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KEAM ENGINEERING ENTRANCE EXAM 2020

PAPER I – PHYSICS & CHEMISTRY

QUESTIONS

1. A traveling wave in a medium is given by the equation y = a sin (ωt – kx). The maximum acceleration of the particle in the medium is
(A) aω (B) a ω^2 (C) ω/k (D) x/t (E) kω

2. Two simple harmonic motions with the same amplitude and same frequency acting in the same direction are impressed on a particle. If the resultant amplitude of the particle is equal to the amplitude of individual S.H.M.s, the phase difference between the two simple harmonic motions is
(A) $\frac{2p}{\sqrt{3}}$ (B) $\frac{p}{2}$ (C) $\frac{p}{4}$ (D) $\frac{2p}{3}$ (E) $\frac{p}{3}$

3. Two nearest harmonics of an organ pipe open at both the ends are 200 Hz and 240 Hz. The fundamental frequency is
(A) 40 Hz (B) 20 Hz (C) 30 Hz (D) 80 Hz (E) 50 Hz

4. Two strings of the same material and same length are given equal tension. If they are vibrating with fundamental frequencies 1600 Hz and 900 Hz, then the ratio of their respective diameters is
(A) 16 : 9 (B) 4: 3 (C) 81 : 256 (D) 3 : 4 (E) 9 : 16

5. An object, moving in a straight line with velocity 100 ms^{-1}, goes past a stationary observer. If the object emits note of 400 Hz while moving, the change in the frequency note by the observer as the object goes past him is
(A) 350 Hz (B) 300 Hz (C) 200 Hz (D) 100 Hz (E) 150 Hz

6. The electric flux (in SI units) through any face of a cube due to a positive charge Q situated at the centre of a cube is
(A) $\frac{Q}{4p\in_0}$ (B) $4\pi\in_0 Q$ (C) $\frac{Q}{6\in_0}$ (D) $\frac{Q}{6p\in_0}$ (E) $6\pi\in_0 Q$

7. A capacitance of a parallel plate air capacitor is 10μF. Dielectric constant of the medium to be introduced in between its plates to double its capacitance is
(A) 2 (B) 3 (C) 4 (D) 2.5 (E) 1.5

8. The electric potential V at any point (x, y, z) in space is given by $V = 4z^2$ volt, where x, y, z are all in metre. The electric field at that point (1m, 0, 2m) in Vm^{-1} is
(A) 16 along the positive z axis (B) 16 along the negative z axis
(C) 4 along the positive z axis (D) 4 along the negative z axis
(E) 8 along the negative z axis

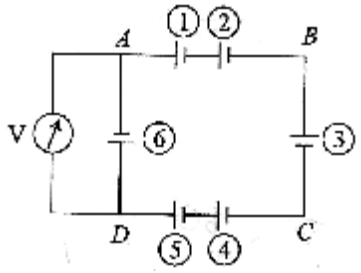
9. The work done in moving a point charge of 10 μ C through a distance of 3 cm along the equatorial axis of an electric dipole is
(A) 10×10^{-6}J (B) 30×10^{-6}J (C) 20×10^{-6} J
(D) 5×10^{-6} J (E) zero

10. A steady current flows in a metallic conductor of non-uniform cross section. The quantity/quantities that remains/remain constant along the length of the conductor is/are
(A) current, electric field and drift speed (B) drift speed only
(C) current and drift speed only (D) current and electric field only
(E) current only

11. In a platinum resistance thermometer, the resistances of the wire at ice point and steam point are of 4 Ω and 4.25 Ω respectively. When the thermometer is kept in a hot water bath, whose temperature is not known, the resistance of the wire is found to be 4.5 Ω. The temperature of the hot water bath is
(A) 150^0 C (B) 100^0C (C) 300^0C (D) 350^0 C (E) 200^0C

12. Internal resistance of a cell is independent of
(A) the circuit elements connected to it (B) surface area of the electrode
(C) distance between the electrode (D) concentration of the electrolytes
(E) temperature of the electrolytes

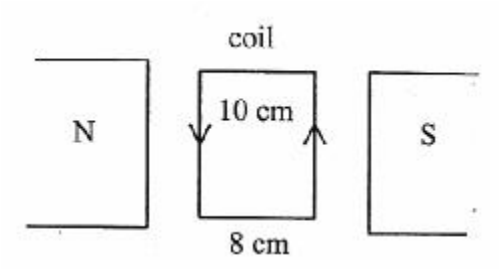
13. Six cells, each of emf 5 V and internal resistance 0.1 Ω are connected as shown in figure. The reading of the ideal voltmeter V is



