

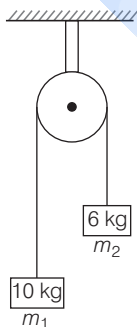
MET 2019 Memory Based Question Paper PDF

PHYSICS

1. Three blocks of masses 2 kg, 3 kg and 5 kg are connected to each other with light string and are then placed on a frictionless surface as shown in the figure. The system is pulled by a force $F = 10$ N, then tension T_1 is



- (a) 1 N (b) 5 N
(c) 8 N (d) 10 N
2. Two masses m_1 and m_2 are attached to a string which passes over a frictionless smooth pulley. When $m_1 = 10$ kg, $m_2 = 6$ kg, the acceleration of masses is



- (a) 20 m/s^2 (b) 5 m/s^2
(c) 2.5 m/s^2 (d) 10 m/s^2

3. The unit of L/R is (where L = inductance and R = resistance)

(a) sec (b) sec^{-1}
(c) volt (d) ampere

4. If force is proportional to square of velocity, then the dimensions of proportionality constant is

(a) $[\text{ML}^{-1} \text{T}]$ (b) $[\text{ML}^{-1} \text{T}^0]$
(c) $[\text{ML} \text{T}^0]$ (d) $[\text{M}^0 \text{LT}^{-1}]$

5. Minimum energy required to take out the only one electron from ground state of He^+ is

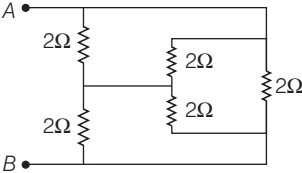
(a) 13.6 eV (b) 54.4 eV
(c) 27.2 eV (d) 6.8 eV

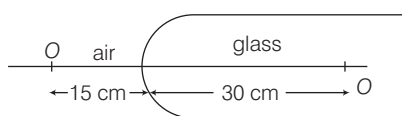
6. Photons of 5.5 eV energy fall on the surface of the metal emitting photoelectrons of maximum kinetic energy 4.0 eV. The stopping voltage required for these electrons is

(a) 5.5 V
(b) 1.5 V
(c) 9.5 V
(d) 4.0 V

7. Which is different from others in units?

(a) Phase difference
(b) Mechanical equivalent
(c) Loudness of sound
(d) Poisson's ratio

8. Continuous emission spectrum is produced by
 (a) in incandescent electric lamp
 (b) mercury vapour lamp
 (c) sodium vapour lamp
 (d) polyatomic substances
9. A ball is dropped from top of a tower of 100 m height. Simultaneously another ball was thrown upward from bottom of the tower with a speed of 50 m/s. They will cross each other after ($g = 10 \text{ m/s}^2$)
 (a) 1 s (b) 2 s (c) 3 s (d) 4 s
10. The driver of a car moving towards a rocket launching pad with a speed of 6 m/s observes that the rocket is moving with speed of 10 m/s. The upward speed of the rocket as seen by the stationary observer is
 (a) 4 m/s (b) 6 m/s (c) 8 m/s (d) 11 m/s
11. A satellite revolves very near to the earth surface. Its speed should be around
 (a) 5 km/s (b) 8 km/s
 (c) 2 km/s (d) 11 km/s
12. If the density of earth is doubled keeping its radius constant, then acceleration due to gravity g is
 (a) 20 m/s^2 (b) 10 m/s^2
 (c) 5 m/s^2 (d) 2.5 m/s^2
13. A simple pendulum oscillates in a vertical plane. When it passes through the mean position, the tension in the string is 3 times the weight of the pendulum bob. What is the maximum displacement of the pendulum of the string with respect to the vertical ?
 (a) 30° (b) 45°
 (c) 60° (d) 90°
14. A body of mass 8 kg is moved by a force $F = 3 \times x \text{ N}$, where x is the distance covered. Initial position is $x = 2 \text{ m}$ and the final position is $x = 10 \text{ m}$. The initial speed is zero. The final speed is
 (a) 6 m/s (b) 12 m/s
 (c) 18 m/s (d) 14 m/s
15. Find the equivalent resistance across AB
- 
- (a) 1Ω (b) 2Ω (c) 3Ω (d) 4Ω
16. The nuclear reaction ${}_1\text{H}^1 + {}_1\text{H}^1 \rightarrow {}_2\text{He}^4$ (mass of deuteron = 2.0141 amu and of He = 4.0024 amu) is
 (a) fusion reaction releasing 24 MeV energy
 (b) fusion reaction absorbing 24 MeV energy
 (c) fission reaction releasing 0.0258 MeV energy
 (d) fission reaction absorbing 0.0258 MeV energy
17. A thin metal plate P is inserted half way between the plates of a parallel plate capacitor of capacitance C in such a way that it is parallel to the two plates. The capacitance now becomes
 (a) C (b) $\frac{C}{2}$
 (c) $4C$ (d) None of these
18. An inclined plane makes an angle 30° with horizontal. A solid sphere rolling down this inclined plane has a linear acceleration of
 (a) $\frac{5g}{14}$ (b) $\frac{2g}{3}$
 (c) $\frac{g}{3}$ (d) $\frac{5g}{7}$
19. A bullet of mass 10 g is fired from a gun of mass 1 kg. If the recoil velocity is 5 m/s, the velocity of the muzzle is
 (a) 0.05 m/s (b) 5 m/s
 (c) 50 m/s (d) 500 m/s
20. A particle moves with constant speed v along a circular path of radius r and completes the circle in time T . The acceleration of the particle is
 (a) $\frac{2\pi v}{T}$ (b) $\frac{2\pi r}{T}$
 (c) $\frac{2\pi r^2}{T}$ (d) $\frac{2\pi v^2}{T}$

