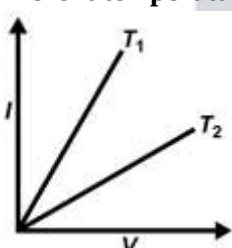
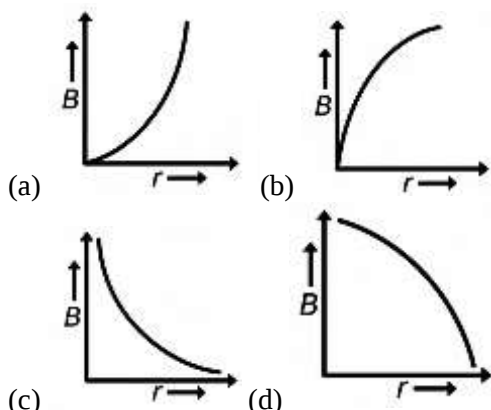


PHYSICS

- A uniform circular disc of mass 400 g and radius 4.0 cm is rotated about one of its diameter at an angular speed of 10 rot/s. The kinetic energy of the disc is
 (a) 3.2×10^{-5} J (b) 3.2×10^{-1} J
 (c) 3.2×10^{-3} J (d) 6.4×10^{-4} J
- Several lamps of 50 W and 100 V rating are available. How many of them can be connected in parallel across a battery of a 120 V of internal resistance 10Ω , so that all bulbs glow in full power?
 (a) 2 (b) 4
 (c) 6 (d) 8
- A stone weight 100 N on the surface of the earth. The ratio of its weight at a height of half the radius of the earth to a depth of half the radius of the earth will be approximately
 (a) 3.6 (b) 2.2
 (c) 1.8 (d) 0.9
- The gravitational field strength at the surface of a certain planet is g. Which of the following is the gravitational field strength at the surface of a planet with twice the radius and twice the mass?
 (a) $g/2$ (b) g
 (c) 2g (d) 4g
- A crane with a steel cable of length 11 m and radius 2.0 cm is employed to lift a block of concrete of mass 40 tons in a building site. If the Young's modulus of steel is 2.0×10^{11} Pa, what will be roughly the increase in the length of the cable while lifting the block?
 (Take, $g = 10 \text{ ms}^{-2}$)
 (a) 0.75 cm (b) 1.25 cm
 (c) 1.75 cm (d) 2.50 cm
- I and V are respectively the current and voltage in a metal wire of resistance R. The I – V graph for the two different temperatures T_1 and T_2 given, then

 (a) $T_1 = T_2$ (b) $T_1 > T_2$
 (c) $T_1 < T_2$ (d) $T_1 = 2T_2$
- A charged particle moves in a uniform magnetic field. The velocity of the particle at some instant makes an acute angle with the magnetic field. The path of the particle will be
 (a) a straight line
 (b) a circle
 (c) a helix with uniform pitch
 (d) a helix with non-uniform pitch
- A certain length of insulated wire can be bent to form either a single circular loop (case I) or a double loop of smaller radius (case II). When the same steady current is passed through the wire, the ratio of the magnetic field at the centre in (case I) to that in (case II) is
 (a) 1 (b) 2
 (c) $1/2$ (d) $1/4$
- Inside a cyclotron, a charged particle is subjected to both an electric field and a magnetic field. It gains kinetic energy due to the
 (a) electric field (b) magnetic field
 (c) Both (a) and (b) (d) None of these

10. The graph showing the variation of the magnetic field strength B with distance r from a long current carrying conductor is



11. The temperature at which centigrade and Fahrenheit scales give the same reading, is

- (a) -40° (b) 40°
(c) -30° (d) 30°

12. The correct definition of Meissner effect is

- (a) the phenomenon of perfect paramagnetism in superconductors
(b) the phenomenon of perfect diamagnetism in superconductors
(c) the phenomenon of perfect diamagnetism in semiconductors
(d) the phenomenon of perfect ferromagnetism in metals

13. A jet plane is travelling west at 450 m/s. If the horizontal component of earth's magnetic field is 4×10^{-4} T and angle of dip is 30° , then the vertical component is

- (a) 3×10^{-4} T (b) 4×10^{-4} T
(c) 23×10^{-4} T (d) 12308×10^{-4} T

14. A bicycle generator creates 1.5 V at 15 km/h. The emf generated at 10 km/h is

- (a) 1.5 V (b) 2 V
(c) 0.5 V (d) 1 V

15. The instantaneous voltage of a 50 Hz generator giving peak voltage as 300 V. The generator equation for this voltage is

- (a) $V = 50 \sin 300\pi t$ (b) $V = 300 \sin 100\pi t$
(c) $V = 6 \sin 100\pi t$ (d) $V = 50 \sin 100\pi t$

16. A transformer is used to light a 100 W, 110 V lamp from a 220 V supply. If the supply current is 0.6 A, then the efficiency of the transformer is

- (a) 66% (b) 76%
(c) 86% (d) 96%

17. If instantaneous current is given by $i = 4 \cos(\omega t + \phi)$, then the rms value of current is

- (a) $2\sqrt{2}$ A (b) 4 A
(c) $4\sqrt{2}$ A (d) zero

18. If the surface is a perfect reflector, then the change in momentum of the wave after falling on the surface is

- (a) p (b) $2p$
(c) $\frac{p}{2}$ (d) $-2p$

19. A person sitting firmly over a rotating stool has his arms stretched. If he folds his arms, his angular momentum about the axis of the rotation

- (a) increases (b) decreases
(c) remains unchanged (d) doubles

20. The temperature of two bodies A and B are 727°C and 327°C respectively, the ratio $H_A : H_B$ of the rates of heat radiated by them is

