

PART-I PHYSICS

1. An object moves with speed v_1 , v_2 and v_3 along a line segment AB, BC and CD respectively as shown in figure. Where $AB = BC$ and $AD = 3AB$, then average speed of the object will be:



- (a) $\frac{v_1 v_2 v_3}{3(v_1 v_2 + v_2 v_3 + v_3 v_1)}$ (b) $\frac{3v_1 v_2 v_3}{(v_1 v_2 + v_2 v_3 + v_3 v_1)}$
- (c) $\frac{(v_1^2 + v_2^2 + v_3^2)}{3}$ (d) $\frac{(v_1 + v_2 + v_3)}{3v_1 v_2 v_3}$
2. conduction band (n_e) and resistance of a semiconductor will be as:
- (a) Both n_e and resistance decrease
 (b) Both n_e and resistance increase
 (c) n_e increases, resistance decreases
 (d) n_e decreases, resistance increases
3. A radio-active material is reduced to $1/8$ of its original amount in 3 days. If 8×10^{-3} kg of the material is left after 5 days. The initial amount of the material is
- (a) 700gm (b) 900gm
 (c) 475gm (d) 256gm
4. A 12.5eV electron beam is used to bombard gaseous hydrogen at room temperature. The number of spectral lines emitted will be:
- (a) 2 (b) 1
 (c) 3 (d) 4
5. If 1000 droplets of water of surface tension 0.07 N/m. having same radius 1 mm each, combine to form a single drop. In the process the released surface energy is-
- (Take $\Pi = \frac{22}{7}$)
- (a) 7.92×10^{-6} J (b) 7.92×10^{-4} J
 (c) 9.68×10^{-4} J (d) 8.8×10^{-5} J
6. The force between two small charged spheres having charges of 1×10^{-7} C and 2×10^{-7} C placed 20 cm apart in air is
- (a) 4.5×10^{-2} N (b) 4.5×10^{-3} N
 (c) 5.4×10^{-2} N (d) 5.4×10^{-3} N
7. The work done in placing a charge of 8×10^{-18} coulomb on a condenser of capacity 100 microfarad is
- (a) 3.1×10^{-26} joule (b) 4×10^{-10} joule
 (c) 32×10^{-32} joule (d) 16×10^{-32} joule
8. The resistance of a wire is 5Ω. Its new resistance in ohm if stretched to 5 times of its original length will be:

- (a) 625 (b) 5
(c) 125 (d) 25

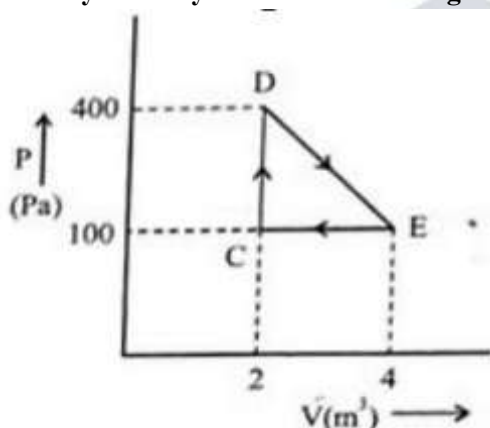
9. A charge particle is moving in a uniform magnetic field $(2\hat{i} + 3\hat{j})$ T. If it has an acceleration of $(\alpha\hat{i} - 4\hat{j})\text{m/s}^2$, then the value of α will be:

- (a) 3 (b) 6
(c) 12 (d) 2

10. Proton (p) and electron (e) will have same de-Broglie wavelength when the ratio of their momentum is (assume, $m_p = 1849m_e$)

- (a) 1:43 (b) 43:1
(c) 1:1849 (d) 1:1

11. A thermodynamic system is taken through cyclic process. The total work done in the process is :



- (a) 100 J (b) 300 J
(c) Zero (d) 200 J

12. In a reflecting telescope, a secondary mirror is used to: Options:

- (a) reduce the problem of mechanical support
(b) remove spherical aberration
(c) make chromatic aberration zero
(d) move the eyepiece outside the telescopic tube

13. The magnetic moment of an electron (e) revolving in an orbit around nucleus with an orbital angular momentum is given by:

- (a) $\vec{\mu}_L = \frac{e\vec{L}}{2m}$ (b) $\vec{\mu}_L = -\frac{e\vec{L}}{2m}$
(c) $\vec{\mu}_1 = -\frac{e\vec{L}}{m}$ (d) $\vec{\mu}_1 = \frac{2e\vec{L}}{m}$

14. The ratio of intensities at two points P and Q on the screen in a Young's double slit experiment where phase difference between two wave of same amplitude are $\frac{\pi}{3}$ and $\frac{\pi}{2}$, respectively are

- (a) 1:3 (b) 3:1

- (c) 3:2 (d) 2:3

15. A bicycle tyre is filled with air having pressure of 270kPa at 27°(c) The approximate pressure of the air in the tyre when the temperature increases to 36° C is

- (a) 270kPa (b) 262KPa
(c) 278kPa (d) 360kPa

16. A particle executes SHM of amplitude (a) The distance from the mean position when it's kinetic energy becomes equal to its potential energy is

- (a) $\sqrt{2} A$ (b) 2 A
(c) $\frac{1}{\sqrt{2}} A$ (d) $\frac{1}{2} A$

17. Electric field in a certain region is given by $\vec{E} = \left(\frac{A}{x^2}\hat{i} + \frac{B}{y^3}\hat{j}\right)$. The SI unit of A and B are:

- (a) Nm^3C^{-1} ; Nm^2C^{-1} (b) Nm^2C^{-1} ; Nm^3C^{-1}
(c) Nm^3C ; Nm^2C (d) Nm^2C ; Nm^3C

18. At any instant the velocity of a particle of mass 500 g is $(2t\hat{i} + 3t^2\hat{j})\text{ms}^{-1}$. If the force acting on the particle at $t = 1$ s is $(\hat{i} + x\hat{j})\text{N}$. Then the value of x will be:

