

118. The value of the integral

is

Rough Work



119. If , then the values of p , q and r are

respectively

120. The area enclosed between the two parabolas and is

Rough Work