- (a) 727:327 (b) 5:3
(c) 25:9 (d) 625:81
21. The refractive index and the permeability of a medium are respectively 1.5 and $5 \times 10^{-7} \text{Hm}^{-1}$. The relative permittivity of the medium is nearly
(a) 25 (b) 15
(c) 6 (d) 10
22. All lights are switched off, except for a bright point-light source kept at the bottom of a swimming pool filled with clear water of refractive index $4/3$. As a result, only a circular patch of 6 m diameter of the water surface is visible to spectators standing around the swimming pool. Which of the following gives the nearest value of the depth of the pool?
(a) 1.6 m (b) 2.0 m
(c) 2.6 m (d) 3.0 m
23. An equiangular glass prism of refractive index 1.6 is kept fully immersed in water of refractive index $4/3$, for a certain ray of monochromatic light. What is the closest value for the angle of minimum deviation of the light ray in this setup? (Take, $\sin 37^\circ = 0.6$)
(a) 10° (b) 14°
(c) 18° (d) 22°
24. A concave mirror gives an image three times as large as its object placed at a distance of 20 cm from it. For the image to be real, the focal length should be
(a) 10 cm (b) 15 cm
(c) 20 cm (d) 30 cm
25. Two coherent monochromatic light beams of intensities I and $4I$ are superimposed. The maximum and minimum possible resulting intensities are
(a) $5I$ and 0 (b) $5I$ and $3I$
(c) $9I$ and I (d) $9I$ and $3I$
26. The momentum of electrons having a wavelength $2\text{\AA}$ (given, $h = 6.626 \times 10^{-34} \text{ J-s}$, $m = 9.1 \times 10^{-31} \text{ kg}$) is
(a) $6.313 \times 10^{-24} \text{ kg-ms}^{-1}$
(b) $3.313 \times 10^{-24} \text{ kg-ms}^{-1}$
(c) $9.313 \times 10^{-25} \text{ kg-ms}^{-1}$
(d) $12.313 \times 10^{-24} \text{ kg-ms}^{-1}$
27. The photoelectric current of voltage in a certain experiment is 1.5 V. What is the maximum kinetic energy of photoelectrons emitted?
(a) $24 \times 10^{-19} \text{ J}$ (b) $-24 \times 10^{-19} \text{ J}$
(c) $2.4 \times 10^{-19} \text{ J}$ (d) $2.04 \times 10^{-19} \text{ J}$
28. The best waves for emission of electrons from a surface are
(a) microwaves (b) ultraviolet rays
(c) infrared rays (d) X-rays
29. The shortest wavelengths of Paschen, Balmer and Lyman series are in the ratio
(a) 9:1:4 (b) 1:4:9
(c) 9:4:1 (d) 1:9:4
30. A sample of a radioactive element whose half-life is 30 s contains a million nuclei at a certain instant of time. How many nuclei will be left after 10 s?
(a) 3.33×10^5 (b) 3.78×10^5
(c) 7.96×10^5 (d) 1.26×10^5
31. A nuclear fission is said to be critical when multiplication factor or k
(a) $k = 1$ (b) $k > 1$
(c) $k < 1$ (d) $k = 0$

32. In case of a p – n junction diode at high value of reverse bias, the current rises sharply. The value of reverse bias is known as

- (a) cut-in (b) zener voltage
(c) inverse voltage (d) critical voltage

33. The truth table of a logic gate is given below

Input		Output
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

The logic gate is

- (a) OR gate (b) AND gate
(c) NOR gate (d) NAND gate

34. In a semiconductor diode, the reverse biased current is due to drift of the free electrons and holes caused by

- (a) thermal expansion only
(b) impurity atoms only
(c) Both (a) and (b)
(d) Neither (a) nor (b)

35. A TV tower is 120 m high. How much more height is to be added to it, if its coverage range is to become double?

- (a) 120 m (b) 240 m
(c) 360 m (d) 480 m

36. A message signal of frequency 10 kHz and peak value of 10 V is used to moderate a carrier of frequency 1 MHz and peak voltage 20 V . The modulation index and side bands produced are

- (a) 0.4 and 1200kHz, 990kHz
(b) 0.5 and 1010kHz, 990kHz
(c) 0.2 and 1010kHz, 1000kHz
(d) 0.5 and 1500kHz, 1000kHz

37. Vector A has a magnitude of 10 units and makes an angle of 30° with the positive X-axis. Vector B has a magnitude of 20 units and makes an angle of 30° with the negative X-axis. What is the magnitude of the resultant between these two vectors?

- (a) $20\sqrt{3}$ (b) 35
(c) $15\sqrt{3}$ (d) $10\sqrt{3}$

38. A uniform chain of length L is lying partly on a table, the remaining part hanging down from the edge of the table. If the coefficient of friction between the chain and the table is 0.5 , what is the minimum length of the chain that should lie on the table, to prevent the chain from slipping down to the ground?

- (a) $L/3$ (b) $L/2$
(c) $2L/3$ (d) $3L/4$

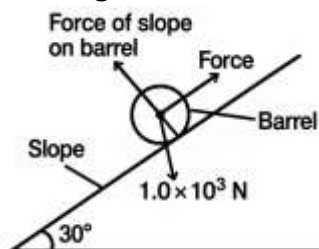
39. A bomb of mass 18 kg at rest explodes into two pieces of masses 6 kg and 12 kg . The velocity of 12 kg mass is 4 m/s. The kinetic energy of the other mass is

- (a) 288 J (b) 192 J
(c) 96 J (d) 144 J

40. A soap bubble of radius r is blown up to form a bubble of radius 3r under isothermal conditions. If σ is the surface tension of soap solution, then the energy spent in blowing is

- (a) $3\pi\sigma r^2$ (b) $6\pi\sigma r^2$
(c) $12\pi\sigma r^2$ (d) $64\pi\sigma r^2$

41. The diagram shows a barrel of weight 1.0×10^3 N on a frictionless slope inclined at 30° to the horizontal.



The force is parallel to the slope. What is the work done in moving the barrel a distance of 5.0 m up the slope?

- (a) 2.5×10^3 J (b) 4.3×10^3 J
(c) 5.0×10^3 J (d) 1.0×10^3 J
42. A 2 kg mass lying on a table is displaced in the horizontal direction through 50 cm. The work done by the normal reaction will be
(a) 10 J (b) 0
(c) 100 erg (d) 100 J
43. The dimensions of four wires of the same material are given below. In which wire the increase in length will be maximum when the same tension is applied?
(a) Length 100 cm, diameter 1 mm
(b) Length 200 cm, diameter 2 mm
(c) Length 300 cm, diameter 3 mm
(d) Length 50 cm, diameter 0.5 mm
44. Under a constant pressure head, the rate of flow of orderly volume flow of liquid through a capillary tube is V . If the length of the capillary is doubled and the diameter of the bore is halved, then the rate of flow would become
(a) $V/4$ (b) $V/8$
(c) $16V$ (d) $V/32$
45. A ball is dropped from the top of the building 100 m high. Simultaneously, another ball is thrown upwards from the bottom of the building with such a velocity that the balls collide exactly mid-way. What is the speed in ms^{-1} with which the second ball is thrown? (Take, $g = 10 \text{ ms}^{-2}$)
(a) 31.6 (b) 27.8
(c) 22.4 (d) 19.6
46. In an isochoric process
(a) work done is constant
(b) volume changes, work done remains same
(c) volume remains constant and no work is done by the system
(d) Both volume and work done changes
47. The average energy of molecules in a sample of oxygen gas at 300 K is 6.21×10^{-21} J. The corresponding values at 600 K are
(a) 12.12×10^{-21} J (b) 8.78×10^{-21} J
(c) 6.21×10^{-21} J (d) 12.42×10^{-21} J
48. A mass M is suspended from a light spring. An additional mass m added displaces the spring further by a distance X . Now, the combined mass will oscillate on the spring with period
(a) $T = 2\pi \sqrt{\frac{mg}{X(M+m)}}$ (b) $T = 2\pi \sqrt{\frac{(M+m)X}{mg}}$
(c) $T = \frac{\pi}{2} \sqrt{\frac{mg}{X(M+m)}}$ (d) $T = 2\pi \sqrt{\frac{(M+m)}{mg}}$