- (a) 3 (b) 4
(c) 6 (d) 2

19. A particle of mass m moving with velocity v collides with a stationary particle of mass 2 m. After collision, they stick together and continue to move together with velocity

- (a) V (b) $\frac{V}{2}$
(c) $\frac{V}{3}$ (d) $\frac{V}{4}$

20. Which of the following Maxwell's equations is valid for time varying conditions but not valid for static conditions:

- (a) $\oint \vec{B} \cdot d\vec{l} = \mu_0 I$ (b) $\oint \vec{E} \cdot d\vec{l} = 0$
(c) $\oint \vec{E} \cdot d\vec{l} = -\frac{\partial \phi_B}{\partial t}$ (d) $\oint \vec{D} \cdot d\vec{A} = Q$

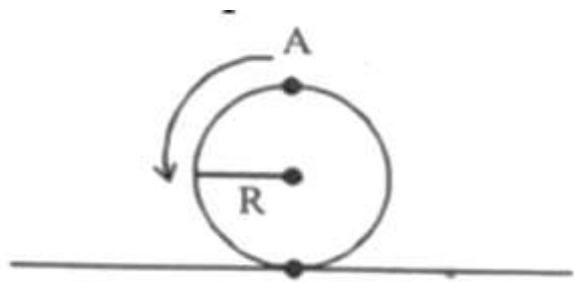
21. In an LC oscillator, if values of inductance and capacitance become twice and eight times, respectively, then the resonant frequency of oscillator becomes x times its initial resonant frequency ω_0 . The value of x is:

- (a) $\frac{1}{4}$ (b) 16
(c) 1 / 16 (d) 4

22. A conducting loop of radius $\frac{10}{\sqrt{\pi}}$ cm is placed perpendicular to a uniform magnetic field of 0.5 T. The magnetic field is decreased to zero in 0.5 s at a steady rate. The induced emf in the circular loop at 0.25 s is:

- (a) emf = 1mV (b) emf = 10mV
(c) emf = 100mV (d) emf = 5mV

23. A disc is rolling without slipping on a surface. The radius of the disc is R. At $t = 0$, the top most point on the disc is A as shown in figure. When the disc completes half of its rotation, the displacement of point A from its initial position is



- (a) $R\sqrt{(\pi^2 + 4)}$ (b) $R\sqrt{(\pi^2 + 1)}$
(c) 2R (d) $2R\sqrt{(1 + 4\pi^2)}$

24. Two planets A and B of radii R and 1.5R have densities ρ and $\rho / 2$ respectively. The ratio of acceleration due to gravity at the surface of B to A is:

- (a) 2: 3 (b) 2: 1
(c) 3: 4 (d) 4: 3

25. A 100 m long wire having cross-sectional area $6.25 \times 10^{-4} \text{ m}^2$ and Young's modulus is 10^{10} Nm^{-2} is subjected to a load of 250 N, then the elongation in the wire will be:

- (a) $6.25 \times 10^{-3} \text{ m}$ (b) $4 \times 10^{-4} \text{ m}$
(c) $6.25 \times 10^{-6} \text{ m}$ (d) $4 \times 10^{-3} \text{ m}$

26. The ratio of speed of sound in hydrogen gas to the speed of sound in oxygen gas at the same temperature is:

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

27. The free space inside a current carrying toroid is filled with a material of susceptibility 2×10^{-2} . The percentage increase in the value of magnetic field inside the toroid will be

- (a) 2% (b) 0.2%
(c) 0.1% (d) 1%

28. The ratio of average electric energy density and total average energy density of electromagnetic wave is:

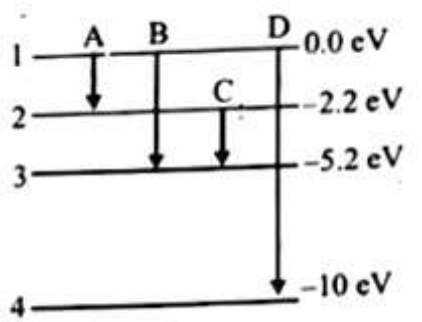
- (a) 2 (b) $\frac{1}{2}$

- (c) 1 (d) 3

29. In a Young's double slit experiment, the intensities at two points, for the path difference $\frac{\lambda}{4}$ and $\frac{\lambda}{3}$ (λ being the wavelength of light used) are I_1 and I_2 respectively. If I_0 denotes the intensity produced by each one of the individual slits, then $\frac{I_1 + I_2}{I_0} = \dots$

- (a) 3 (b) 5
(c) 7 (d) 10

30. The energy levels of an atom is shown in figure. Which one of these transitions will result in the emission of a photon of wavelength 124.1 nm ? Given ($h = 6.62 \times 10^{-34} \text{Js}$)



- (a) B (b) A
(c) C (d) D

31. What is the minimum energy required to launch a satellite of mass m from the surface of a planet of mass M and radius R in a circular orbit at an altitude of $2R$?

- (a) $\frac{5GmM}{6R}$ (b) $\frac{2GmM}{3R}$
(c) $\frac{GmM}{2R}$ (d) $\frac{GmM}{2R}$

32. After two hours, one-sixteenth of the starting amount of a certain radioactive isotope remained undecayed. The half-life of the isotope is

- (a) 15 minutes (b) 30 minutes
(c) 45 minutes (d) 4 hour

33. A coil of inductance 300mH and resistance 2Ω s connected to a source of voltage 2 V. The current reaches half of its steady state value in

- (a) 0.1 s (b) 0.05 s
(c) 0.3 s (d) 0.15 s

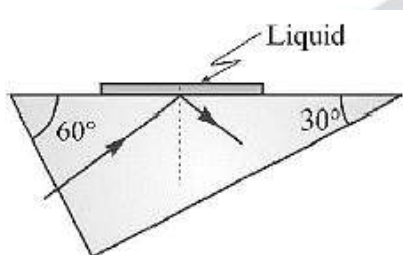
34. A capillary tube of radius R is immersed in water and water rises in it to a height H . Mass of water in the capillary tube is M . If the radius of the tube is doubled, mass of water that will rise in the capillary tube will now be:

- (a) M (b) $2M$
(c) $M/2$ (d) $4M$

35. A sonometer wire resonates with a given tuning fork forming standing waves with five antinodes between the two bridges when a mass of 9 kg is suspended from the wire. When this mass is replaced by a mass M , the wire resonates with the same tuning fork forming three antinodes for the same positions of the bridges. The value of M is

- (a) 25 kg (b) 5 kg
(c) 12.5 kg (d) $1/25$ kg

36. When ${}_{92}\text{U}^{235}$ undergoes fission, 0.1% of its original mass is changed into energy. How much energy is released if 1 kg of ${}_{92}\text{U}^{235}$ undergoes fission
- (a) 9×10^{10} J (b) 9×10^{11} J
(c) 9×10^{12} J (d) 9×10^{13} J
37. A tuning fork of frequency 392 Hz, resonates with 50 cm length of a string under tension (T). If length of the string is decreased by 2%, keeping the tension constant, the number of beats heard when the string and the tuning fork made to vibrate simultaneously is :
- (a) 4 (b) 6
(c) 8 (d) 12
38. A steel wire of length 'L' at 40°C is suspended from the ceiling and then a mass 'm' is hung from its free end. The wire is cooled down from 40°C to 30°C to regain its original length 'L'. The coefficient of linear thermal expansion of the steel is $10^{-5}/^\circ\text{C}$, Young's modulus of steel is 10^{11} N/m² and radius of the wire is 1 mm. Assume that $L >$ diameter of the wire. Then the value of 'm' in kg is nearly
- (a) 1 (b) 2
(c) 3 (d) 5
39. On a hypotenuse of a right prism ($30^\circ - 60^\circ - 90^\circ$) of refractive index 1.50, a drop of liquid is placed as shown in figure. Light is allowed to fall normally on the short face of the prism. In order that the ray of light may get totally reflected, the maximum value of refractive index is:



- (a) 1.30 (b) 1.47
(c) 1.20 (d) 1.25

40. Five gas molecules chosen at random are found to have speeds of 500, 600, 700, 800 and 900 m/s :
- (a) The root mean square speed and the average speed are the same.
(b) The root mean square speed is 14 m/s higher than the average speed.
(c) The root mean square speed is 14 m/s lower than the average speed.
(d) The root mean square speed is $\sqrt{14}$ m/s higher than the average speed.

PART- II CHEMISTRY

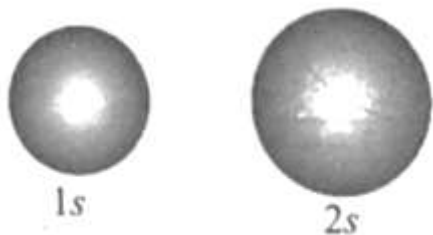
41. Frenkel and Schottky defects are:

- (a) nucleus defects (b) non-crystal defects
(c) crystal defects (d) nuclear defects

42. The Bohr orbit radius for the hydrogen atom ($n = 1$) is approximately $0.530\text{\AA}$. The radius for the first excited state ($n = 2$) orbit is (in $\text{\AA}$)

- (a) 0.13 (b) 1.06
(c) 4.77 (d) 2.12

43. The probability density plots of 1s and 2s orbitals are given in figure.'



The density of dots in a region represents the probability density of finding electrons in the region.

On the basis of above diagram which of the following statements is incorrect?

- (a) 1s and 2s orbitals are spherical in shape.
- (b) The probability of finding the electron is maximum near the nucleus.
- (c) The probability of finding the electron at a given distance is equal in all directions.
- (d) The probability density of electrons for 2 s orbital decreases uniformly as distance from the nucleus increases.

44. Element with electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 5s^2 5p^3$ belongs to the following group of the periodic table

- (a) 5 th
- (b) 15 th
- (c) 3rd
- (d) 17 th

45. Which of the following can be repeatedly soften on heating?

- (i) Polystyrene
- (ii) Melamine
- (iii) Polyesters
- (iv) Polyethylene
- (v) Neoprene
- (a) (i) and (iii)
- (b) (i) and (iv)
- (c) (iii), (iv) and (v)
- (d) (ii) and (iv)

46. Which of the following pairs will form the most stable ionic bond? Options:

- (a) Na and Cl
- (b) Mg and F
- (c) Li and F
- (d) Na and F

47. How much ethyl alcohol must be added to 1 litre of water so that the solution will freeze at 14°C ?

(K_f for water = 1.86°C/mol)

- (a) 7.5 mol
- (b) 8.5 mol
- (c) 9.5 mol
- (d) 10.5 mol

48. Which one of the following complexes is an outer orbital complex?

- (a) $[\text{Co}(\text{NH}_3)_6]^{3+}$
- (b) $[\text{Mn}(\text{CN})_6]^{4-}$
- (c) $[\text{Fe}(\text{CN})_6]^{4-}$
- (d) $[\text{Ni}(\text{NH}_3)_6]^{2+}$

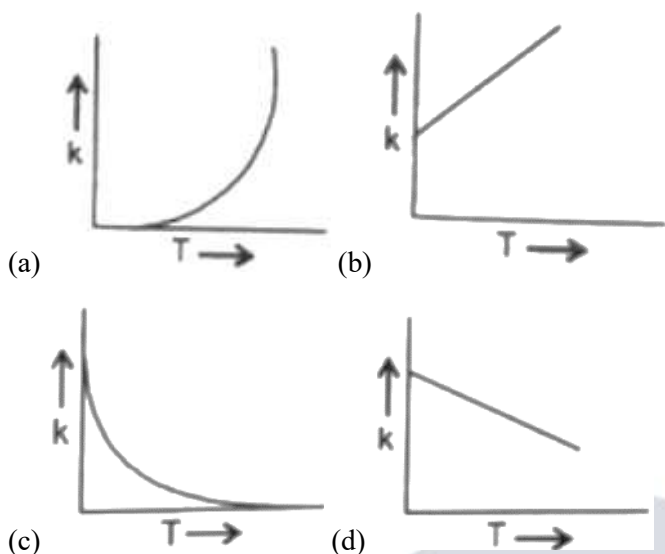
49. The conductivity of a weak acid HA of concentration 0.001 mol L^{-1} is $2.0 \times 10^{-5} \text{ Scm}^{-1}$.