(A) 30 V (B) 5 V (C) 15 V (D) zero (E) 0.5 V

14. Which one of the following characteristics is not associated with a paramagnetic material?
(A) it is weakly magnetized in the direction of the magnetizing field, in which it is placed
(B) its magnetic permeability is greater than one
(C) its magnetic susceptibility is positive
(D) its magnetic susceptibility increases with rise in temperature
(E) its individual atom/molecule/ion has a net non-zero magnetic moment of its own

15. A coil of 50 turns carrying a current of 2 A in a magnetic field of 0.5 T. The torque acting on the coil is



(A) 0.4 Nm clockwise (B) 0.2 Nm anticlockwise (C) 0.4 Nm anticlockwise
(D) 0.2 Nm clockwise (E) 0.8 Nm anticlockwise

16. A long solenoid with 500 turns per unit length carries a current of 1.5 A. The magnetic induction at one of the ends of the solenoid on its axis is nearly
(A) 32×10^{-4}T (B) 4×10^{-5}T (C) 47×10^{-5}T
(D) 16×10^{-4}T (E) 8×10^{5}T

17. Choose the ***wrong*** statement.
(A) The magnetic declination is greater at higher latitudes and smaller near the equator.
(B)In most of the northern hemisphere, the south pole of the dip needle tilts downwards.
(C) Circulating electron in an atom has a magnetic moment.
(D)The magnetic declination at Delhi is 0°41'E andatMumbai is 0°58' W.
(E) At the poles, the magnetic field lines are converging or diverging vertically so that the horizontal component is negligible

18. The magnetic field at the centre of a circular coil of 50 turns and radius 10 cm carrying a current of 1 A, in tesla is
(A) $\pi \times 10^{-4}$ (B) $\pi \times 10^{-2}$ (C) $2\pi \times 10^{-3}$
(D) $\pi/4 \times 10^{-5}$ (E) $\pi/2 \times 10^{-4}$

19. Choose the wrong statement for the pure inductive circuit.
(A) The inductive reactance limits the current in a purely inductive circuit.
(B) The average power supplied to an inductor over one complete cycle is zero.
(C) The inductive reactance is directly proportional to the frequency of the current.
(D) The emf of the source and current oscillates symmetrically about zero value.
(E) The current leads the voltage by $\pi/2$

20. A train is running at a speed of 72 km hr^{-1} on the rails separated by a distance of 150 cm. If the vertical component of earth's magnetic field at the place is 4.0×10^{-5} T. The induced emf on the rails is
(A) 1.2mV (B) 3mV (C) 2.5 mV (D) 0.5 mV (E) 4.2mV

21. A transformer operates at V_p = 6 kV on the primary side and supplies electric energy at V_S = 220 V to a number of houses in a town. If the total power consumption of the town is 7.2 kW, the current (in amperes) in the primary is
(A) 2 (B) 1.2 (C) 2.5 (D) 3 (E) 1

22. The relation between the charge flow ΔQ through the circuit of resistance r and the change in the magnetic flux $\Delta\phi_B$ is

(A) $\Delta Q = \frac{\Delta f_B}{r}$ (B) $\Delta f_B = \frac{\Delta Q}{r}$ (C) $\Delta f_B = \Delta Q$

(D) $\Delta f_B = \frac{\Delta Q}{r^2}$ (E) $\Delta Q = \frac{r}{f_B}$

23. If an electromagnetic wave of frequency 5 MHz travels from vacuum into dielectric medium of electrical permittivity ε = 4, then its (take m_T = 1)
(A) wavelength is halved and the frequency remains unchanged
(B) wavelength and frequency are both doubled
(C) wavelength and frequency both remain unchanged
(D) wavelength is doubled but the frequency remains unchanged
(E) wavelength remains unchanged but the frequency is doubled

24. Among the following, which is ***not*** true for ultraviolet light?
(A) induces the production of more melanin, causing tanning of the skin
(B) can be focused into very narrow beams
(C) kills germs in water purifiers
(D) used in eye surgery
(E) treatment for certain forms of cancer

25. Choose the **wrong** statement.
(A) A ray entering a material of larger index of refraction bends toward the normal.
(B) A ray entering a material of smaller index of refraction bends away from the normal.
(C) A ray oriented along the normal does not bend, regardless of the materials.
(D) Light rays from any submerged object bend away from the normal when they emerge into the air.
(E) When a wave passes from one material into a second material with larger index of refraction, the wave speed increases.