21. The separation between C and O-atoms in CO is $1.2 \text{ \AA}$. The distance of carbon atom from the centre of mass is
(a) $0.3 \text{ \AA}$ (b) $0.7 \text{ \AA}$ (c) $0.5 \text{ \AA}$ (d) $0.9 \text{ \AA}$
22. A body moves a distance of 10 m under the action of force $F = 10 \text{ N}$. If the work done is 25 J, the angle which the force makes with the direction of motion is
(a) 0° (b) 30°
(c) 60° (d) None of these
23. When a spring is stretched by 2 cm, it stores 100 J of energy. If it is stretched further by 2 cm, the stored energy will be increased by
(a) 100 J (b) 200 J (c) 300 J (d) 400 J
24. Two wires A and B are of same materials. Their lengths are in the ratio 1 : 2 and diameters are in the ratio 2 : 1. When stretched by force F_A and F_B , respectively, they get equal increase in their lengths. Then the ratio $\frac{F_A}{F_B}$ should be
(a) 1 : 2 (b) 1 : 1 (c) 2 : 1 (d) 8 : 1
25. Mixed He^+ and O^{2+} ions (mass of $\text{He}^+ = 4 \text{ amu}$ and that of $\text{O}^{2+} = 16 \text{ amu}$) beam passes a region of constant perpendicular magnetic field. If kinetic energy of all the ions is same, then
(a) He^+ ions will be deflected more than those of O^{2+}
(b) He^+ ions will be deflected less than those of O^{2+}
(c) all the ions will be deflected equally
(d) no ions will be deflected
26. In Young's double slit experiment the wavelength of light was changed from $7000 \text{ \AA}$ to $3500 \text{ \AA}$. While doubling the separation between the slits which of the following is not true for this experiment?
(a) The width of the fringes changes
(b) The colour of bright fringes changes
(c) The separation between successive bright fringes changes
(d) The separation between successive dark fringes remains unchanged
27. The coherence of two light sources means that the light waves emitted have
(a) same frequency
(b) same intensity
(c) constant phase difference
(d) same velocity
28. The valence band and conduction band of a solid overlap at low temperature, the solid may be
(a) a metal
(b) a semiconductor
(c) an insulator
(d) None of the above
29. The dominant contribution to current comes from holes in case of
(a) metals
(b) intrinsic semiconductors
(c) p-type extrinsic semiconductors
(d) n-type extrinsic semiconductors
30. A laser device produces amplification in the
(a) microwave region
(b) ultraviolet or visible region
(c) infrared region
(d) None of the above
31. A point object O is placed in front of a glass rod having spherical end of radius of curvature 30 cm. The image would be formed at
- 
- (a) 30 cm left
(b) infinity
(c) 1 cm to the right
(d) 18 cm to the left
32. In the formation of a rainbow light from the sun on water droplets undergoes
(a) dispersion only
(b) only total internal reflection
(c) dispersion and total internal reflection
(d) None of the above

33. If no external voltage is applied across p-n junction, there would be
- no electric field across the junction
 - an electric field pointing from n-type to p-type side across the junction
 - an electric field pointing from p-type to n-type side across the junction
 - a temporary electric field during formation of p-n junction that would subsequently disappear

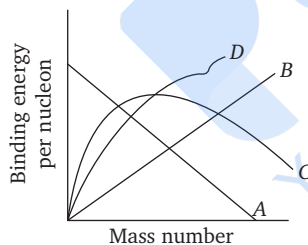
34. Light travelling from a transparent medium to air undergoes total internal reflection at an angle of incidence of 45° . Then refractive index of the medium may be

- 1.5
- 1.3
- 1.1
- $1/\sqrt{2}$

35. A force F acting on a body depends on its displacement S as $F \propto S^{-1/3}$. The power delivered by F will depend on displacement as

- $S^{2/3}$
- $S^{-5/3}$
- $S^{1/2}$
- S^0

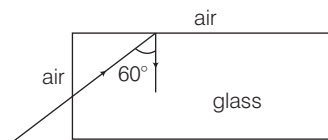
36. Binding energy per nucleon plot against the mass number for stable nuclei is shown in the figure. Which curve is correct?



- A
- B
- C
- D

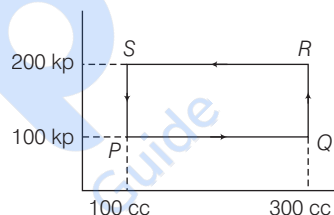
37. A light ray from air is incident (as shown in figure) at one end of a glass fiber (refractive index, $\mu = 1.5$) making an incidence angle of 60° on the lateral

surface, so that it undergoes a total internal reflection. How much time would it take to traverse the straight fiber of length 1 km ?



- $3.33 \mu\text{s}$
- $6.67 \mu\text{s}$
- $5.77 \mu\text{s}$
- $3.85 \mu\text{s}$

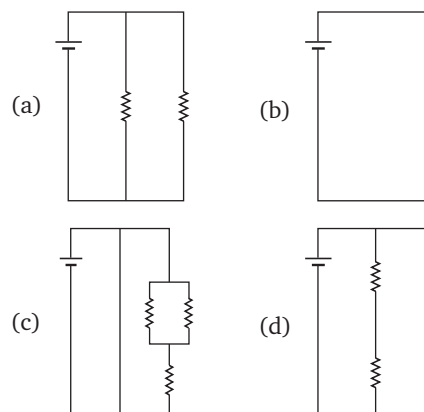
38. A thermodynamic system is taken through the cycle PQRSP process. The net work done by the system is



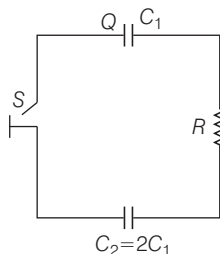
- 20 J
- 20 J
- 400 J
- 374 J

39. Consider four circuits shown in the figure below. In which circuit power dissipated is greatest?

(Neglect the internal resistance of the power supply).