If $\Lambda_m^\circ(\text{HA}) = 190 \text{ cm}^2 \text{ mol}^{-1}$, the ionization constant (K_a) of HA is equal to $10^{-6} \times$

- (a) 24
- (b) 48

- (c) 12 (d) 45

50. Plots showing the variation of the rate constant (k) with temperature (T) are given below. The plot that follows Arrhenius equation is



51. For the reaction $\text{H}_2(\text{g}) + \text{Br}_2(\text{g}) \rightarrow 2\text{HBr}(\text{g})$, the experimental data suggest, $\text{rate} = k[\text{H}_2][\text{Br}_2]^{1/2}$. The molecularity and order of the reaction are respectively

- (a) $2, \frac{3}{2}$ (b) $\frac{3}{2}, \frac{3}{2}$
 (c) 1, 1 (d) $1, \frac{1}{2}$

52. Which of the following method is used for coagulation of the sol? Options:

- (a) By mixing two oppositely charged sols.
 (b) By electrophoresis.
 (c) By addition of electrolytes.
 (d) All of the above.

53. The reaction that does NOT take place in a blast furnace between 900 K to 1500 K temperature range during extraction of iron is:

- (a) $\text{Fe}_2\text{O}_3 + \text{CO} \rightarrow 2\text{FeO} + \text{CO}_2$
 (b) $\text{FeO} + \text{CO} \rightarrow \text{Fe} + \text{CO}_2$
 (c) $\text{C} + \text{CO}_2 \rightarrow 2\text{CO}$
 (d) $\text{CaO} + \text{SiO}_2 \rightarrow \text{CaSiO}_3$

54. Stronger is oxidising agent, more is

- (a) standard reduction potential of that species
 (b) the tendency to get it self oxidised
 (c) the tendency to lose electrons by that species
 (d) standard oxidation potential of that species

55. Kinetic theory of gases proves

- (a) only Boyle's law (b) only Charles' law

- (c) only Avogadro's law (d) all of these

56. If enthalpies of formation of $C_2H_4(g)$, $CO_2(g)$ and $H_2O(l)$ at $25^\circ C$ and 1 atm pressure are 52,394 and -286 kJ/mol respectively, the change in enthalpy for combustion of C_2H_4 is equal to

- (a) -141.2 kJ/mol (b) -1412 kJ/mol
(c) $+14.2$ kJ/mol (d) $+1412$ kJ/mol

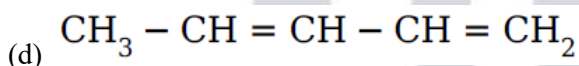
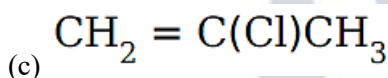
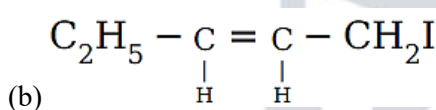
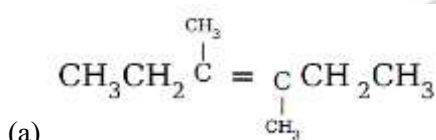
57. The energy of an electron in second Bohr orbit of hydrogen atom is :

- (a) -5.44×10^{-19} eV (b) -5.44×10^{-19} cal
(c) -5.44×10^{-19} kJ (d) -5.44×10^{-19} J

58. The photochemical smog does not generally contain:

- (a) NO (b) SO_2
(c) NO_2 (d) HCHO

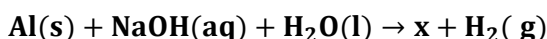
59. Geometrical isomerism is not shown by



60. For the separation of two immiscible liquids which method is used?

- (a) Chromatography
(b) Fractionating column
(c) Fractional distillation
(d) Separating funnel

61. What is x in the following reaction?



- (a) $Na_2[Al(OH)_4]^-$ (b) $Na^+[Al(OH)_4]^-$
(c) $Na_2[Al(OH)_6]^-$ (d) $Na^+[Al(OH)_6]^-$

62. Which of the following is not involved in the formation of photochemical smog?

- (a) Hydrocarbon (b) NO
(c) SO_2 (d) O_3

63. Which of the following will precipitate first when aqueous solution containing sulphate ions are added?

- (a) Mg^{2+} (b) Ca^{2+}
(c) Sr^{2+} (d) Ba^{2+}

64. Ionic hydrides reacts with water to give Options:

- (a) acidic solutions (b) hydride ions
(c) basic solutions (d) electrons

65. The drug used as an antidepressant is

- (a) Luminol (b) Tofranil
(c) Mescaline (d) Sulphadiazine

66. Melamine plastic crockery is a copolymer of:

- (a) HCHO and melamine (b) HCHO and ethylene
(c) melamine and ethylene (d) None of these

67. The energy of an electron in second Bohr orbit of hydrogen atom is :

- (a) $-5.44 \times 10^{-19} \text{ eV}$ (b) $-5.44 \times 10^{-19} \text{ cal}$
(c) $-5.44 \times 10^{-19} \text{ kJ}$ (d) $-5.44 \times 10^{-19} \text{ J}$

68. The helical structure of protein is stabilized by

- (a) dipeptide bonds (b) hydrogen bonds
(c) ether bonds (d) peptide bonds

69. Which of the following factors affect the basic strength of amine?

(i) Inductive effect

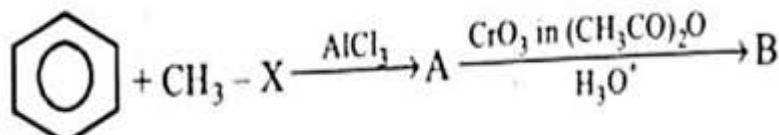
(ii) Steric hinderance

(iii) Solvation effect

(iv) Solubility in organic solvents.