49. A 10 kg collar is attached to a spring (spring constant 600 N/m), it slides without friction over a horizontal rod. The collar is displaced from its equilibrium position by 20 cm and released. What is the speed of the oscillation?
- (a) $\sqrt{60} \times 0.2$ m/s (b) 60×0.2 m/s
(c) 60×2 m/s (d) 6×0.2 m/s
50. A body of mass 1 kg starting from origin with initial velocity of $3\hat{i} + 4\hat{j}$ ms⁻¹. If a constant force of $2\hat{i} - 3\hat{j}$ acts on it, find the coordinate of point it reaches in 3 s.
- (a) (18, -1.5) (b) (9, 1.5)
(c) (18, 1.5) (d) (9, -15)
51. A steel wire has a length of 90 cm which is under a constant tension of 100 N. The speed of the transverse waves that can be produced in the wire will be (take, the mass of the steel wire to be 6×10^{-3} kg)
- (a) 50 m/s (b) 50 cm/s
(c) $1/3\sqrt{6}$ m/s (d) $50\sqrt{6}$ m/s
52. The number of electrons in 1 C of charges is
- (a) 6.25×10^{18} (b) 6.25×10^{16}
(c) 6.25×10^{10} (d) 6.25×10^{12}
53. An electric dipole consists of two opposite charges, each of magnitude 1.0 μ C separated by a distance of 2.0 cm. The dipole is placed in an external field of 10^5 NC⁻¹. The maximum torque on the dipole is
- (a) 0.2×10^{-3} N - m (b) 1×10^{-3} N - m
(c) 2×10^{-3} N - m (d) 4×10^{-3} N - m
54. Two small charged spheres A and B have charges 10 μ C and 40 μ C respectively and are held at separation of 90 cm from each other. At what distance from A, electric field intensity would be zero?
- (a) 22.5 cm (b) 18 cm
(c) 30 cm (d) 36 cm
55. A charge q is placed at the centre of a cube. The electric flux passing through the cube is
- (a) $\frac{1}{3} \frac{q}{\epsilon_0}$ (b) $\frac{1}{6} \frac{q}{\epsilon_0}$
(c) $\frac{q}{\epsilon_0}$ (d) $\frac{1}{4} \frac{q}{\epsilon_0}$
56. A parallel plated capacitor has area 2 m² separated by 3 dielectric slabs. Their relative permittivity is 2, 3, 6 and thickness is 0.4 mm, 0.6 mm, 1.2 mm, respectively. The capacitance is
- (a) 5×10^{-8} F (b) 11×10^{-5} F
(c) 2.95×10^{-8} F (d) 10×10^{-8} F
57. A particle A has charge +q and particle B has charge +4q, each of them having the same mass m. When allowed to fall from rest through the same electrical potential difference, then the ratio of their speeds will become
- (a) 2: 1 (b) 1: 2
(c) 1: 4 (d) 4: 1
58. A body accelerates from rest with a uniform acceleration a for a time t. The uncertainty in a is 8% and the uncertainty in t is 4%. The uncertainty in the speed is
- (a) 32% (b) 12%
(c) 8% (d) 2%
59. A parallel plate capacitor has a capacity C. The separation between the plates is doubled and a dielectric medium is inserted between the plates. If the capacity is 3C, then the dielectric constant of the medium will be
- (a) 1.5 (b) 3
(c) 6 (d) 12
60. Two resistances A and B have colour codes orange, blue, white and brown, red, green, respectively. Then, ratio of their resistances A: B is

- (a) 3:1 (b) 1:3
(c) $1:3 \times 10^4$ (d) $3 \times 10^4:1$

CHEMISTRY

61. 20 mL of acetic acid reacts with 20 mL of ethyl alcohol to form ethyl acetate. The density of acid and alcohol are 1 g/mL and 0.7 g/mL respectively. The limiting reagent in this reaction is

- (a) acetic acid
(b) ethyl alcohol
(c) acetic acid and ethyl alcohol
(d) ester

62. The mass of oxygen gas which occupies 5.6 L at STP would be

- (a) the gram atomic mass of oxygen
(b) one-fourth of the gram atomic mass of oxygen
(c) double the gram atomic mass of oxygen
(d) half of the gram atomic mass of oxygen

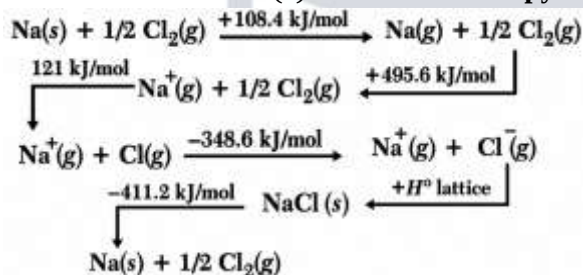
63. Energy associated with the first orbit of He^+ is

- (a) $8.72 \times 10^{-18} \text{ J}$ (b) $0.872 \times 10^{-18} \text{ J}$
(c) $-0.872 \times 10^{-18} \text{ J}$ (d) $-8.72 \times 10^{-18} \text{ J}$

64. Pick the incorrect statement among those given below.

- (a) Multiple covalent bonds are shorter, than single covalent bonds between same set of atoms.
(b) Bond strength varies inversely with bond length.
(c) Bond order of isoelectronic species will be same.
(d) Bond enthalpy increases with increasing bond length.