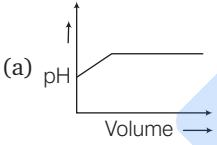
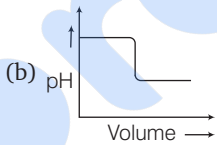
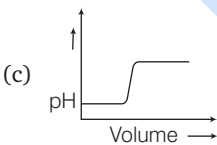
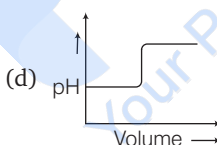
40. Two capacitors C_1 and $C_2 = 2C_1$ are connected in a circuit with a switch between them as shown in the figure. Initially the switch is open and C_1 holds charge Q . The switch is closed. At steady state, the charge on each capacitor will be



- (a) $Q, 2Q$ (b) $\frac{Q}{3}, \frac{2Q}{3}$
(c) $\frac{3Q}{2}, 3Q$ (d) $\frac{2Q}{3}, \frac{4Q}{3}$
41. A particle is moving in a vertical circle. The tensions in the string when passing through two positions at angles 30° and 60° from vertical (lowest positions) are T_1 and T_2 , respectively. Then
(a) $T_1 = T_2$
(b) $T_2 > T_1$
(c) $T_1 > T_2$
(d) tension in the string always remains the same
42. A coil of 100 turns carries a current of 5 mA and creates a magnetic flux of 10^{-5} wb. The inductance is
(a) 0.2 mH (b) 2.0 mH
(c) 0.02 mH (d) None of these
43. The starter motor of a car draw a current $I = 300$ A from the battery of voltage 12 V. If the car starts only after 2 minutes, what is the energy drawn from the battery ?
(a) 3 kJ (b) 30 kJ
(c) 7.2 kJ (d) 432 kJ
44. Surface of the lake is at 2°C and depth of the lake is 20 m. Find the temperature of the bottom of the lake
(a) 2°C (b) 3°C
(c) 4°C (d) None of these
45. $y_1 = 4 \sin(\omega t + kx)$, $y_2 = -4 \cos(\omega t + kx)$, the phase difference is
(a) $\frac{\pi}{2}$ (b) $\frac{3\pi}{2}$ (c) π (d) zero
46. A charged particle of mass 0.003 g is held stationary in space by placing it in a downward direction of electric field of 6×10^4 N/C. Then the magnitude of the charge is
(a) 5×10^{-4} C (b) 5×10^{-10} C
(c) -18×10^{-6} C (d) -5×10^{-9} C
47. A parallel plate capacitor has an electric field of 10^5 V/m between the plates. If the charge on the capacitor plate is $1 \mu\text{C}$, the force on each capacitor plate is
(a) 0.5 N (b) 0.05 N
(c) 0.005 N (d) None of these
48. 1 g of water at atmospheric pressure has volume of 1 cc and when boiled it becomes 1681 cc of steam. The heat of vaporisation of water is 540 cal/g. Then the change in its internal energy in this process is
(a) 540 cal
(b) 500 cal
(c) 1681 cal
(d) None of the above
49. A physicist works in a laboratory where the magnetic field is 2 T. She wears a necklace enclosing area 0.01 m^2 in such a way that the plane of the necklace is normal to the field and is having a resistance, $R = 0.01 \Omega$. Because of power failure, the field decays to 1 T in time 10^{-3} s. Then what is the total heat produced in her necklace?
(a) 10 J (b) 20 J
(c) 30 J (d) 40 J
50. The temperature coefficient of resistance of a wire is $0.00125^\circ\text{C}^{-1}$. At 300 K, its resistance is 1Ω . At what temperature the resistance of the wire will be 2Ω ?
(a) 800 K
(b) 1100 K
(c) 600 K
(d) None of the above

CHEMISTRY

- The solubility CaF_2 is s moles/litre. Then solubility product is
(a) s^2 (b) $4s^3$ (c) $3s^2$ (d) s^3
- If p , T , ρ and R represents pressure, temperature, density and universal gas constant respectively, then the molar mass of the ideal gas is given by
(a) $\frac{\rho RT}{p}$ (b) $\frac{\rho T}{pR}$ (c) $\frac{p}{\rho RT}$ (d) $\frac{RT}{\rho p}$
- The kinetic energy of a gas molecule is temperature
(a) independent of
(b) directly proportional to
(c) inversely proportional to
(d) directly proportional to square root of
- The ratio of rate of diffusion of SO_2 ($M = 64$) and oxygen ($M = 32$) is
(a) 1 : 1 (b) 2 : 1
(c) 1 : 2 (d) 1 : 1.414
- An aqueous solution freezes at -0.186°C , then elevation in boiling point is ($K_b = 0.512$, $K_f = 1.86$)
(a) 0.0512°C (b) 100.0512°C
(c) -0.0512°C (d) None of these
- Arrange the following in the increasing order of their bond order
 $\text{O}_2, \text{O}_2^+, \text{O}_2^-$ and O_2^{2-}
(a) $\text{O}_2^{2-}, \text{O}_2^-, \text{O}_2, \text{O}_2^+$ (b) $\text{O}_2^{2-}, \text{O}_2^-, \text{O}_2^+, \text{O}_2$
(c) $\text{O}_2^+, \text{O}_2, \text{O}_2^-, \text{O}_2^{2-}$ (d) $\text{O}_2, \text{O}_2^+, \text{O}_2^-, \text{O}_2^{2-}$
- In hydrolysis of a salt of weak acid and strong base, $\text{A}^- + \text{H}_2\text{O} \rightleftharpoons \text{HA} + \text{OH}^-$, the hydrolysis constant (K_h) is equal to
(a) $\frac{K_w}{K_a}$ (b) $\frac{K_w}{K_b}$ (c) $\sqrt{\frac{K_a}{C}}$ (d) $\frac{K_w}{K_a \times K_b}$
- For a reaction of the type $a\text{A} + b\text{B} \longrightarrow$ Products, the $-\frac{d[\text{A}]}{dt}$ is equal to
(a) $-\frac{d[\text{B}]}{dt}$ (b) $-\frac{1}{b} \times \frac{d[\text{B}]}{dt}$
(c) $-\frac{a}{b} \times \frac{d[\text{B}]}{dt}$ (d) $-\frac{b}{a} \times \frac{d[\text{B}]}{dt}$
- In a mixture of 1 g H_2 and 8 g O_2 the mole fraction of hydrogen is
(a) 0.667
(b) 0.5
(c) 0.33
(d) None of the above
- In acid medium MnO_4^- is reduced to Mn^{2+} , by a reducing agent. Then the equivalent mass of KMnO_4 is given by (M = molecular mass)
(a) $M/2$ (b) M
(c) $M/5$ (d) $M/3$
- For the reaction
$$\text{CH}_3\text{COOH}_{(l)} + 2\text{O}_{2(g)} \rightleftharpoons 2\text{CO}_{2(g)} + 2\text{H}_2\text{O}_{(l)}$$
at 25°C and 1 atm pressure, $\Delta H = -874\text{ kJ}$. Then the change in internal energy (ΔE) is
(a) -874 kJ (b) -871.53 kJ
(c) -876.47 kJ (d) $+874\text{ kJ}$
- The electrophile involved in the sulphonation of benzene is
(a) SO_3^+ (b) SO_3^{2-}
(c) H_3O^+ (d) SO_3
- According to the adsorption theory of catalysis, the speed of reaction increases because
(a) adsorption lowers the activation energy of the reaction
(b) the concentration of reactant molecules at the active centres of the catalyst becomes high due to adsorption
(c) in the process of adsorption, the activation energy of the molecules becomes large
(d) adsorption produces heat which increases the speed of the reaction
- The product of reaction between alcoholic silver nitrite with ethyl bromide is
(a) ethene
(b) ethane
(c) ethyl nitrile
(d) nitro ethane