26 Angular width of the first minimum on either side of the central maximum due to a single slit of width *a,* illuminated by a light of wave length A is
(A) λ/a (B) λ/2a (C) 2λ/a (D) λ/4a (E) 4λ/a

27. The reflected ray is completely polarized for certain angle of incidence in a transparent medium. If the angle of refraction is 30°, then the refractive index of the medium is
(A) 1.5 (B) 1.732 (C) 1.33 (D) 1.414 (E) 1.6

28. A certain prism produces a minimum deviation of 42°. It produces a deviation of 45° when the angle of incidence is either 43° or 62°. The angle of incidence when the prism undergoes minimum deviation is
(A) 60° (B) 30° (C) 49° (D) 51° (E) 40°

29. If two waves of intensities I and 41 superpose, the ratio between maximum and minimum intensities is
(A) 9:1 (B) 5:2 (C) 4:3 (D) 3:l (E) 6:1

30. Among the following photosensitive substances, the one which emits electrons when it is illuminated by visible light is
(A) magnesium (B) zinc (C) sodium
(D) cadmium (E) platinum

31. The de Broglie wavelength of the matter wave associated with an object dropped from a height *x*, when it reaches the ground is proportional to
(A) x^2 (B) $\frac{1}{\sqrt{x}}$ (C) $\sqrt{x}$ (D) $x^{3/2}$ (E) x

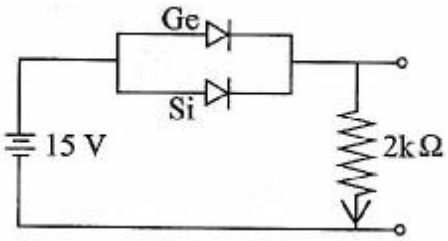
32. The number of a-particles emitted during the radioactive decay chain from $^{226}_{88}Ra$ and ending at $^{206}_{82}Pb$ is
(A) 5 (B) 4 (C) 6 (D) 3 (E) 2

33. The shortest wavelength of Paschen series in hydrogen spectrum is 8182 A. The first member of the Paschen series is nearly
(A) 15400 A (B) 12200 A (C) 13400 A (D) 18700 A (E) 16700 A

34. A nucleus, initially at rest, breaks up into two nuclear fragments with their radii in the ratio 2:1. Then their velocities will be in the ratio
(A) 3 : 2 (B) 1 : 5 (C) 1 : 8 (D) 2:1 (E) 1 : 4

35. The ratio of the energy released by 4 kg of hydrogen at sun by fusion process to 23.5 kg of ^{235}U in the nuclear reactor by fission process is (Assume energy released per fusion is 26 MeV and that per fission is 200 MeV)
(A) 5 : 13 (B) 1 : 26 (C) 13 : 10 (D) 10 : 13 (E) 26 : 1

36. If the Ge diode in the circuit is reverse biased, the current through 2 kΩ resistor



(A) increases by 0.2 mA (B) decreases by 0.4 mA
(C) increases by 0.4 mA (D) decreases by 0.25 mA
(E) does not change

37. The contribution to the total current in a semiconductor, due to electrons and holes are 0.75 and 0.25 respectively. The drift velocity of electrons is 3/2 times that of holes at this temperature. Then the ratio between electron concentration and hole concentration is
(A) 1 : 3 (B) 3 : 2 (C) 6 : 5 (D) 4 : 1 (E) 2 : 1

38. In a common emitter amplifier, the input resistance and output resistance are 200 and 500 *Cl* respectively. If the voltage gain of the amplifier is 50, then the power gain *is*
(A) 1250 (B) 1000 (C) 750 (D) 100 (E) 500

39. The gates that give output Y — 0 for the two inputs A = 1 and B = 1 are
(A) AND and OR gates (B) OR, AND and NAND gates
(C) NOR and OR gates (D) NOR and NAND gates
(E) NAND and AND gates

40. In amplitude modulation of audio frequency 700 Hz, the appropriate carrier frequency to be used is
(A) 5 MHz (B) 50 MHz (C) 1000 kHz (D) 350 kHz (E) 1000 MHz

41. The maximum line-of-sight distance dM between the transmitting antenna of height hr and receiving antenna of height hR in LOS communication is (R = radius of the earth)
(A) $h_T + h_R$ (B) $\sqrt{h_T + h_R}$ (C) $\frac{h_T + h_R}{2}$
(D) $\sqrt{h_T} + \sqrt{h_R}$ (E) $\sqrt{2Rh_T} + \sqrt{2Rh_R}$

42. If ε_0 and μ_0 are respectively the electrical permittivity and magnetic permeability of vacuum, the dimensional formula for $\frac{1}{\sqrt{m_0 e_0}}$ is
(A) MLT (B) MLT^{-2} (C) $ML^{-1}T^{-1}$ (D) M^0LT^{-1} (E) $M^0L^{-2}T$

43. The power in an electrical circuit for a current of 5 ± 0.4A and voltage 10 ± 0.2 V is measured at 10% error. To measure the power at 5% error the current should be measured at an error of
(A) 5% (B) 2% (C) 10% (D) 3% (E) 4%