65. For one mole of NaCl(s) the lattice enthalpy is



- (a) -788 kJ/mol (b) $+878 \text{ kJ/mol}$
(c) $+788 \text{ kJ/mol}$ (d) -878 kJ/mol

66. An endothermic reaction is found to have +ve entropy change. The reaction will be

- (a) possible at high temperature
(b) possible only at low temperature
(c) not possible at any temperature
(d) possible at any temperature

67. For an adiabatic change in a system, the condition which is applicable will be

- (a) $w = 0$ (b) $q = -w$
(c) $q = w$ (d) $q = 0$

68. Which of the following equations give ionic product of water?

- (I) $\text{NH}_3(\text{aq}) + \text{H}_2\text{O} \rightarrow \text{NH}_4^+(\text{aq}) + \text{OH}^-(\text{aq})$
(II) $\text{NH}_4^+(\text{aq}) + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{NH}_3(\text{g})$
(III) $\text{NH}_2^-(\text{aq}) + \text{H}_2\text{O} \rightleftharpoons \text{NH}_3(\text{g}) + \text{OH}^-(\text{aq})$
(IV) $\text{NH}_3(\text{g}) + \text{OH}^-(\text{aq}) \rightarrow \text{NH}_2^-(\text{aq}) + \text{H}_2\text{O}$

- (a) II and III (b) III and IV
(c) I and II (d) III and I

69. The number of H^+ ions present in 1 mL of a solution whose pH is 13

- (a) 6.022×10^{10} (b) 6.022×10^7
(c) 6.022×10^{20} (d) 6.022×10^{23}

70. Strongest reducing agent among the following is

- (I) $Na^+ + e^- \rightarrow Na(s)$ $E^\circ = -2.71 V$
(II) $Al^{3+} + 3e^- \rightarrow Al(s)$ $E^\circ = -1.66 V$
(III) $F_2(g) + 2e^- \rightarrow 2 F^-$ $E^\circ = +2.87 V$
(IV) $2H_2O + 2e^- \rightarrow H_2(g) + 2OH^-(aq);$
 $E^\circ = -0.83 V$

- (a) only IV (b) only III
(c) only II (d) only I

71. Choose the correct statement applicable for the reaction: $2H_2O + 2 F_2 \rightarrow 4HF + O_2$

- (a) water is oxidised to O_2 .
(b) F_2 is oxidised to HF .
(c) water is reduced to HF .
(d) F_2 acts as reducing agent in the reaction.

72. Decomposition of hydrogen peroxide can be prevented by adding

- (a) NaOH (b) MnO_2
(c) urea (d) oxalic acid

73. Mg is an important component of

- (a) haemoglobin (b) chlorophyll
(c) ATP (d) florigen

74. $Pb_3O_4 + 4HNO_3 \rightarrow 2 Pb(NO_3)_2 + PbO_2 + 2H_2O$

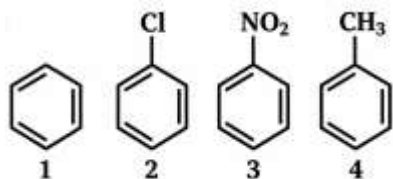
Which is true about the lead ions in Pb_3O_4 ?

- (a) Pb^{2+} reacts with HNO_3 to give lead nitrate.
(b) Pb^{4+} reacts with HNO_3 to give lead nitrate.
(c) Pb^{2+} reacts with HNO_3 to give PbO_2 .
(d) Pb^{4+} reacts with HNO_3 to give PbO_2 .

75. Which of the following chemicals does not liberate hydrogen gas on reaction with aluminium metal?

- (a) Dil. sulphuric acid
(b) Aqueous sodium hydroxide
(c) Dil. hydrochloric acid
(d) Conc. nitric acid

76. The decreasing order of reactivity towards electrophilic substitution of the following compounds is



- (a) $1 > 3 > 4 > 2$ (b) $4 > 1 > 3 > 2$
(c) $4 > 1 > 2 > 3$ (d) $1 > 4 > 3 > 2$

77. An organic compound weighing 0.15 g gave on Carius estimation, 0.12 g of AgBr. The percentage of Br in the compound will be close to (Atomic mass of Ag = 108, Br = 80)

- (a) 46% (b) 34.1%
(c) 3.41% (d) 4.6%

78. Identify the correct IUPAC name of the following compound.



- (a) Butyl cyanide (b) Butanenitrile
(c) Pentanenitrile (d) Pentyl cyanide

79. Identify the main product in the following reaction. $\text{C}(\text{CH}_3)_3\text{OH} \xrightarrow[358 \text{ K}]{20\% \text{H}_3\text{PO}_4} ?$
- (a) $(\text{CH}_3)_2\text{C} = \text{CH}_2$ (b) $(\text{CH}_3)_2\text{CHOH}$
 (c) $\text{CH}_3\text{CH} = \text{CHCH}_3$ (d) $\text{CH}_3\text{CH}_2\text{CH} = \text{CH}_2$
80. BOD is a measure of
- (a) ozone depletion in the stratosphere due to too many free radicals.
 (b) suspended particulate matter in the air causing lung problems.
 (c) pesticides which are non-biodegradable in the soil and water.
 (d) organic material present in water needing dissolved oxygen to break them down depleting oxygen content in water.
81. If same type of atoms are packed in hexagonal close packing and cubic close packing separately, then
- (a) density of hcp will be greater than ccp
 (b) density of hcp will be smaller than ccp
 (c) density of hcp will be equal to ccp
 (d) density of hcp and ccp will depend upon the temperature of the system
82. Silicon doped with arsenic is
- (a) p-type semiconductor
 (b) n-type semiconductor
 (c) intrinsic semiconductor
 (d) insulator
83. Which of the following compounds have the same value of van't Hoff's factor (i) as that of $\text{Al}_2(\text{SO}_4)_3$?
- (a) $\text{K}_4[\text{Fe}(\text{CN})_6]$ (b) NaCl
 (c) $\text{Al}(\text{NO}_3)_3$ (d) Na_2SO_4
84. The standard electrode potential for Daniell cell is 1.1 V . What is the standard Gibbs energy for the reaction ?
- (a) $212.3 \text{ kJ mol}^{-1}$ (b) $-2123 \text{ kJ mol}^{-1}$
 (c) $106.15 \text{ kJ mol}^{-1}$ (d) $-106.15 \text{ kJ mol}^{-1}$
85. The cathode reaction in the dry cell will be
- (a) $\text{Zn(s)} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$
 (b) $\text{MnO}_2 + \text{NH}_4^+ + \text{e}^- \rightarrow \text{MnO(OH)} + \text{NH}_3$
 (c) $\text{Zn(Hg)} + 2\text{OH}^- \rightarrow \text{ZnO(s)} + \text{H}_2\text{O} + 2\text{e}^-$
 (d) $\text{MnO(OH)} + \text{NH}_3 \rightarrow \text{MnO}_2 + \text{NH}_4^+ + 2\text{e}^-$
86. λ_m° for NH_4Cl , NaOH and NaCl are $130, 248$ and $126.5 \Omega^{-1} \text{ cm}^2 \text{ mol}^{-1}$ respectively. The λ_m° of NH_4OH will be
- (a) 251.5 (b) 244.5
 (c) 130 (d) 504.5
87. In a chemical reaction i.e., $\text{A} + 2\text{B} \rightarrow \text{products}$, when concentration of A is doubled, rate of the reaction increases 4 times and when concentration of B alone is doubled rate continues to be the same. The order of the reaction is
- (a) 1 (b) 2
 (c) 3 (d) 4
88. Zeolites are shape selective structures because of
- (a) high adsorption capacity
 (b) three dimensional network of atoms
 (c) presence of aluminosilicates
 (d) honey comb like structure
89. Sulphur sol is a type of
- (a) emulsion
 (b) multimolecular colloid