15. The specific conductivity of 0.1 N KCl solution is $0.0129 \text{ ohm}^{-1}\text{cm}^{-1}$. The resistance of the solution in the cell is 100 ohm. The cell constant of the cell will be
(a) 1.10 (b) 1.29
(c) 0.56 (d) 2.80
16. The standard emf of a cell $\text{Zn} / \text{Zn}^{2+} || \text{Fe}^{2+} / \text{Fe}$, if electrode potentials for $(\text{Zn}/\text{Zn}^{2+})$ and $(\text{Fe}^{2+}/\text{Fe})$ are 0.763 V and -0.44 V respectively is
(a) + 0.323 V (b) -1.203 V
(c) + 1.203 V (d) -0.323 V
17. Which of the following has highest second ionisation energy
(a) Chromium
(b) Calcium
(c) Iron
(d) Cobalt
18. Which of the following plot represents the graph of pH against volume of alkali added in the titration of NaOH and HCl?
- (a)  (b) 
- (c)  (d) 
19. CO_2 is a gas, while SiO_2 is a solid, but both are
(a) acidic
(b) ionic
(c) discrete molecules
(d) covalent containing π -bonds
20. Pure conc. HNO_3 make iron passive, as the surface is covered with protective layer of
(a) Fe_2O_3
(b) FeO
(c) Fe_3O_4
(d) $\text{Fe}(\text{NO}_3)_3$
21. Ozone when reacts with potassium iodide solution liberates certain product, which turns starch paper blue. The liberated substance is
(a) oxygen
(b) iodine
(c) hydrogen iodide
(d) potassium hydroxide
22. Red hot iron absorbs SO_2 giving the product
(a) $\text{FeS} + \text{O}_2$ (b) $\text{Fe}_2\text{O}_3 + \text{FeS}$
(c) $\text{FeO} + \text{FeS}$ (d) $\text{FeO} + \text{S}$
23. Ethyl iodide when heated with sodium in dry ether gives pure
(a) C_4H_{10} (b) C_2H_6
(c) C_3H_8 (d) $\text{C}_2\text{H}_5\text{OH}$
24. For the reaction,
 $\text{CH}_3-\text{CH}=\text{CH}_2 + \text{HOCl} \longrightarrow \text{A}$
The product A is :
(a) $\text{CH}_3-\text{CHCl}-\text{CH}_2\text{OH}$
(b) $\text{CH}_3-\text{CH}(\text{OH})-\text{CH}_2-\text{Cl}$
(c) $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{COCl}$
(d) $\text{CH}_3-\text{C}(\text{OH})(\text{Cl})-\text{CH}_3$
25. Which of the following is not correct for ionic crystals?
(a) They possess high melting point and boiling point
(b) All are electrolyte
(c) Exhibit the property of isomorphism
(d) Exhibit directional properties of the bond
26. Which of the following is not true in Rutherford's nuclear model of atom?
(a) Protons and neutrons are present inside nucleus
(b) Volume of nucleus is very small as compared to volume of atom
(c) The number of protons and neutrons are always equal
(d) The number of electrons and protons are always equal