44. The angular diameter of a planet measured from earth is 90". If the diameter of the planet is *n* x 10^6m , then its distance from the earth is
(A) 3.6 x 10^9 m (B) 7.2x $l0^9$ m (C) 3.6 x 10^6 m
(D) 7.2 x 10^6 m (E) 1.8^X 10^8 m

45. The angle between $\vec{A}$ and the resultant of $2\vec{A} + 3\vec{B}$ and $4\vec{A} - 3\vec{B}$ is
(A) 90^0 (B) $\tan^{-1}\left(\frac{A}{B}\right)$ (C) $\tan^{-1}\left(\frac{B}{A}\right)$ (D) $\tan^{-1}\left(\frac{A-B}{A+B}\right)$ (E) 0^0

46. A particle is moved in a semi-circular path of radius R. Then
(A) its average velocity is zero
(B) its average acceleration is zero
(C) its magnitude of displacement is 2R
(D) its average velocity and average speed are equal
(E) its distance travelled is equal to displacement

47. Two projectiles *P* and *Q* thrown with velocities v and v/2 respectively have the same range. If *Q* is thrown at an angle of 15° to the horizontal, *P* must be thrown at an angle of
(A) 30° (B) $\frac{1}{2}\sin^{-1}\left(\frac{1}{8}\right)$ (C) $\frac{1}{4}\sin^{-1}\left(\frac{1}{2}\right)$ (D) 60° (E) 45°

48. An object is thrown vertically with a velocity *u*. The velocity with which it strikes the ground on its return is
(A) u/2 (B) –u/2 (C) – u (D) u (E) *2u*

49. Pick out the correct statement
(A) Second law of motion is a vector equation
(B) Second law of motion is applicable to a particle and not to the system of particles
(C) Force is always in the direction of motion
(D) If external force on a body is zero, it does not mean the acceleration is zero
(E) Acceleration at an instant depends on the history of the motion of the particle

50. A boy is standing on a weighing machine inside a lift. When the lift goes upwards with acceleration g/4, the machine shows the reading 50 kg. wt. When the lift goes downward with acceleration g/4, the reading of the machine in kg. wt. would be
(A) 50 (B) 30 (C) 45.5 (D) 62.5 (E) 14

51. A ship of mass 2 x 10^7 kg initially at rest is pulled by a force of 5 x 10^5 N through a distance of 2 m. Assuming that the resistance due to water is negligible, the speed of the ship is
(A) 2 ms^{-1} (B) 0.01ms^{-1} (C) 0.1ms"^{1} (D) 1 ms^{-1} (E) 5 ms^{-1}

52. A force of $\left(2\hat{i}+3\hat{j}\right)N$ acts on a body of mass 1 kg which is at rest initially. The acceleration of the body is
(A) $\left(4\hat{i}+6\hat{j}\right)ms^{-2}$ (B) $\left(2\hat{i}+3\hat{j}\right)ms^{-2}$ (C) $\left(3\hat{i}+5\hat{j}\right)ms^{-2}$
(D) $\left(6\hat{i}+2\hat{j}\right)ms^{-2}$ (E) $\left(\hat{i}+\hat{j}\right)ms^{-2}$

53. The Work - Energy theorem
(A) does not hold in all inertial frames
(B) is independent of Newton's second law
(C) may be viewed as a scalar form of Newton's second law
(D) cannot be extended to non-inertial frames
(E) is independent of Newton's third law

54. A running boy has the same kinetic energy as that of a man of twice his mass. If the speed of the boy is 14.14 ms^{-1}, the speed of the man is
(A) 1.414 ms^{-1} (B) 0.25 ms^{-1} (C) 10 ms^{-1}
(D) $3\sqrt{2}$ ms^{-1} (E) 0.5 ms^{-1}

55. A body of mass 2 kg is moving with a momentum of 10 kg ms^{-1}. The force needed to increase its kinetic energy by four times in 10 seconds is
(A) 2 N (B) 4 N (C) 1 N (D) 0.5 N (E) 8 N

56. If a force $\vec{F}=\vec{i}-2\vec{j}-4\vec{k}$ acting on a particle displaces it from (1, 1, 1) to (2, - 1, 0), then the work done by the force (in units of work) is
(A) 2 (B) l (C) 5 (D) 4 (E) 9

57. A disc spinning at the rate 27.5 rad s^{-1} is slowed at the rate 10 rad s^{-2}. The time after which it will come to rest is
(A) 2.75 s (B) 5.5s (C) 1.25 s (D) 3.5 s (E) 6.2 s