- (c) lyophilic colloid
(d) macromolecular colloid

90. The magnetite ore is

- (a) ferrous oxide (b) ferric oxide
(c) ferric hydroxide (d) ferrous-ferric oxide

91. In the metallurgy of aluminium, when the fused matrix is electrolysed, the overall reduction reaction is

- (a) $\text{Al}_2\text{O}_3 + 3\text{C} \rightarrow 2\text{Al} + 3\text{CO}$
(b) $\text{Al}_2\text{O}_3 \rightarrow 2\text{Al}^{3+} + 3\text{O}_2$
(c) $2\text{Al}_2\text{O}_3 + 3\text{C} \rightarrow 4\text{Al} + 3\text{CO}_2$
(d) $\text{Al}_2\text{O}_3 + 2\text{CO} \rightarrow 2\text{Al} + 2\text{CO}_2$

92. Carbon monoxide forms volatile compound with

- (a) Ni (b) Cu
(c) Al (d) Si

93. Which of the following reactions does not produce PH_3 ?

- (a) White phosphorus with water
(b) White phosphorus with conc. NaOH
(c) Metal phosphide with dil. HCl
(d) Metal phosphides with water

94. The decreasing order of stability of oxides of halogen is

- (a) fluorine > chlorine > iodine > bromine
(b) fluorine > chlorine > bromine > iodine
(c) iodine > bromine > chlorine > fluorine
(d) iodine > chlorine > bromine > fluorine

95. N_2 does not show property of catenation because

- (a) it has no d-orbitals in the valence shell
(b) interelectronic repulsion between non-bonding electrons is greater
(c) $\text{N} \equiv \text{N}$ has high bond enthalpy
(d) nitrogen has very high ionisation enthalpy

96. Hybridised state of bromine in bromine pentafluoride is

- (a) sp^3d (b) d^2sp^3
(c) dsp^3 (d) sp^3d^2

97. An element belonging to chalcogen group is

- (a) carbon (b) phosphorus
(c) chlorine (d) sulphur

98. More number of oxidation state are exhibited by the actinoids, than by lanthanoids. The main reason for this is

- (a) greater metallic character of lanthanoids than that of their corresponding actinoids
(b) more active nature of actinoids
(c) more energy difference between 5f and 6d-orbitals, than that between 4f and 5d-orbitals
(d) lesser energy difference between 5f and 6d-orbitals, than that between 4f and 5d-orbitals

99. A transition elements with atomic number 24 will have its magnetic moment

- (a) 5.92 BM
(b) 6.93 BM
(c) it will be diamagnetic
(d) it will be more than 8 BM

100. In tetrahedral permanganate ion π -bonding type between metal and oxygen is

- (a) $\text{p}\pi - \text{p}\pi$ (b) $\text{d}\pi - \text{p}\pi$
(c) $\text{d}\pi - \text{d}\pi$ (d) $\text{d}\pi - \text{s}$

101. Which of the following pairs has the same size?
 (a) $\text{Fe}^{2+}, \text{Ni}^{2+}$ (b) $\text{Zr}^{4+}, \text{Ti}^{4+}$
 (c) $\text{Zr}^{4+}, \text{Hf}^{4+}$ (d) $\text{Zn}^{2+}, \text{Hf}^{4+}$
102. $[\text{Ti}(\text{H}_2\text{O})_6]^{2+}$ is a $3d^2$ system, the value of crystal field stabilisation energy decreases by
 (a) $4 \times 10^{-1} \Delta_o$ (b) $4.0 \Delta_o$
 (c) $8.0 \Delta_o$ (d) $8 \times 10^{-1} \Delta_o$
103. Among the complexes of Ni listed below, the following is the only correct statement about the given compounds.
 (I) $[\text{Ni}(\text{CO})_4]$
 (II) $[\text{Ni}(\text{CN})_4]^{2-}$
 (III) $[\text{NiCl}_4]^{2-}$
 (a) all of them have tetrahedral geometry.
 (b) I and III are tetrahedral and II has square planar geometry.
 (c) I and II are tetrahedral and III is square planar.
 (d) all of them have square planar geometry.
104. The formula for sodium trioxalatoaluminate (III) is
 (a) $\text{Na}_4[\text{Al}(\text{C}_2\text{O}_4)_3]$ (b) $\text{Na}_3[\text{Al}(\text{C}_2\text{O}_4)_3]$
 (c) $\text{Na}_3[\text{Al}(\text{C}_2\text{O}_4)_3]$ (d) $\text{Na}_2[\text{Al}(\text{C}_2\text{O}_4)_3]$
105. Which one of the following coordination entity is chiral?
 (a) $\text{trans} - [\text{CrCl}_2(\text{ox})_2]^{3-}$
 (b) $\text{cis} \{ \text{Co}(\text{NH}_3)_4\text{Cl}_2 \}^+$
 (c) $\text{cis} \{ \text{CrCl}_2(\text{ox})_2 \}^{3-}$
 (d) $\text{trans} - \{ \text{Co}(\text{NH}_3)_4\text{Cl}_2 \}^+$
106. Which of the following compounds is responsible for depletion of ozone layer?
 (a) Freon (b) Chloroform
 (c) DDT (d) Iodoform
107. Ethanol, when warmed with iodine and sodium carbonate gives a yellow coloured crystalline solid, which is used in preparation of antiseptic ointments. The yellow coloured crystalline substance is
 (a) chloroform
 (b) iodoform
 (c) carbon tetrachloride
 (d) dichloromethane
108. Consider the acid strength of the carboxylic acids.
 (I). PhCOOH
 (II). $\text{o} - \text{NO}_2\text{C}_6\text{H}_4\text{COOH}$
 (III). $\text{p} - \text{NO}_2\text{C}_6\text{H}_4\text{COOH}$
 (IV). $\text{m} - \text{NO}_2\text{C}_6\text{H}_4\text{COOH}$
 (a) $\text{I} > \text{II} > \text{III} > \text{IV}$ (b) $\text{IV} > \text{III} > \text{II} > \text{I}$
 (c) $\text{II} > \text{III} > \text{IV} > \text{I}$ (d) $\text{II} > \text{IV} > \text{III} > \text{I}$
109. Which of the following is the correct sequence of relative acidic strength?
 (a) $\text{FCH}_2\text{COOH} > \text{ClCH}_2\text{COOH} > \text{BrCH}_2\text{COOH}$
 (b) $\text{ClCH}_2\text{COOH} > \text{BrCH}_2\text{COOH} > \text{FCH}_2\text{COOH}$
 (c) $\text{BrCH}_2\text{COOH} > \text{ClCH}_2\text{COOH} > \text{FCH}_2\text{COOH}$
 (d) $\text{ClCH}_2\text{COOH} > \text{FCH}_2\text{COOH} > \text{BrCH}_2\text{COOH}$
110. A mixture of methylamine and dimethyl amine is given to you. The reagents used to separate the components of the mixture are
 (a) CHCl_3 and HCl
 (b) $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$ and KOH