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

70. Find out B in the given reactions

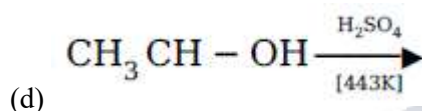
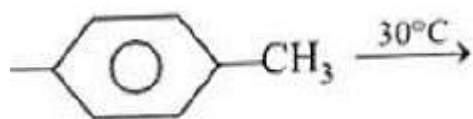
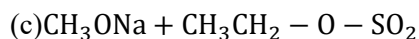
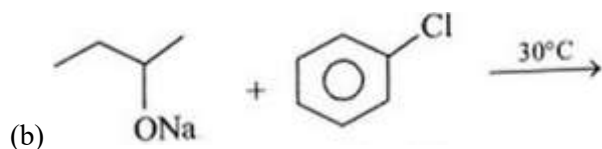
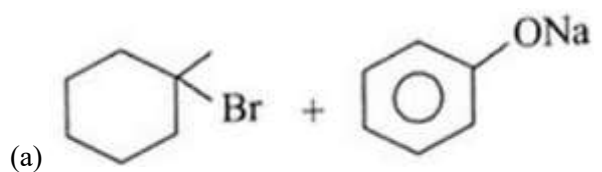


- (a) acetophenone (b) benzaldehyde
(c) cyclohexyl carbaldehyde (d) benzoic acid

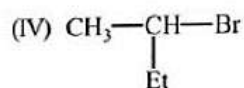
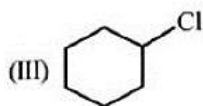
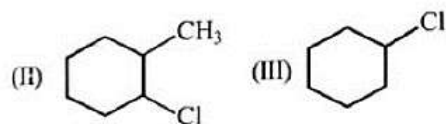
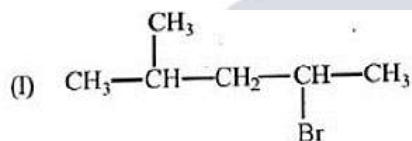
71. Which of the following shows nitrogen with its increasing order of oxidation number?

- (a) $\text{NO} < \text{N}_2\text{O} < \text{NO}_2 < \text{NO}_3^- < \text{NH}_4^+$
(b) $\text{NH}_4^+ < \text{N}_2\text{O} < \text{NO}_2 < \text{NO}_3^- < \text{NO}$
(c) $\text{NH}_4^+ < \text{N}_2\text{O} < \text{NO} < \text{NO}_2 < \text{NO}_3^-$
(d) $\text{NH}_4^+ < \text{NO} < \text{N}_2\text{O} < \text{NO}_2 < \text{NO}_3^-$

72. Which method is useful for the synthesis of ether?



73. Among the given halides, which one will give same product in both $\text{S}_\text{N}1$ and $\text{S}_\text{N}2$ reactions.



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

74. Which one of the following is an amine hormone?

- (a) Thyroxine (b) Oxypurin
(c) Insulin (d) Progesterone

75. Among the ligands NH_3 , en, CN^- and CO the correct order of their increasing field strength, is:

- (a) $\text{NH}_3 < \text{en} < \text{CN}^- < \text{CO}$
(b) $\text{CN}^- < \text{NH}_3 < \text{NH}_3 < \text{en}$
(c) $\text{en} < \text{CN}^- < \text{NH}_3 < \text{CO}$
(d) $\text{CO} < \text{NH}_3 < \text{en} < \text{CN}^-$

76. S – S bond is not present in

- (a) $\text{S}_2\text{O}_4^{2-}$ (b) $\text{S}_2\text{O}_5^{2-}$
(c) $\text{S}_2\text{O}_3^{2-}$ (d) $\text{S}_2\text{O}_7^{2-}$

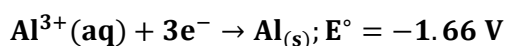
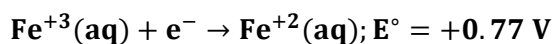
77. In the laboratory, manganese (II) salt is oxidised to permanganate ion in aqueous solution by

- (a) hydrogen peroxide (b) con(c) nitric acid
(c) peroxy disulphate (d) dichromate

78. Which one of the following molecular hydrides acts as a Lewis acid?

- (a) NH_3 (b) H_2O
(c) B_2H_6 (d) CH_4

79. Electrode potential data are given below:



Based on the data, the reducing power of Fe^{2+} , Al and Br^- will increase in the order

- (a) $\text{Br}^- < \text{Fe}^{2+} < \text{Al}$ (b) $\text{Fe}^{2+} < \text{Al} < \text{Br}^-$
(c) $\text{Al} < \text{Br}^- < \text{Fe}^{2+}$ (d) $\text{Al} < \text{Fe}^{2+} < \text{Br}^-$

80. Correct formula of the complex formed in the brown ring test for nitrates is

- (a) $\text{FeSO}_4 \cdot \text{NO}$ (b) $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]^{2+}$
(c) $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]^+$ (d) $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]^{3+}$

PART- III (A) ENGLISH PROFICIENCY

81. fricassee

- (a) grill (b) decorate
(c) stew (d) to baste

82. RETRIBUTION

- (a) compensation (b) forgiveness
(c) contempt (d) grudge

83. SUMPTUOUS

- (a) irritable (b) meagre
(c) fancy (d) sad

84. Rajeev failed in the examination because his answers were not _____ to the questions asked

- (a) allusive (b) pertinent
(c) revealing (d) referential

85. Choose the correct words to complete the sentence: It was ____ cold ____ we couldn't go out.

- (a) so, that (b) too, to
(c) neither, nor (d) either, or

86. Faced with the

(P) traditional culture in the pre-independence India

(Q) challenge of the intrusion of colonial culture and ideology

(R) developed during the nineteenth century

(S) at attempt to reinvigorate traditional institutions and realize the potential of

Which one of the following is the correct sequence?