58. Four particles of masses m_1 = 1 kg, m_2=2 kg, m_3 = 1 kg and m_4 are placed at the four corners of a square. The mass m_4 required, so that the centre of mass of all the four particles is exactly at the centre of the square is
(A) 3 kg (B) 4kg (C) 1.5 kg (D) 0.5 kg (E) 2kg

59. A solid sphere of radius *r* is revolving about one of its diameters with an angular velocity *co.* If it suddenly expands uniformly so that its radius increases to *n* times its original value, then its angular velocity becomes
(A) n^2 ω (B) ω/n^2 (C) nω (D) ω/n (E) 2 nω

60. If a ring rolls down from top to bottom of an inclined plane, it takes time t_1. If it slides, it takes time t_2. Then the ratio $\frac{t_2^2}{t_1^2}$ is
(A) 1/3 (B) 2/3 (C) 1/4 (D) 1/2 (E) 2/5

61. If the distance between sun and earth is *d*, then the angular momentum of earth around the sun is proportional to
(A) $\sqrt{d}$ (B) d^2 (C) $d^{1/3}$ (D) d (E) $d^{3/2}$

62. Two identical objects each of mass 50 kg are kept at a distance of separation of 50 cm apart on a horizontal table. The net gravitational force at the mid-point of the line joining their centres is
(A) zero (B) 6.6733 x 10^{-9} N (C) 13.346 x 10^{-9} N
(D) 3.336 x 10^{-9}N (E) 6.673 x $l0^6$N

63. The ratio of the weight of a body at a height of R/10 from the surface of the earth to that at a depth of R/10 is (R is radius of earth)
(A) 4 : 5 (B) 1 : 1 (C) 9 : 8 (D) 2 : 3 (E) 8 : 9

64. Three thin wires of equal length are suspended from the top of a roof. The respective ratio of their area of cross section is 1: 2: 4 and Young's modulii is 4 : 2 : 1, then the ratio of their weights to be attached at the other ends to obtain same elongation in them is
(A) 1 : 1 : 1 (B) 1 : 2 : 4 (C) 4 : 2 : 1 (D) 2 : $\sqrt{2}$: 1 (E) 1 : $\sqrt{2}$: 2

65. Water flows through a horizontal pipe of diameter 2 cm at a speed of 3 cm s^{-1}. The pipe has a nozzle of diameter 0.5 cm at its end. The speed of water emerging from the nozzle is
(A) 6 cm s^{-1} (B) 48 cm s^{-1} (C) 16 cm s''^{1} (D) 12 cms^{-1} (E) 36 cms^{-1}

66. The density of kerosene is 800 kg m^{-3} . Its relative density is
(A) 1.6 (B) 3.2 (C) 1 (D) 0.8 (E) 0.4

67. A solid sphere of volume V experiences a viscous force F when descending with a speed v in a liquid. If another solid sphere of volume 27 V descends with the same speed v in the same liquid, it experiences a viscous force
(A) 12 F (B) 6 F (C) 9 F (D) F (E) 3 F

68. Two taps supply water to a container, one at the temperature of 20°C at the rate of 2 kg/minute and another at 80°C at the rate of 1 kg/minute. If the container gets water from the two taps simultaneously for 10 minutes, then the temperature of water in the container is
(A) 35°C (B) 30°C (C) 50°C (D) 40°C (E) 45°C

69. If a monoatomic gas is compressed adiabatically to (l/27)th of its initial volume, then its pressure becomes
(A) 27 times (B) 125 times (C) 243 times (D) 81 times (E) 64 times

70. The values of C_p and C_v for a diatomic gas are respectively (R=gas constant)
(A) 5/2R, 7/2R (B) 3/2 R, 5/2 R (C) 3R, 4R
(D) 5/2R, 3/2R (E) 7/2 R, 5/2 R

71. Three moles of an ideal gas are in a rigid cubical box with sides of length 0.170 m. The ratio of the forces that the gas exerts on each of the six sides of the box when the gas temperature are 27°C and 127°C is
(A) 6 : 1 (B) 1 : 2 (C) 3 : 1 (D) 3 : 4 (E) 1 : 3

72. The average kinetic energy of a monoatomic gas molecule kept at temperature 27°C is (Boltzmann constant $k = 1.3 \times 10^{-23}$ JKT^{-1})
(A) 5.85 x l0^{-21}J (B) 4.12 x l0^{-21}J (C) 3.75 x l0^{-21}J
(D) 2.85 x l0^{-21}J (E) 7.55 x l0$^{-2,}$J