- (c) $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$ and HCl
 (d) CHCl_3 and KOH
111. **Gabriel phthalimide synthesis is used for the preparation of**
 (a) secondary amines (b) amides
 (c) primary amines (d) tertiary amines
112. **The correct increasing order of basic strength of following amines, $\text{C}_2\text{H}_5\text{NH}_2$, NH_3 , $(\text{C}_2\text{H}_5)_2\text{NH}$, $\text{C}_6\text{H}_5\text{NH}_2$ in gaseous state is**
 (a) $(\text{C}_2\text{H}_5)_2\text{NH} < \text{C}_2\text{H}_5\text{NH}_2 < \text{NH}_3 < \text{C}_6\text{H}_5\text{NH}_2$
 (b) $\text{C}_6\text{H}_5\text{NH}_2 < (\text{C}_2\text{H}_5)_2\text{NH} < \text{C}_2\text{H}_5\text{NH}_2 < \text{NH}_3$
 (c) $\text{C}_6\text{H}_5\text{NH}_2 < \text{NH}_3 < \text{C}_2\text{H}_5\text{NH}_2 < (\text{C}_2\text{H}_5)_2\text{NH}$
 (d) $(\text{C}_2\text{H}_5)_2\text{NH} < \text{C}_2\text{H}_5\text{NH}_2 < \text{C}_6\text{H}_5\text{NH}_2 < \text{NH}_3$
113. **The sequence of bases on RNA molecule synthesised on the GCAT strand of DNA is**
 (a) CGUAAU (b) CGTAT
 (c) TACGC (d) AYC GC
114. **α -helix and β -pleated structures of proteins are classified as**
 (a) primary structure
 (b) secondary structure
 (c) tertiary structure
 (d) quaternary structure
115. **Which statement is not true for describing enzymes?**
 (a) They are polypeptides.
 (b) There are glycosidic linkages between the molecules.
 (c) They are specific for a particular reaction.
 (d) They catalyse biological reactions.
116. **Which of the following are monosaccharides?**
 (a) Glucose and maltose
 (b) Glucose and sucrose
 (c) Glucose and ribose
 (d) None of the above
117. **Nylon-6, 6 is an example of a polymer formed by**
 (a) chain growth polymerisation
 (b) cross-linked polymerisation
 (c) addition polymerisation
 (d) step growth polymerisation
118. **Which of the following will form a biodegradable polymer?**
 (a) Glycine and aminocaproic acid.
 (b) Ethylene glycol and phthalic acid.
 (c) Hexamethylenediamine and adipic acid.
 (d) 1, 3-butadiene and acrylonitrile.
119. **Detergents can be made biodegradable and pollution free by**
 (a) using cyclic hydrocarbon chain
 (b) shortening the hydrocarbon chain
 (c) using unbranched hydrocarbon chain
 (d) hydrocarbons with more branching
120. **Sodium rosinate is generally added in the soap because it**
 (a) prevents rapid drying of soap
 (b) produces rich lather
 (c) gives antiseptic property
 (d) acts as a perfume

121. If two sets A and B have 99 elements in common, then the number of elements common to the sets $A \times B$ and $B \times A$ is
 (a) 2^{99} (b) 99^2
 (c) 100 (d) 18
122. If $f(x) = e^x$ and $g(x) = \log^x$, then which of the following is true?
 (a) $f\{g(x)\} \neq g\{f(x)\}$
 (b) $f\{g(x)\} = g\{f(x)\}$
 (c) $f\{g(x)\} + g\{f(x)\} = 0$
 (d) $f\{g(x)\} - g\{f(x)\} = 1$
123. The number of bijective functions from the set A to itself, if A contains 108 elements is
 (a) 108 (b) $(108)!$
 (c) $(108)^2$ (d) 2^{108}
124. If a class of 175 students the following data shows the number of students opting one or more subjects. Mathematics 100, Physics 70, Chemistry 40. Mathematics and Physics 30, Mathematics and Chemistry 28, Physics and Chemistry 23, Mathematics, Physics and Chemistry 18. The number of students who have opted Mathematics alone is
 (a) 35 (b) 48
 (c) 60 (d) 22
125. If a set A has 4 elements, then the total number of proper subsets of set A, is
 (a) 16 (b) 14
 (c) 15 (d) 17
126. If $\tan(x + y) = 33$ and $x = \tan^{-1}3$, then y is
 (a) $\frac{3}{10}$ (b) $\frac{33}{10}$
 (c) $\tan^{-1}\left(\frac{1}{3}\right)$ (d) $\tan^{-1}\left(\frac{3}{10}\right)$
127. $\cot^{-1}(21) + \cot^{-1}(13) + \cot^{-1}(-8) =$
 (a) 0 (b) $\cot^{-1} 26$
 (c) π (d) None of these
128. $\tan\left(\cos^{-1}\left(\frac{1}{5\sqrt{2}}\right) - \sin^{-1}\left(\frac{4}{\sqrt{17}}\right)\right)$ is equal to
 (a) $\frac{\sqrt{29}}{3}$ (b) $\frac{29}{3}$
 (c) $\frac{\sqrt{3}}{29}$ (d) $\frac{3}{29}$
129. The number of solutions of the equation $|\cot x| = \cot x + \frac{1}{\sin x}$, $(0 \leq x \leq 2\pi)$ is
 (a) 0 (b) 1
 (c) 2 (d) 3
130. $\frac{\sin x - \sin 3x}{\sin^2 x - \cos^2 x}$ is equal to
 (a) $-2\sin x$ (b) $\frac{2}{\sin x}$
 (c) $\frac{1}{\sin x}$ (d) $2\sin x$
131. In a $\triangle ABC$, $\operatorname{cosec} A(\sin B \cos C + \cos B \sin C) =$
 (a) 0 (b) 1
 (c) -1 (d) None of these
132. Amplitude of the complex number $i \sin\left(\frac{\pi}{19}\right)$ is
 (a) $\frac{\pi}{19}$ (b) $-\frac{\pi}{19}$
 (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{2} - \frac{\pi}{19}$