- (a) P – R – Q – S (b) Q-S - P - R
(c) P – S – Q – R (d) Q – R – P – S

87. (A) diversified use

P : as a heating or power generation fuel by converting gas into

Q : adding a new dimension to the traditional use of gas

R : of natural gas is emerging

S: amongst other products, high quality diesel transportation fuel virtually free of sulphur

Which one of the following is the correct sequence?

- (a) R – P – Q – S (b) S – Q – P – R
(c) R – Q – P – S (d) S – P – Q – R

88. Music is often linked to _____ -

- (a) anger (b) mood
(c) anxiety (d) happiness

89. How is music an important part of life?

- (a) It makes us feel different emotions
(b) It makes us sad
(c) It helps in our daily activities
(d) It helps us in remembering things

90. Which of the statements is true?

- (a) All forms of music may heal wounds
(b) All forms of music may have good effect
(c) All forms of music may be soothing
(d) All forms of music may have therapeutic effects

91. On the following questions, select the related word/letters/from the attractive

MASTER: OCUVGT: LABOUR:?

- (a) NCDQWT (b) HDERWT

- (c) NBECRWT (d) NEDRWT

DIRECTIONS (Qs.92.): In the following question, out of the four alternatives, choose the one which best expresses the meaning of the given word.

92. Loquacious

- (a) Talkative (b) Slow
(c) Content (d) Unclear

DIRECTIONS (Qs. 93): Choose the word opposite in meaning to the given word.

93. Meticulous

- (a) Forgetful (b) Destructive
(c) Careless (d) Flagrant

DIRECTIONS (Qs.94 to 95) : In questions below, sentences are given with blanks to be filled in with an appropriate word (s). Four alternatives are suggested for each question. Choose the correct alternative out of the four.

94. China is a big country; in area it is bigger than any other country ____ Russia.

- (a) accept (b) except
(c) expect (d) access

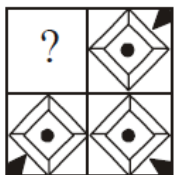
95. The treasure was hidden ____ a big shore.

- (a) on (b) underneath
(c) toward (d) off

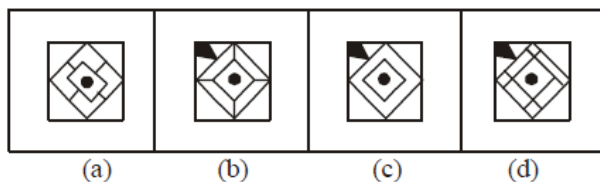
PART-III (B) LOGICAL REASONING

96. Which answer figure complete the form in question figure?

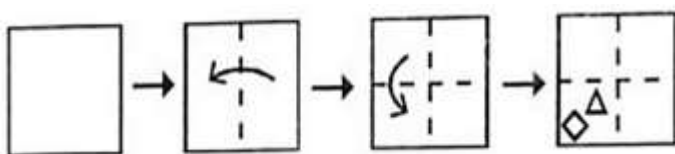
Question figure:

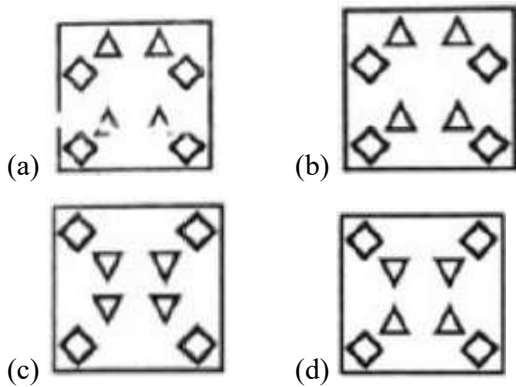


Answer figures :



97. The sequence of folding a paper and the manner in which the folded paper has been cut is shown in the following figures. How would this paper look when unfolded?





98. In a given code SISTER is coded as 535301. UNCLE as 84670 and BOY as 129. How is RUSTIC written in that code?

- (a) 633185 (b) 185336
(c) 363815 (d) 581363

99. Daya has a brother, Anil. Daya is the son of Chandr(a) Bimal is Chandra's father. In terms of relationship, what is Anil of Bimal?

- (a) Son (b) Grandson
(c) Brother (d) Grandfather

100. Find the odd word pair among the given four- word pairs.

- (a) Error: Accurate (b) Careless: Casual
(c) Strength: Lethargy (d) Gloomy: Cheerful

101. M is the son of P. Q is the grand daughter of O who is the husband of P. How is M related to O ?

- (a) Son (b) Daughter
(c) Mother (d) Father

102. Vinod introduces Vishal as the son of the only brother of his father's wife. How is Vinod related to Vishal?

- (a) Cousin (b) Brother
(c) Son (d) Uncle

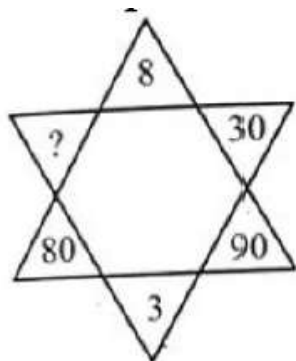
103. AGMSY, CIOUA, EKQWC, ? IOUAG, KQWCI

- (a) GMSYE (b) FMSYE
(c) GNSYD (d) FMYES

104. (?), PSVYB, EHKNQ, TWZCF, ILORU

- (a) BEHKN(b) ADGJM
(c) SVYBE (d) ZCFIL

105. In the questions, select the missing number from the given responses.



- (a) 20 (b) 15
(c) 40 (d) 10

PART-IV MATHEMATICS

106. If $\sec^2 \theta = \frac{4}{3}$, then the general value of θ is

- (a) $2n\pi \pm \frac{\pi}{6}$ (b) $n\pi \pm \frac{\pi}{6}$
(c) $2n\pi \pm \frac{\pi}{3}$ (d) $n\pi \pm \frac{\pi}{3}$

107. Number of words from the letters of the words BHARAT in which B and H will never come together is

- (a) 210 (b) 240
(c) 422 (d) 400

108. The ratio in which the YZ-plane divide the line segment formed by joining the points $(-2, 4, 7)$ and $(3, -5, 8)$ is 2: m. The value of m is