73. In the coagulation of a positive sol, the flocculating power of the ions PO_4^{3-}, SO_4^{2-} and Cl^- decreases I the other
(A) $PO_4^{3-} > Cl^- > SO_4^{2-}$ (B) $PO_4^{3-} > SO_4^{2-} > Cl^-$ (C) $Cl^- > SO_4^{2-} > PO_4^{3-}$
(D) $Cl^- > PO_4^{3-} > SO_4^{2-}$ (E) $SO_4^{2-} > PO_4^{3-} > Cl^-$

74. Which one of the following nitrates does not give the corresponding metallic oxide, nitrogen dioxide and oxygen on heating?
(A) Lithium nitrate (B) Beryllium nitrate (C) Magnesium nitrate
(D) Calcium nitrate (E) Potassium nitrate

75. Which of the following statement is **incorrect** about beryllium?
(A) Beryllium hydroxide is amphoteric.
(B) Beryllium compounds are largely covalent.
(C) Beryllium is not easily attacked by acids.
(D) Beryllium exhibit coordination number of six.
(E) Beryllium hydroxide dissolves in excess of alkali to give a beryllate ion.

76. The oxyacid of phosphorus that contains one P-OH, two P-H and one P= O bonds is
(A) Phosphinic acid (B) Phosphoric acid (C) Pyrophosphoric acid
(D) Hypophosphoric acid (E) Pyrophosphorous acid

77. Choose the correct statements about diborane
I. It is prepared by the oxidation of sodium borohydride with iodine.
II. It undergoes cleavage reactions with Lewis bases to give borane adducts.
III. It is produced on an industrial scale by the reaction of BF3 with LiAltU.
IV. It is readily hydrolysed by water to give borazine.
V. It burns in oxygen and gives boron trioxide.
(A) I, II, III (B) I, II, V (C) I, II, IV (D) II, III, IV (E) I, III, V

78. Which one of the following actinoid has no electron in 6d orbital?
(A) Pa (B) Np (C) Lr (D) Cm (E) Pu

79. The catalyst used in the Wacker process of oxidation of ethyne to ethanal is
(A) Silver (B) Nickel (C) $PdCl_2$
(D) V_20_5 (E) Ziegler catalyst

80. The correct formula of dichlorobis (triphenylphosphine) nickel(II) is
(A) $[NiCl_2(PPh_3)_2]Cl$ (B) $[NiCl_2(PPh_3)]$ (C) $[NiCl_2(PPh_2)_3]$
(D) $[NiCl(PPh_3)_2]Cl$ (E) $[NiCl_2(PPh_3)_2]$

81. Which one of the following is an ambidentate ligand?
(A) CI^- (B) H_20 (C) $H_2NCH_2CH_2NH_2$
(D) SCN^- (E) $C_20_4^{2-}$

82. Which one is *not* correctly matched?

Ore		Composition
(A) Siderite	-	$FeCO_3$
(B) Calamine	-	$ZnCO_3$
(C) Sphalerite	-	ZnS
(D) Kaolinite	-	$[Al_2(OH)_4Si_2O_5]$
(E) Cuprite	-	$CuC0_3.Cu(OH)_2$

83. Which one of the following is a benzenoid aromatic compound?
(A) Cyclooctatetraene (B) Hexyne (C) Cyclohexane
(C) Toluene (E) Cyclopentadiene

84. The products obtained by the ozonolysis of 2-methylbut-1 -ene are
(A) propanone and ethanal (B) propanone and methanal
(C) butanone and methanal (D) ethanal and propanal
(E) butanone and methanol

85. Which one of the following is not an isomer of 3-methylbut-l-yne?
(A) 2,3-Dimethylbuta-1,3-diene (B) Pent-1 -yne (C) Pent-2-yne
(D) Penta-l,3-diene (E)2-Methylbuta-l,3-diene

86. The compound that does not undergo hydrolysis by S_NI mechanism is
(A) $C_6H_5CH_2C1$ (B) $C_6H_5CH(CH3)C1$ (C) C_6H_5C1
(D) CH_3CH_2C1 (E) $C_6H_5CH(C_6H5)C1$

87. Which one of the following is a secondary alcohol?
(A) 2-methylbutan-2-ol (B) 3 -methylbutan-1 -ol (C) 2-methylbutan-1 –ol
(D) 3-methylbutan-2-ol (E) 2,2-dimethylbutan-1 -ol

88. An organic compound 'A' with molecular formula C_7H_6O forms 2,4-DNP derivative and reduces Tollens' reagent. When 'A' is heated with cone. KOH, it gives sodium benzoate and compound 'B'. The compound 'B' is
(A) Benzene (B) Toluene (C) Acetophenone
(D) Benzaldehyde (E) Benzyl alcohol