27. All the s-block elements of the periodic table are placed in the groups
- (a) IA and IIA (b) IIIA and IVA
(c) B sub groups (d) VA to VIIA
28. The magnetic quantum number for d-orbital is given by
- (a) 2 (b) $0, \pm 1, \pm 2$
(c) $0, 1, 2$ (d) 5
29. XeF_2 is isostructural with
- (a) ICl_2 (b) SbCl_3
(c) BaCl_2 (d) TeF_2
30. In the process, $\text{O}_2^+ \longrightarrow \text{O}_2^{2+} + e^-$ the electron lost is from
- (a) bonding π -orbital
(b) antibonding π -orbital
(c) $2p_z$ orbital (d) $2p_x$ orbital
31. Bond between A and B can be represented by
- $\text{A} - \text{B}, \text{A}^+ \text{B}^-, \text{A}^- \text{B}^+$
(I) (II) (III)
- If A is more electronegative than B, then least contribution to the actual structure comes from
- (a) I
(b) II
(c) III
(d) All the structures have equal contribution
32. In the following reaction
- $\text{NaOH} + \text{S} \rightarrow \text{A} + \text{Na}_2\text{S} + \text{H}_2\text{O}$; A is
- (a) Na_2SO_4
(b) Na_2SO_3
(c) Na_2S
(d) $\text{Na}_2\text{S}_2\text{O}_3$
33. SiF_4 gets hydrolysed giving
- (a) SiO_2 (b) $\text{Si}(\text{OH})_2\text{F}_2$
(c) H_2SiF_6 (d) $\text{Si}(\text{OH})_4$
34. All ores are minerals, while all minerals are not ores, because
- (a) the metal cannot be extracted economically from all the minerals
(b) minerals are complex compounds
(c) the minerals are obtained from mines
(d) All of these are correct
35. In the reaction,
- $\text{P}_2\text{O}_5 + 3\text{CaO} \longrightarrow \text{Ca}_3(\text{PO}_4)_2$, P_2O_5 acts as
- (a) acidic flux (b) basic flux
(c) basic impurity (d) acidic impurity
36. In the given reaction, the oxide of sodium is
- $$\left(\begin{array}{l} 4\text{Na} + \text{O}_2 \longrightarrow 2\text{Na}_2\text{O} \\ \text{Na}_2\text{O} + \text{H}_2\text{O} \longrightarrow 2\text{NaOH} \end{array} \right)$$
- (a) acidic (b) basic
(c) amphoteric (d) neutral
37. When CO_2 is passed through solution of calcium hydroxide, which one of the following compound is precipitated?
- (a) $\text{Ca}(\text{HCO}_3)_2$ (b) CaO
(c) CaCO_3 (d) $\text{Ca}(\text{OH})_2$
38. Ferric alum has the composition $(\text{NH}_4)_2\text{SO}_4 \cdot \text{Fe}_2(\text{SO}_4)_3 \cdot x\text{H}_2\text{O}$. The value of x is
- (a) 7 (b) 24
(c) 6 (d) 15
39. What is the general electronic configuration for 2nd row transition series?
- (a) $[\text{Ne}]3d^{1-10}, 4s^2$ (b) $[\text{Ar}]3d^{1-10}, 4s^{1-2}$
(c) $[\text{Kr}]4d^{1-10}, 5s^{1-2}$ (d) $[\text{Xe}]5d^{1-10}, 5s^{1-2}$
40. The existence of two different coloured complexes of $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$ is due to
- (a) ionisation isomerism
(b) co-ordination isomerism
(c) linkage isomerism
(d) geometrical isomerism
41. IUPAC name of the compound
- $$\begin{array}{ccccccc} \text{CH}_3 & - & \text{C} & \text{H} & - & \text{CH}_2 & - & \text{C} & \text{H} & - & \text{CH}_3 \\ & & | & & & & & | & & & \\ & & \text{OH} & & & & & \text{CH}_3 & & & \end{array}$$
- (a) 4-methyl pentene-2-ol
(b) 2-methyl pentanol-4
(c) 4, 4-dimethyl-butane-2-ol
(d) 4-methyl pentane-2-ol
42. Alkyl halide on heating with alc. NH_3 in a sealed tube results
- (a) 1° amine (b) 2° amine
(c) 3° amine (d) all of these

43. Among H—CHO , CH_3CHO and $\text{C}_6\text{H}_5\text{CHO}$, which will undergo Cannizzaro's reaction?
 (a) HCHO and $\text{CH}_3\text{—CHO}$
 (b) $\text{CH}_3\text{—CHO}$ and $\text{C}_6\text{H}_5\text{CHO}$
 (c) $\text{C}_6\text{H}_5\text{CHO}$ and HCHO
 (d) All of the above
44. The main product of the reaction of CH_3CONH_2 with Br_2 in aqueous potassium hydroxide medium is
 (a) $\text{CH}_3\text{—CH}_2\text{—NH}_2$ (b) CH_3Br
 (c) CH_3CONHBr (d) CH_3NH_2
45. In the reaction,

$$\text{HCHO} + \text{CH}_3\text{MgI} \longrightarrow \text{A} \xrightarrow{\text{H}_2\text{O}} \text{B} + \text{Mg(OH)I}$$

 What are A and B?
 (a) CH_3OMgI and $\text{CH}_3\text{—OH}$
 (b) $\text{CH}_3\text{CH}_2\text{OMgI}$ and $\text{C}_2\text{H}_5\text{—O—C}_2\text{H}_5$
 (c) $\text{CH}_3\text{CH}_2\text{OMgI}$ and $\text{CH}_3\text{—CH}_2\text{—OH}$
 (d) $\text{CH}_3\text{—CH}_2\text{—I}$ and $\text{CH}_3\text{—CH}_2\text{—OH}$
46. Acetylation of a secondary amine in alkaline medium yields
 (a) N, N-dialkyl acetamide
 (b) N, N-dialkyl amine
 (c) N, N-dialkyl amide
 (d) acetyl dialkyl amine
47. In acid medium nitrobenzene is reduced to aniline as shown in the reaction

$$\text{C}_6\text{H}_5\text{—NO}_2 + 6[\text{H}] \longrightarrow \text{C}_6\text{H}_5\text{—NH}_2 + 2\text{H}_2\text{O}$$

 The reducing agent used in this reaction is :
 (a) LiAlH_4 (b) Sn / HCl
 (c) Na / Alcohol (d) H_2/Ni
48. Acetyl salicylic acid is used as
 (a) anti oxidant (b) analgesic drug
 (c) anti biotic drug (d) anaesthetic
49. C_6H_6 consists of one ring, while naphthalene consists of two rings. Both of them are aromatic and obey the $(4n + 2)$ rule. Thus the number of π -electrons inside rings of C_6H_6 and naphthalene are respectively
 (a) 3, 5
 (b) 5, 10
 (c) 6, 10
 (d) 6, 12
50. In the oxidation of $\text{C}_6\text{H}_5\text{—CH}_2\text{—CH}_3$ by KMnO_4 the product formed is
 (a) $\text{C}_6\text{H}_5\text{—CH}_2\text{—CHO}$
 (b) $\text{C}_6\text{H}_5\text{—CH}_2\text{—COOH}$
 (c) $\text{C}_6\text{H}_6\text{—COOH}$
 (d) $\text{C}_6\text{H}_5\text{—CH}_2\text{—OH}$

MATHEMATICS

1. If the angles between the pair of straight lines represented by the equation

$$x^2 - 3xy + \lambda y^2 + 3x - 5y + 2 = 0$$
 is

$$\tan^{-1} \frac{1}{3}$$

 Where λ is a non-negative real number, then λ is
 (a) 2 (b) 0
 (c) 3 (d) 1
2. The distance of the line $2x - 3y = 4$ from the point (1, 1) measured parallel to the line $x + y = 1$ is
 (a) $\sqrt{2}$ (b) $5/\sqrt{2}$
 (c) $1/\sqrt{2}$ (d) 6
3. The equation of bisectors of the angles between the lines $|x| = |y|$ are
 (a) $y = \pm x$ and $x = 0$
 (b) $x = \frac{1}{2}$ and $y = \frac{1}{2}$
 (c) $y = 0$ and $x = 0$
 (d) None of the above
4. The base of vertices of an isosceles triangle PQR are Q(1, 3) and R(-2, 7). The vertex P can be
 (a) (1, 6) (b) $\left(\frac{1}{2}, 5\right)$
 (c) $\left(\frac{5}{6}, 6\right)$ (d) None of these