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

109. A set A has 3 elements and another set B has 6 elements. Then

- (a) $3 \leq n(A \cup B) \leq 6$ (b) $3 \leq n(A \cup B) \leq 9$
(c) $6 \leq n(A \cup B) \leq 9$ (d) $0 \leq n(A \cup B) \leq 9$

110. For all $n \in \mathbb{N}$, the sum of $\frac{n^5}{5} + \frac{n^3}{3} + \frac{7n}{15}$ is

- (a) a negative integer (b) a whole number
(c) a real number (d) a natural number

111. The roots of the given equation $(p - q)x^2 + (q - r)x + (r - p) = 0$ are: Options:

- (a) $\frac{p-q}{r-p}, 1$ (b) $\frac{q-r}{p-q}, 1$
(c) $\frac{r-p}{p-q}, 1$ (d) None of these

112. What is the angle between the two straight lines $y = (2 - \sqrt{3})x + 5$ and $y = (2 + \sqrt{3})x - 7$?

- (a) 60° (b) 45°
(c) 30° (d) 15°

113. The range of the function $f(x) = \sqrt{3x^2 - 4x + 5}$ is

- (a) $\left(-\infty, \sqrt{\frac{11}{3}}\right]$ (b) $\left(-\infty, \sqrt{\frac{11}{5}}\right]$
(c) $\left[\sqrt{\frac{11}{3}}, \infty\right)$ (d) $\left(\sqrt{\frac{11}{5}}, \infty\right)$

114. If $f(x) = \frac{x}{\sqrt{1+x^2}}$, then $(f \circ f)(x)$ is

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

115. The derivative of e^{x^3} with respect to $\log x$ is

- (a) e^{x^3} (b) $3x^2 2e^{x^3}$
(c) $3x^3 e^{x^3}$ (d) $3x^3 e^{x^3} + 3x^2$

116. If the coordinates of the points A and B be (3, 3) and (7, 6), then the length of the portion of the line AB intercepted between the axes is

- (a) $\frac{5}{4}$ (b) $\frac{\sqrt{10}}{4}$
(c) $\frac{\sqrt{13}}{3}$ (d) None of these

117. Solution of $2^x + 2^{|x|} \geq 2\sqrt{2}$ is

- (a) $(-\infty, \log_2(\sqrt{2} + 1))$
(b) $(0, \infty)$
(c) $\left(\frac{1}{2}, \log_2(\sqrt{2} - 1)\right)$
(d) $(-\infty, \log_2(\sqrt{2} - 1)] \cup \left[\frac{1}{2}, \infty\right)$

118. If $y = \sqrt{\frac{1+\cos 2\theta}{1-\cos 2\theta}}$, then $\frac{dy}{d\theta}$ at $\theta = \frac{3\pi}{4}$ is:

- (a) -2 (b) 2
(c) ± 2 (d) None of these

119. The number of solutions of $\frac{dy}{dx} = \frac{y+1}{x-1}$, when $y(1) = 2$ is

- (a) none (b) one

(c) two (d) infinite

120. The probability of getting sum more than 7 when a pair of dice are thrown is:

- (a) $\frac{7}{36}$ (b) $\frac{5}{12}$
(c) $\frac{7}{12}$ (d) None of these

121. The probability that a card drawn from a pack of 52 cards will be a diamond or king is:

- (a) $\frac{1}{52}$ (b) $\frac{2}{13}$
(c) $\frac{4}{13}$ (d) $\frac{1}{13}$

122. If $A = \begin{bmatrix} 0 & 2 \\ 3 & -4 \end{bmatrix}$ and $kA = \begin{bmatrix} 0 & 3a \\ 2b & 24 \end{bmatrix}$, then the values of k, a and b respectively are:

- (a) $-6, -12, -18$ (b) $-6, -4, -9$
(c) $-6, 4, 9$ (d) $-6, 12, 18$

123. If the eccentricity and length of latus rectum of a hyperbola are $\frac{\sqrt{13}}{3}$ and $\frac{10}{3}$ units respectively, then what is the length of the transverse axis?

- (a) $\frac{7}{2}$ unit (b) 12 unit
(c) $\frac{15}{2}$ unit (d) $\frac{15}{4}$ unit

124. If the sum of an infinite GP $a, ar, ar^2, ar^3, \dots$ is 15 and the sum of the squares of its each term is 150, then the sum of $ar^2, a^4, ar^6, \dots$ is:

- (a) $\frac{5}{2}$ (b) $\frac{1}{2}$
(c) $\frac{25}{2}$ (d) $\frac{9}{2}$

125. The interval in which the function $f(x) = \frac{4x^2+1}{x}$ is decreasing is:

- (a) $\left(-\frac{1}{2}, \frac{1}{2}\right)$ (b) $\left[-\frac{1}{2}, \frac{1}{2}\right]$
(c) $(-1, 1)$ (d) $[-1, 1]$

126. If $\int \frac{e^x(1+\sin x)dx}{1+\cos x} = e^x f(x) + C$, then $f(x)$ is equal to

- (a) $\sin \frac{x}{2}$ (b) $\cos \frac{x}{2}$
(c) $\tan \frac{x}{2}$ (d) $\log \frac{x}{2}$

127. The curve given by $x + y = e^{xy}$ has a tangent parallel to the Y-axis at the point

- (a) (0,1) (b) (1,0)
(c) (1,1) (d) None of these

128. The area enclosed between the curve $y = \log_e(x + e)$ and the coordinate axes is

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

129. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{a} \cdot \vec{b} = 1$ and $\vec{a} \times \vec{b} = \hat{j} - \hat{k}$, then $\vec{b}$ is

- (a) $\hat{i} - \hat{j} + \hat{k}$ (b) $2\hat{j} - \hat{k}$
(c) $2\hat{i}$ (d) $\hat{i}$

130. $\lim_{x \rightarrow 0} \frac{|\sin x|}{x}$ is equal to

- (a) 1 (b) -1
(c) Does not exist (d) None of these

131. The lines $\frac{x-2}{1} = \frac{y-3}{1} = \frac{z-4}{-k}$ and $\frac{x-1}{k} = \frac{y-4}{2} = \frac{z-5}{1}$ are coplanar if