133. Given, 5 line segments of lengths 2, 3, 4, 5, 6 units. Then, the number of triangles that can be formed by joining these segments is
 (a) ${}^5C_3 - 3$ (b) 5C_3
 (c) ${}^5C_3 - 1$ (d) ${}^5C_3 - 2$
134. How many numbers greater than 1000000 be formed from 2, 3, 0, 3, 4, 2, 3 ?
 (a) 420 (b) 360
 (c) 400 (d) 300
135. The expression $\frac{1}{\sqrt{(3x+1)}} \left[\left(\frac{1+\sqrt{3x+1}}{2} \right)^7 - \left(\frac{1-\sqrt{3x+1}}{2} \right)^7 \right]$ is a polynomial in x of degree
 (a) 7 (b) 5
 (c) 4 (d) 3
136. If in the expansion of $(1 + px)^n$, $n \in \mathbb{N}$, the coefficient of x and x^2 are 8 and 24, then
 (a) $n - 3, p = 2$ (b) $n - 5, p = 3$
 (c) $n = 4, p = 3$ (d) $n = 4, p = 2$
137. $11^3 + 12^3 + 13^3 + \dots + 20^3$ is
 (a) an even integer.
 (b) an odd integer divisible by 5 .
 (c) multiple of 10 .
 (d) an odd integer but not a multiple of 5 .
138. The medians AD and BE of a triangle with vertices A(0, b), B(0, 0) and C(a, 0) are perpendicular to each other, if
 (a) $a = \frac{b}{2}$ (b) $b = \frac{a}{2}$
 (c) $ab = 1$ (d) $a = \pm\sqrt{2}b$
139. Let a and b be non-zero real such that $a \neq b$. Then, the equation of the line passing through the origin and the point of intersection of $\frac{x}{a} + \frac{y}{b} = 1$ and $\frac{x}{b} + \frac{y}{a} = 1$ is
 (a) $ax + by = 0$ (b) $bx + ay = 0$
 (c) $y - x = 0$ (d) $x + y = 0$
140. A straight line meets the coordinate axes at A and B, so that the centroid of the $\triangle OAB$ is (1, 2). Then, the equation of the line AB is
 (a) $x + y = 6$ (b) $2x + y = 6$
 (c) $x + 2y = 6$ (d) $3x + y = 6$
141. The direction ratios of the line which is perpendicular to the lines $\frac{x-7}{2} = \frac{y+17}{-3} = \frac{z-6}{1}$ and $\frac{x+5}{1} = \frac{y+3}{2} = \frac{z-4}{-2}$ are
 (a) $\langle 4, 5, 7 \rangle$ (b) $\langle 4, -5, 7 \rangle$
 (c) $\langle 4, -5, -7 \rangle$ (d) $\langle -4, 5, 7 \rangle$
142. A line making angles 45° and 60° with the positive directions of the axis of X and Y, makes with the positive direction of Z -axis, an angle of
 (a) 60° (b) 120°
 (c) 60° and 120° (d) None of these
143. The shortest distance between the lines $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1}$ and $\frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$ is
 (a) $\sqrt{30}$ (b) $2\sqrt{30}$
 (c) $5\sqrt{30}$ (d) $3\sqrt{30}$
144. $\lim_{x \rightarrow \infty} \left(\sqrt{a^2x^2 + bx + x - ax} \right) =$
 (a) $\frac{b+1}{2a}$ (b) $\frac{b}{a}$
 (c) 0 (d) $\frac{2b}{a}$

145. If $y = |\cos x| + |\sin x|$, then $\frac{dy}{dx}$ at $x = \frac{2\pi}{3}$ is

- (a) $\frac{1-\sqrt{3}}{2}$ (b) 0
(c) $\frac{1}{2}(\sqrt{3} - 1)$ (d) None of these

146. The slant height of a cone is fixed at 7 cm. If the rate of increase of its height is 0.3 cm/sec, then the rate of increase of its volume when its height is 4 cm is

- (a) $\frac{\pi}{2}$ cc/sec (b) π cc/sec
(c) $\frac{\pi}{5}$ cc/sec (d) $\frac{\pi}{10}$ cc/sec

147. A ladder 5 m long is leaning against a wall. The bottom of the ladder is pulled along the ground away from the wall, at the rate of 2 m/sec. The speed at which its height on the wall decreases when the foot of the ladder is 4 m away from the wall is

- (a) $\frac{3}{8}$ m/sec (b) $\frac{8}{3}$ m/sec
(c) $\frac{5}{3}$ m/sec (d) $\frac{2}{3}$ m/sec

148. The angle between the curve $y^2 = 4ax$ and $ay = 2x^2$ is

- (a) $\tan^{-1} \frac{3}{4}$ (b) $\tan^{-1} \frac{3}{5}$
(c) $\tan^{-1} \frac{4}{3}$ (d) $\tan^{-1} \frac{5}{3}$

149. The maximum area in square units of an isosceles triangle inscribed in an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with its vertex at one end of the major axis is

- (a) $\sqrt{3}ab$ sq units (b) $\frac{3\sqrt{3}}{4}ab$ sq units
(c) $\frac{5\sqrt{3}}{4}ab$ sq units (d) None of these

150. If $f(x+y) = f(x)f(y)$ for all x and y and $f(5) = 2$, $f'(0) = 3$, then $f'(5)$ is

- (a) 5 (b) 6
(c) 0 (d) None of these

151. If $f(x) = \log_{x^2}(\log x)$, then $f'(x)$ at $x = e$ is

- (a) 0 (b) 1
(c) $\frac{1}{e}$ (d) $\frac{1}{2e}$

152. The value of c in Lagrange's mean value theorem for the function $f(x) = \log(\sin x)$ in the interval $\left[\frac{\pi}{6}, \frac{5\pi}{6}\right]$ is

- (a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$
(c) $\frac{2\pi}{3}$ (d) None of these

153. $\int_{-1}^1 (x^{27} \cos x + e^x) dx =$

- (a) $\frac{2e-1}{e}$ (b) $\frac{e+1}{e}$
(c) $e - \frac{1}{e}$ (d) $\frac{1}{e}$

154. The value of the integral $\int_0^{\pi} \frac{x \sin^{2n} x}{\sin^{2n} x + \cos^{2n} x} dx$ is

- (a) π^2 (b) $2\pi^2$
(c) $\frac{\pi^2}{4}$ (d) $\frac{\pi^2}{2}$

155. $\int \frac{x^3-1}{x^3+x} dx =$

- (a) $x - \log x + \log(x^2 + 1) - \tan^{-1} x + c$
(b) $x - \log x + \frac{1}{2} \log(x^2 + 1) - \tan^{-1} x + c$