5. The normal at the point (3, 4) on a circle cuts the circle at the point (-1, -2). Then the equation of the circle is
 (a) $x^2 + y^2 + 2x - 2y - 13 = 0$
 (b) $x^2 + y^2 - 2x - 2y - 11 = 0$
 (c) $x^2 + y^2 - 2x + 2y + 12 = 0$
 (d) $x^2 + y^2 - 2x - 2y + 14 = 0$
6. If $\cos P = \frac{1}{7}$ and $\cos Q = \frac{13}{14}$, where P and Q both are acute angles. Then the value of P - Q is
 (a) 30° (b) 60°
 (c) 45° (d) 75°
7. The equation $3 \cos x + 4 \sin x = 6$ has solution.
 (a) finite (b) infinite
 (c) one (d) no
8. If $\sec^{-1} x = \operatorname{cosec}^{-1} y$, then $\cos^{-1} \frac{1}{x} + \cos^{-1} \frac{1}{y}$ is equal to
 (a) π (b) $\frac{\pi}{4}$ (c) $-\frac{\pi}{2}$ (d) $\frac{\pi}{2}$
9. If n be any integer, then $n(n+1)(2n+1)$ is:
 (a) odd number
 (b) integral multiple of 6
 (c) perfect square
 (d) does not necessarily have any of the foregoing proof
10. If $\tan \theta = -\frac{4}{3}$, then the value of $\sin \theta$ is
 (a) $-\frac{4}{5}$ but $\neq \frac{4}{5}$ (b) $-\frac{4}{5}$ or $\frac{4}{5}$
 (c) $\frac{4}{5}$ but $\neq -\frac{4}{5}$ (d) $\frac{1}{5}$
11. If $c = 2 \cos \theta$, then the value of the determinant $\Delta = \begin{vmatrix} c & 1 & 0 \\ 1 & c & 1 \\ 6 & 1 & c \end{vmatrix}$ is
 (a) $\frac{\sin 4\theta}{\sin \theta}$ (b) $\frac{2 \sin^2 2\theta}{\sin \theta}$
 (c) $4 \cos^2 \theta (2 \cos \theta - 1)$ (d) None of these
12. The equation of the parabola whose vertex is (-1, -2), axis is vertical and which passes through the point (3, 6), is
 (a) $x^2 + 2x - 2y - 3 = 0$
 (b) $2x^2 = 3y$
 (c) $x^2 - 2x + 2y - 3 = 0$
 (d) $x^2 - 2x - 2y - 3 = 0$
13. The length of the axis of the conic $9x^2 + 4y^2 - 6x + 4y + 1 = 0$ are
 (a) $\frac{1}{2}, 9$ (b) $3, \frac{2}{5}$ (c) $1, \frac{2}{3}$ (d) $3, 2$
14. If $f(x) = \cot^{-1} \left(\frac{3x - x^3}{1 - 3x^2} \right)$ and $g(x) = \cos^{-1} \left(\frac{1 - x^2}{1 + x^2} \right)$, then $\lim_{x \rightarrow a} \frac{f(x) - f(a)}{g(x) - g(a)}, 0 < a < \frac{1}{2}$, is
 (a) $\frac{3}{2(1+a^2)}$ (b) $\frac{3}{2(1+x^2)}$
 (c) $\frac{3}{2}$ (d) $-\frac{3}{2}$
15. If $f(x) = \begin{cases} x, & 0 \leq x \leq 1 \\ 2x - 1, & 1 < x \end{cases}$, then
 (a) f is discontinuous at $x = 1$
 (b) f is differentiable at $x = 1$
 (c) f is continuous but not differentiable at $x = 1$
 (d) None of the above
16. $\lim_{x \rightarrow -2} \frac{\sin^{-1}(x+2)}{x^2 + 2x}$ is equal to
 (a) 0 (b) ∞
 (c) $-\frac{1}{2}$ (d) None of these
17. Let $f(x) = x^p \cos \left(\frac{1}{x} \right)$, when $x \neq 0$ and $f(x) = 0$, when $x = 0$. Then $f(x)$ will be differentiable at $x = 0$, if
 (a) $p > 0$ (b) $p > 1$
 (c) $0 < p < 1$ (d) $\frac{1}{2} < p < 1$