89. Which one of the following compounds would undergo Cannizaro reaction?
(A) 2-Methylpentanal (B) Cyclohexanone (C) 2,2-Dimethylbutanal
(D) 1-Phenylpropanone (E) Phenylacetaldehyde

90. Which one of the following can be prepared by Gabriel phthalimide synthesis?
(A) 2-Aminotoluene (B) Aniline (C) 4-Bromoaniline
(D) Allylamine (E) N-Methylethanamine

91. The reagent that is used to distinguish between a secondary amine and a tertiary amine is
(A) p-toluenesulphonyl chloride (B) dil. HC1 (C) dil. NaOH
(D) CHCI3 and ale. KOH (E) bromine water

92. Choose the correct statement of the following
(A) Cellulose is also known as animal starch.
(B) A linkage between two monosaccharide units through oxygen atom is called oxide Linkage.
(C) Glucose on oxidation with bromine water gives n-hexane.
(D) Carbohydrates are used as storage molecules as starch in animals.
(E) Water insoluble component of starch is amylopectin.

93. Among the following which one is a non-reducing sugar?
(A) Lactose (B) Glucose (C) Sucrose (D) Maltose (E) Fructose

94. Which one of the following polymer is a copolymer formed by condensation polymerisation?
(A) Buna-S (B) Neoprene (C) Polythene
(D) Melamine-formaldehyde (E) Buna-N

95. Which one of the following sets forms the biodegradable polymer?
(A) 3-Hydroxybutanoic acid and 3-hydroxypentanoic acid.
(B) Acrylonitrile and 1,3-butadiene.
(C) Urea and formaldehyde.
(D) Ethylene glycol and terephthalic acid.
(E) Adipic acid and hexamethylene diamine.

96. The antimicrobial drug that contains arsenic is
(A) Prontosil (B) Salvarsan (C) Sulphapyridine
(D) Ofloxacin (E) Sulphanilamide

97. Which one of the following statements is **not** correct?
(A) All monosaccharides are reducing sugars.
(B) Lactose is commonly known as milk sugar.
(C) Glucose pentaacetate does not react with hydroxylamine.
(D) Glucose does not give 2,4- DNP test.
(E) Glucose on oxidation with bromine water, gives saccharic acid.

98. Which one of the following is an antifertility drug?
(A) Bithionol (B) Ofloxacin (C) Norethindrone
(D) Aspartame (E) Terpineol

99. Which one of the following is a greenhouse gas?
(A) Methane (B) Ethane (C) Hydrogen sulphide
(D) Acetylene (E) Ethylene

100. Which one of the following will have the largest number of atoms?
(A) lg Au(s) (B) lg Na(s) (C) lg Li(s)
(D) lg of $Cl_2(g)$ (E) lg of $O_2(g)$

101. An organic compound contains 24% carbon, 4% hydrogen and remaining chlorine. Its empirical formula is
(A) CHC1 (B) CH_2C1 (C) $CHCI_2$ (D) CH_3CI (E) CH_2CI_2

102. The IUPAC name of an element is Unbinilium. Its atomic number is
(A) 102 (B) 110 (C) 120 (D) 106 (E) 100

103. The number of electrons, protons and neutrons in a species are equal to 10, 11 and 12 respectively. The proper symbol of the species is
(A) ${}^{22}_{11}Na^{+}$ (B) ${}^{23}_{11}Na$ (C) ${}^{23}_{10}Ne$ (D) ${}^{23}_{11}Na^{+}$ (E) ${}^{23}_{11}Na^{2+}$

104. Which one of the following element is represented as Eka-Silicon in Mendeleev's periodic table?
(A) Gallium (B) Germanium (C) Aluminium (D) Tin (E) Arsenic

105. The correct match among the following is

(a) Lithium, Sodium, Potassium	(i) Alkaline earth metals
(b) Beryllium, Magnesium, Calcium	(ii) Semi-metals
(c) Oxygen, Sulphur, Selenium	(iii) Alkali metals
(d) Silicon, Germanium, Arsenic	(iv) Chalcogens

(A) (A)-(ii), (B)-(i), (C)-(iv), (D)-(iii) (B) (A)-(iv), (B)-(ii), (C)-(i), (D)-(iii)
(C) (A)-(iii), (B)-(i), (C)-(iv), (D)-(ii) (D) (A)-(iii), (B)-(iv), (C)-(i), (D)-(ii)
(E) (A)-(ii), (B)-(i), (C)-(iii), (D)-(iv)

106. Which one of the following molecules is formed by sp^3d hybridisation?
(A) BrF_5 (B) PF_5 (C) SF_6 (D) $[Co(NH_3)_6]^{3+}$ (E) $[Pt(Cl)_4]^{2-}$