- (a) $k = 3$ or -2 (b) $k = 0$ or -1
(c) $k = 1$ or -1 (d) $k = 0$ or -3

132. Negation of the Boolean expression $p \Leftrightarrow (q \Rightarrow p)$ is Options:

- (a) $(\sim p) \wedge q$ (b) $(p) \wedge (\sim q)$
(c) $(\sim p) \vee (\sim q)$ (d) $(\sim p) \wedge (\sim q)$

133. The maximum value of $z = 5x + 2y$ subject to constraints $x + y \leq 7$, $x + 2y \leq 10$, $x, y \geq 0$

- (a) 10 (b) 26
(c) 35 (d) 70

134. Find the mean deviation about the mean for the data 4, 7, 8, 9, 10, 12, 13, 17

- (a) 3 (b) 24
(c) 10 (d) 8

135. If the line through the points $A(k, 1, -1)$ and $B(2k, 0, 2)$ is perpendicular to the line through the points B and $C(2 + 2k, k, 1)$, then what is the value of k ?

- (a) -1 (b) 1
(c) -3 (d) 3

136. Bag P contains 6 red and 4 blue balls and bag Q contains 5 red and 6 blue balls. A ball is transferred from bag P to bag Q and then a ball is drawn from bag Q. What is the probability that the ball drawn is blue?

- (a) $\frac{7}{15}$ (b) $\frac{8}{15}$
(c) $\frac{4}{19}$ (d) $\frac{8}{19}$

137. $\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{2}{9}\right)$ is equal to

- (a) $\frac{1}{2} \cos^{-1} \left(\frac{3}{5} \right)$ (b) $\frac{1}{2} \sin^{-1} \left(\frac{3}{5} \right)$
 (c) $\frac{1}{2} \tan^{-1} \left(\frac{3}{5} \right)$ (d) $\tan^{-1} \left(\frac{1}{2} \right)$

138. The middle term in the expansion of $\left(\frac{10}{x} + \frac{x}{10} \right)^{10}$ is

- (a) ${}^{10}C_5$ (b) ${}^{10}C_6$
 (c) ${}^{10}C_5 \frac{1}{x^{10}}$ (d) ${}^{10}C_5 x^{10}$

139. An urn contains five balls. Two balls are drawn and found to be white. The probability that all the balls are white is

- (a) $\frac{1}{10}$ (b) $\frac{3}{10}$
 (c) $\frac{3}{5}$ (d) $\frac{1}{2}$

140. The equation of a common tangent to the parabolas $y = x^2$ and $y = -(x - 2)^2$ is

- (a) $y = 4(x - 2)$ (b) $y = 4(x - 1)$
 (c) $y = 4(x + 1)$ (d) $y = 4(x + 2)$

141. A circle touches both the y-axis and the line $x + y = 0$. Then the locus of its center is

- (a) $y = \sqrt{2}x$ (b) $x = \sqrt{2}y$
 (c) $y^2 - x^2 = 2xy$ (d) $x^2 - y^2 = 2xy$

142. The function $f(x) = \tan^{-1}(\sin x + \cos x)$ is an increasing function in Options:

- (a) $\left(\frac{\pi}{4}, \frac{\pi}{2} \right)$ (b) $\left(-\frac{\pi}{2}, \frac{\pi}{4} \right)$
 (c) $\left(0, \frac{\pi}{2} \right)$ (d) $\left(-\frac{\pi}{2}, \frac{\pi}{2} \right)$

143. $2^{1/4} \cdot 2^{2/8} \cdot 2^{3/16} \cdot 2^{4/32} \dots \dots \infty$ is equal to-

- (a) 1 (b) 2
 (c) $3/2$ (d) $5/2$

144. $i^{57} + \frac{1}{i^{25}}$, when simplified has the value

- (a) 0 (b) $2i$
 (c) $-2i$ (d) 2

145. If one root of the equation $x^2 + px + 12 = 0$ is 4, while the equation $x^2 + px + q = 0$ has equal roots, then the value of 'q' is

- (a) 4 (b) 12
 (c) 3 (d) $\frac{49}{4}$

146. $\int \frac{x+3}{(x+4)^2} e^x dx$ is equal to

- (a) $e^x \left(\frac{1}{x+4} \right) + C$ (b) $e^{-x} \left(\frac{1}{x+4} \right) + C$
 (c) $e^{-x} \left(\frac{1}{x-4} \right) + C$ (d) $e^{2x} \left(\frac{1}{x-4} \right) + C$

147. A cylindrical gas container is closed at the top and open at the bottom. if the iron plate of the top is $\frac{5}{4}$ time as thick as the plate forming the cylindrical sides. The ratio of the radius to the height of the cylinder using minimum material for the same capacity is

- (a) $\frac{2}{3}$ (b) $\frac{1}{2}$
(c) $\frac{4}{5}$ (d) $\frac{1}{3}$

148. The shortest distance between the lines $\frac{x-3}{2} = \frac{y-2}{3} = \frac{z-1}{-1}$ and $\frac{x+3}{2} = \frac{y-6}{1} = \frac{z-5}{3}$ is:

- (a) $\frac{18}{\sqrt{5}}$ (b) $\frac{22}{3\sqrt{5}}$
(c) $\frac{46}{3\sqrt{5}}$ (d) $6\sqrt{3}$

149. If $P(B) = \frac{3}{5}$, $P(A | B) = \frac{1}{2}$ and $P(A \cup B) = \frac{4}{5}$, then $P(A \cup B)' + P(A' \cup B) =$

- (a) $\frac{1}{5}$ (b) $\frac{4}{5}$
(c) $\frac{1}{2}$ (d) 1

150. The equation of one of the common tangents to the parabola $y^2 = 8x$ and $x^2 + y^2 - 12x + 4 = 0$ is

- (a) $y = -x + 2$ (b) $y = x - 2$
(c) $y = x + 2$ (d) None of these