18. The derivative of $f(x) = 3|2 + x|$ at the point $x_0 = -3$ is
 (a) 3
 (b) -3
 (c) 0
 (d) None of the above
19. Derivative of the function $f(x) = \log_5(\log_7 x)$, $x > 7$ is
 (a) $\frac{1}{x(\log 5)(\log 7)(\log_7 x)}$
 (b) $\frac{1}{x(\log 5)(\log 7)}$
 (c) $\frac{1}{x(\log x)}$
 (d) None of the above
20. If $z = x + iy$, $z^{1/3} = a - ib$, then $\frac{x}{a} - \frac{y}{b} = k(a^2 - b^2)$, where k is equal to :
 (a) 1
 (b) 2
 (c) 3
 (d) 4
21. The number of real solutions of the equation $1 + |e^x - 1| = e^x (e^x - 2)$ is
 (a) 1
 (b) 2
 (c) 4
 (d) 8
22. If $u = x^2 + y^2$ and $x = s + 3t$, $y = 2s - t$, then $\frac{d^2u}{ds^2}$ is equal to
 (a) 12
 (b) 10
 (c) 32
 (d) 36
23. If the equation $x^2 + px + q = 0$ and $x^2 + qx + p = 0$ have a common root then $p + q + 1$ is equal to
 (a) 0
 (b) 1
 (c) 2
 (d) -1
24. The value of a ($a \geq b$) for which the sum of the cubes of the roots of $x^2 - (a - 2)x + (a - 3) = 0$ assumes the least value, is
 (a) 3
 (b) 4
 (c) 5
 (d) None of the above
25. Let z_1, z_2, z_3 be three vertices of an equilateral triangle circumscribing the circle $|z| = \frac{1}{2}$. If $z_1 = \frac{1}{2} + \frac{i\sqrt{3}}{2}$ and z_1, z_2, z_3 were in anticlockwise sense, then z_2 is
 (a) $1 + \sqrt{3}i$ (b) $1 - \sqrt{3}i$ (c) 1 (d) -1
26. If $z = \frac{-2}{1 + \sqrt{3}i}$, then the value of $\arg(z)$ is
 (a) π (b) $\frac{\pi}{3}$ (c) $\frac{2\pi}{3}$ (d) $\frac{\pi}{4}$
27. Let ω is an imaginary cube roots of unity, then the value of $2(1 + \omega)(1 + \omega^2) + 3(2\omega + 1)(2\omega^2 + 1) + \dots + (n + 1)(n\omega + 1)(n\omega^2 + 1)$ is
 (a) $\left[\frac{n(n+1)}{2}\right]^2 + n$ (b) $\left[\frac{n^2(n+1)^2}{4}\right]$
 (c) $\left[\frac{n(n+1)}{2}\right]^2 - n$ (d) None of these
28. The locus of the point z satisfying $\arg\left(\frac{z-1}{z+1}\right) = k$, (where k is non-zero) is
 (a) a circle with centre on y-axis
 (b) circle with centre on x-axis
 (c) a straight line parallel to x-axis
 (d) a straight line making an angle 60° with the x-axis
29. If $(3, 4, 5)$, $Q(4, 6, 3)$, $R(-1, 2, 4)$, $S(1, 0, 5)$, then the projection of RS on PQ is
 (a) $-\frac{2}{3}$ (b) $-\frac{4}{3}$ (c) $\frac{1}{2}$ (d) 2
30. If a line makes α, β, γ with the positive direction of x, y and z -axes respectively. Then, $\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma$ is equal to
 (a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) -1 (d) 1
31. The projection of a line on a co-ordinate axes are 2, 3, 6. Then the length of the line is
 (a) 7 (b) 5 (c) 1 (d) 11
32. The decimal equivalent of the binary number 10011.1 is
 (a) 19.50 (b) 11001.11
 (c) 5005.55 (d) 19.10

33. The binary represents of 60 is
 (a) 101110 (b) 111100
 (c) 110011 (d) 110000
34. Which of the following statement is not tautology?
 (a) $\sim(p \wedge q) \vee p$
 (b) $(p \wedge q) \Rightarrow p$
 (c) $q \vee \sim(p \wedge q)$
 (d) $(\sim p \wedge q) \cap (\sim p \vee p)$
35. The period of $f(x) = \sin\left(\frac{\pi x}{n-1}\right) + \cos\left(\frac{\pi x}{n}\right)$, $n \in \mathbb{Z}$, $n > 2$ is
 (a) $2\pi n(n-1)$
 (b) $4n(n-1)$
 (c) $2n(n-1)$
 (d) None of the above
36. For $\theta > \frac{\pi}{3}$, the value of $f(\theta) = \sec^2 \theta + \cos^2 \theta$ always lies in the interval
 (a) (0, 2) (b) [0, 1]
 (c) (1, 2) (d) [2, ∞)
37. The radius of the circle whose arc of length 15 cm makes an angle of $\frac{3}{4}$ radian at the centre, is
 (a) 10 cm (b) 20 cm
 (c) $11\frac{1}{4}$ cm (d) $22\frac{1}{2}$ cm
38. If $f_n(x) = e^{f_{(n-1)}(x)}$, for all $n \in \mathbb{N}$ and $f_0(x) = x$, then $\frac{d}{dx} \{f_n(x)\}$ is equal to
 (a) $f_n(x) f_{n-1}(x) \frac{d}{dx}$
 (b) $f_n(x) \frac{d}{dx} \{f_{n+1}(x)\}$
 (c) $f_n(x) \cdot f_{n-1}(x) \dots f_2(x) f_1(x)$
 (d) None of the above
39. If $3^x + 2^{2x} \geq 5^x$, then the solution set for x is
 (a) $(-\infty, 2]$ (b) $[2, \infty)$
 (c) $[0, 2]$ (d) $\{2\}$
40. The number of integral solution of $\frac{x+1}{x^2+2} > \frac{1}{4}$ is
 (a) 1 (b) 2
 (c) 5 (d) None of these
41. The triangle PQR of which the angles P, Q, R satisfy $\cos P = \frac{\sin Q}{2 \sin R}$ is
 (a) equilateral (b) right angled
 (c) any triangle (d) isosceles
42. If $f(x) = (a - x^n)^{1/n}$, where $a > 0$ and n is a positive integer, then $f[f(x)]$ is equal to
 (a) x^3 (b) x^2
 (c) x (d) None of these
43. A function $f(x) = \frac{x^2 - 3x + 2}{x^2 + 2x - 3}$ is
 (a) maximum at $x = -3$
 (b) maximum at $x = -3$ and maximum at $x = 1$
 (c) maximum at $x = 1$
 (d) function is increasing in its domain
44. The locus of the point P(x, y) satisfying the relation
 $\sqrt{(x-3)^2 + (y-1)^2} + \sqrt{(x+3)^2 + (y-1)^2} = 6$ is
 (a) straight line
 (b) pair of straight lines
 (c) circle
 (d) ellipse
45. If z_1, z_2 and z_3 are complex number such that $|z_1| = |z_2| = |z_3| = \left| \frac{1}{z_1} + \frac{1}{z_2} + \frac{1}{z_3} \right| = 1$ then $|z_1 + z_2 + z_3|$ is
 (a) equal to 1 (b) less than 1
 (c) greater than 3 (d) equal to 3
46. Equation $x * a = b$ has in group $(G, \forall)$
 (a) unique solution $b * a^{-1}$
 (b) unique solution $a^{-1} * b$
 (c) unique solution $a^{-1} * b^{-1}$
 (d) many solutions