107. The correct order of bond energy (in kJ/mol) of the following molecules is
(A) $O_2<B_2<C_2<N_2$ (B) $B_2<C_2<0_2<N_2$ (C) $C_2<0_2<B_2<N_2$
(D) $B_2<0_2<C_2<N_2$ (E) $B_2<0_2<N_2<C_2$

108. The type of attractive forces that operate between gaseous HC1 molecules is
(A) dipole-dipole forces (B) dispersion forces
(C) ion-dipole forces (D) dipole-induced dipole forces
(E) electrostatic forces

109. Schottky defect is shown by
(A) ionic substances in which the size of the cation is smaller than that of the anion
(B) ionic substances in which the cation and anion are of almost similar sizes
(C) ionic substances in which the size of the cation is larger than that of the anion
(D) non-stoichiometric inorganic solids
(E) non-ionic substances

110. In which one of the following reactions, entropy decreases?
(A) Sodium chloride is dissolved in water
(B) Water is heated from 303K to 353K
(C) Sodium bicarbonate is decomposed to $Na_2CO_3(s)$, $C0_2(g)$ and $H_2O(g)$
(D) Water crystallizes into ice
(E) Dihydrogen molecule is decomposed into hydrogen atoms

111. The standard enthalpies of formation of $H_20(1)$ and $C0_2(g)$ are respectively -286 kJ mol^{-1} and -394 kJ mol^{-1}. If the standard heat of combustion of $CH_4(g)$ is -891 kJ mol^{-1}, then the standard enthalpy of formation of $CH_4(g)$ is
(A) –75 kJ mol^{-1} (B) +75 kJ mol^{-1} (C) –211 kJ mol^{-1}
(D) +211 kJ mol^{-1} (E) –1571 kJ mol^{-1}

112. The equilibrium constant for the equilibrium $PCl_5(g)$ ‡ ^ † $PCl_3(g) + Cl_2(g)$ at a particular temperature is 2 x 10^{-2}mol dm^{-3}. The number of moles of PCI_5 that must be taken in a one-litre flask at the same temperature to obtain a concentration of 0.20 mol of chlorine at equilibrium is
(A) 2.0 (B) 2.2 (C) 1.8 (D) 0.2 (E) 0.1

113. The pH of the resultant solution obtained by mixing 20mL of 0.01M HCl and 20mL of 0.005M $Ca(OH)_2$ is
(A) 2 (B) 0 (C) l (D) 7 (E) 5

1l4. $CH_4(g) + 4Cl_2(g) \longrightarrow CC1_4(1) + 4HCl(g)$
In the above reaction, the change of oxidation state of carbon is
(A) from +4 to –4 (B) from +1 to +4 (C) from –4 to +4
(D) from –1 to +1 (E) from – 4 to –1

115. How many moles of platinum will be deposited on the cathode when 0.40 F of electricity is passed through a 1.0 M solution of Pt^{4+}?
(A) 0.60 mol (B) 1.0 mol (C) 0.40 mol (D) 0.45mol (E) 0.10 mol

116. When the same amount of the solute 'P' and 'Q' are separately dissolved in 500g water, the ΔT_f values are 0.15K and 0.30K respectively. If the molecular weight of 'P' is 80 g mol^{-1}, then the molecular weight of 'Q' is
(A) 30 g mol^{-1} (B) 60 g mol^{-1} (C) 40 g mol^{-1}
(D) 45 g mor^{-1} (E) 160 g mol^{-1}

117. A solution is prepared by dissolving 20g NaOH in 1250 mL of a solvent of density 0.8 g/mL. Then the molality of the solution is
(A) 0.2 mol kg^{-1} (B) 0.08 mol kg^{-1} (C) 0.25 mol kg^{-1}
(D) 0.0064 mol kg^{-1} (E) 0.5 mol kg^{-1}

118. The rate constant of a first order reaction is 231 x 10^{-5} s^{-1}. How long will 4 g of this reactant reduce to 2 g?
(A) 310 s (B) 300s (C) 210s
(D) 30.1s (E) 230.3 s

119. An endothermic reaction A $\longrightarrow$ B has an activation energy of 13 kJ mol^{-1} and the enthalpy change for the reaction is 2 kJ mol^{-1}. The activation energy of the reaction B $\longrightarrow$ A is
(A) 15 kJ mol^{-1} (B) 11 kJ mol^{-1} (C) 2 kJ mol^{-1}
(D) -15 kJ mol^{-1} (E) 26 kJ mol^{-1}

120. Adsorption is accompanied by
(A) decrease in enthalpy and decrease in entropy
(B) increase in enthalpy and decrease in entropy
(C) decrease in enthalpy and increase in entropy
(D) increase in enthalpy and increase in entropy
(E) no change in enthalpy and entropy