(c) $x + \log x + \log(x^2 + 1) - \tan^{-1}x + c$

(d) $x + \log x + \frac{1}{2}\log(x^2 + 1) - \tan^{-1}x + c$

156. If $\int \frac{\cos 8x + 1}{\tan 2x - \cot 2x} dx = a \cos 8x + c$, then $a =$

(a) $-\frac{1}{16}$

(b) $\frac{1}{8}$

(c) $\frac{1}{16}$

(d) $-\frac{1}{8}$

157. If $\int_0^\pi x f(\sin x) dx = A \int_0^{\pi/2} f(\sin x) dx$, then A is equal to

(a) 0

(b) 2π

(c) $\frac{\pi}{4}$

(d) π

158. Area bounded by the curve $y = x^3$, the X-axis and the ordinates at $x = -2$ and $x = 1$, is

(a) 9 sq units

(b) $-\frac{15}{4}$ sq units

(c) $\frac{15}{4}$ sq units

(d) $\frac{17}{4}$ sq units

159. The area in square units bounded by the normal at $(1, 2)$ to the parabola $y^2 = 4x$, X-axis and the curve is given by

(a) $\frac{10}{3}$

(b) $\frac{7}{3}$

(c) $\frac{4}{3}$

(d) None of these

160. Area bounded by the Y-axis, $y = \cos x$, $y = \sin x$, when $0 \leq x \leq \frac{\pi}{2}$ is

(a) $\sqrt{2} - 1$

(b) $2(\sqrt{2} - 1)$

(c) $(\sqrt{2} + 1)$

(d) $\sqrt{2}$

161. The area in square units of the region bounded by $y^2 = 9x$ and $y = 3x$ is

(a) 2

(b) $\frac{1}{4}$

(c) $\frac{1}{2}$

(d) 1

162. $\int_1^e \log x dx =$

(a) 1

(b) $e - 1$

(c) $e + 1$

(d) 0

163. The differential equation of the family of parabolas $y^2 = 4ax$, where a is parameter, is

(a) $\frac{dy}{dx} = \frac{y}{2x}$

(b) $\frac{dy}{dx} = -\frac{y}{2x}$

(c) $\frac{dy}{dx} = -\frac{2y}{x}$

(d) $\frac{dy}{dx} = \frac{2y}{x}$

164. If $\frac{dy}{dx} = \frac{y + x \tan \frac{y}{x}}{x}$, then $\sin\left(\frac{y}{x}\right) =$

(a) cx^2

(b) cx

(c) cx^3

(d) $\log x$

165. The general solution of the differential equation $\left(\frac{dy}{dx}\right)^2 + y \cdot g'(x) = g(x) \cdot g'(x)$, where $g(x)$ is a given function of x is

(a) $g(x) + \log(1 + y + g(x)) = c$

(b) $g(x) + \log(1 + y - g(x)) = c$

(c) $g(x) - \log(1 + y - g(x)) = c$

(d) $g(x) - \log(1 - y + g(x)) = c$

166. The product of the degree and order of the differential equation $\left(\frac{d^2y}{dx^2}\right)^2 - \left(\frac{dy}{dx}\right)^3 = y^3$ is

(a) 4

(b) 6

(c) 2

(d) 3

167. Given, two vectors $\hat{i} - \hat{j}$ and $\hat{i} - 2\hat{j}$. The unit vector, coplanar with the two given vectors and perpendicular to $(\hat{i} - \hat{j})$ is
- (a) $\frac{1}{\sqrt{2}}(\hat{i} + \hat{j})$ (b) $\frac{1}{\sqrt{5}}(2\hat{i} + \hat{j})$
 (c) $\pm \frac{1}{\sqrt{2}}(\hat{i} + \hat{j})$ (d) None of these
168. If a, b, c are three non-zero vectors such that each one of them are perpendicular to the sum of the other two vectors, then the value of $|a + b + c|^2$ is
- (a) $|a|^2 + |b|^2 + |c|^2$
 (b) $|a| + |b| + |c|$
 (c) $2(|a|^2 + |b|^2 + |c|^2)$
 (d) $\frac{1}{2}(|a|^2 + |b|^2 + |c|^2)$
169. If A and B are 2 matrices such that $AB = A$ and $BA = B$, then B^2 is equal to
- (a) B (b) A
 (c) zero matrix (d) 1
170. If a, b, c are in AP, then the value of the determinant $\begin{vmatrix} x+2 & x+3 & x+2a \\ x+3 & x+4 & x+2b \\ x+4 & x+5 & x+2c \end{vmatrix}$ is
- (a) 0 (b) 1
 (c) x (d) $2x$
171. If $A = \begin{bmatrix} a & 0 & 0 \\ 0 & a & 0 \\ 0 & 0 & a \end{bmatrix}$, then $\det(\text{adj}A)$ is
- (a) a^{27} (b) a^9
 (c) a^6 (d) a^2
172. If $A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ and $A^8 = aA + bI$, then $(a, b) =$
- (a) (8, 7) (b) $(-7, 8)$
 (c) $(8, -7)$ (d) $(-8 - 7)$
173. An urn contains 9 balls, 2 of which are white, 3 blue and 4 black. 3 balls are drawn at random from the urn. The chance that 2 balls will be of the same colour and the third of a different colour is
- (a) $\frac{45}{84}$ (b) $\frac{55}{84}$
 (c) $\frac{35}{84}$ (d) $\frac{25}{84}$
174. 6 boys and 6 girls in a row at random. The probability that all the girls sit together is
- (a) $\frac{1}{432}$ (b) $\frac{12}{431}$
 (c) $\frac{1}{132}$ (d) None of these
175. Three dice are rolled once. The chance of getting a score of 5 is
- (a) $\frac{5}{216}$ (b) $\frac{1}{6}$
 (c) $\frac{1}{36}$ (d) $\frac{1}{72}$
176. A bag contains 3 white, 4 black, 2 red balls. If 2 balls are drawn at random, then the probability that both the balls are white is
- (a) $\frac{1}{18}$ (b) $\frac{1}{36}$
 (c) $\frac{1}{12}$ (d) $\frac{1}{24}$
177. The solution of $\frac{6x}{4x-1} < \frac{1}{2}$ is
- (a) $x < \frac{-1}{8}$ (b) $\frac{-1}{8} < x < \frac{1}{4}$
 (c) $x < \frac{-1}{8}$ and $x > \frac{1}{4}$ (d) $x > \frac{1}{8}$

178. If $S^2 = at^2 + 2bt + c$, then acceleration is

- (a) directly proportional to S
- (b) inversely proportional to S .
- (c) directly proportional to S^2 .
- (d) inversely proportional to S^3 .

179. The mean and variance for the data 6, 7, 10, 12, 13, 4, 8, 12 respectively are

- (a) $8\sqrt{26.25}$ (b) $9, \sqrt{9.25}$
- (c) 8, 26.25 (d) 9, 9.25

180. If the conjugate of $(x + iy)(1 - 2i)$ is $1 + i$, then

- (a) $x - iy = \frac{1-i}{1-2i}$ (b) $x + iy = \frac{1-i}{1-2i}$
- (c) $x = \frac{1}{5}$ (d) $x = -\frac{1}{5}$