47. If $f(x) = \cos[\pi^2]x + \cos[-\pi^2]x$, then

- (a) $f\left(\frac{\pi}{4}\right) = 2$ (b) $f(-\pi) = 2$
 (c) $f(\pi) = 1$ (d) $f\left(\frac{\pi}{2}\right) = -1$

48. The range of

$$f(x) = \sec\left(\frac{\pi}{4} \cos^2 x\right), -\infty < x < \infty \text{ is}$$

- (a) $[1, \sqrt{2}]$
 (b) $[1, \infty)$
 (c) $[-\sqrt{2}, -1] \cup [1, \sqrt{2}]$
 (d) $(-\infty, 1] \cup [1, \infty)$

49. The domain of the function

$$f(x) = \frac{\sin^{-1}(3-x)}{\log(|x|-2)} \text{ is :}$$

- (a) $[2, 4]$
 (b) $(3, 4]$
 (c) $[2, \infty)$
 (d) $(-\infty, 3) \cup [2, \infty)$

50. The remainder obtained when

$1! + 2! + \dots + 200!$ is divided by 14 is

- (a) 3
 (b) 4
 (c) 5
 (d) None of the above

51. $\cos^{-1}\{\cos 2 \cot^{-1}(\sqrt{2}-1)\}$ is equal to

- (a) $\sqrt{2}-1$ (b) $\frac{\pi}{4}$
 (c) $\frac{3\pi}{4}$ (d) 0

52. The function $f(x) = [x] \cos\left[\frac{2x-1}{2}\right]\pi$,

where $[.]$ denotes the greatest integer function, is discontinuous at

- (a) all x
 (b) no x
 (c) all integral points
 (d) x which is not an integer

53. A perpendicular is drawn from the point

$P(2, 4, -1)$ to the line

$$\frac{x+5}{1} = \frac{y+3}{4} = \frac{z-6}{-9}.$$

The equation of the perpendicular from P to the given line is

- (a) $\frac{x-2}{6} = \frac{y-4}{3} = \frac{z+1}{2}$
 (b) $\frac{x+2}{6} = \frac{y-4}{3} = \frac{z+1}{2}$
 (c) $\frac{x+2}{-6} = \frac{y-4}{3} = \frac{z+1}{2}$
 (d) $\frac{x+2}{6} = \frac{y+4}{3} = \frac{z+1}{2}$

54. One mapping (function) is selected at random from all the mappings of the set $A = \{1, 2, 3, \dots, n\}$ into itself. The probability that the mapping selected is one-one, is

- (a) $\frac{n!}{n^{n-1}}$ (b) $\frac{n!}{n^n}$
 (c) $\frac{n!}{2n^n}$ (d) None of these

55. If $\mathbf{a} = -\hat{\mathbf{i}} + 2\hat{\mathbf{j}} - \hat{\mathbf{k}}$, $\mathbf{b} = \hat{\mathbf{i}} + \hat{\mathbf{j}} - 3\hat{\mathbf{k}}$ and $\mathbf{c} = -4\hat{\mathbf{i}} - \hat{\mathbf{k}}$, then $\mathbf{a} \times (\mathbf{b} \times \mathbf{c}) + (\mathbf{a} \cdot \mathbf{b})\mathbf{c}$

- (a) $5\hat{\mathbf{i}} + 5\hat{\mathbf{j}} - 15\hat{\mathbf{k}}$ (b) 0
 (c) $12\hat{\mathbf{j}} + 4\hat{\mathbf{k}}$ (d) $-3\hat{\mathbf{i}} + 6\hat{\mathbf{j}} - 3\hat{\mathbf{k}}$

56. The number of five digits numbers that can be formed without any restriction is

- (a) 990000 (b) 10000
 (c) 90000 (d) None of these

57. The maximum value of $3\cos\theta + 4\sin\theta$ is

- (a) -5 (b) 5
 (c) 25 (d) None of these

58. The vertex connectivity of any tree is

- (a) one (b) two
 (c) three (d) None of these

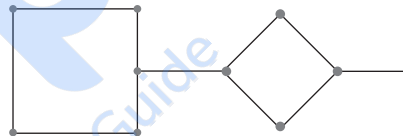
59. If $\mathbf{a}$, $\mathbf{b}$ and $\mathbf{c}$ are non-collinear vectors such that for some scalars, x, y, z ,

$$x\mathbf{a} + y\mathbf{b} + z\mathbf{c} = \mathbf{0}, \text{ then}$$

- (a) $x = 0, y = 0, z = 0$
 (b) $x \neq 0, y \neq 0, z = 0$
 (c) $x = 0, y \neq 0, z \neq 0$
 (d) $x \neq 0, y \neq 0, z \neq 0$

60. Which is the correct order for a given number α in increasing order?

- (a) $\log_2 \alpha, \log_3 \alpha, \log_e \alpha, \log_{10} \alpha$
 (b) $\log_{10} \alpha, \log_3 \alpha, \log_e \alpha, \log_2 \alpha$
 (c) $\log_{10} \alpha, \log_e \alpha, \log_2 \alpha, \alpha \log_3 \alpha$
 (d) None of the above

61. In $\triangle ABC$, $\frac{b-c}{r_1} + \frac{c-a}{r_2} + \frac{a-b}{r_3}$ is equal to
 (a) 0 (b) abc
 (c) $a + b + c$ (d) $ab + bc + ca$
62. If $n \in \mathbb{N}$, then $|\sin nx|$
 (a) $\leq n |\sin x|$ (b) $\geq n |\sin x|$
 (c) $= n |\sin x|$ (d) None of these
63. If x follows a binomial distribution with parameters $n = 100$ and $p = \frac{1}{3}$, then $p(X = r)$ is maximum when r equals
 (a) 16 (b) 32
 (c) 33 (d) None of these
64. The direction cosines of any normal to the xy -plane are
 (a) 1, 0, 0 (b) 0, 1, 0
 (c) 1, 1, 0 (d) 0, 0, 1
65. If $\int f(x) dx = F(x)$, then $\int x^3 f(x^2) dx$ is equal to
 (a) $\frac{1}{2} [x^2 \{F(x)\}^2 - \int \{F(x)\}^2 dx]$
 (b) $\frac{1}{2} [x^2 F(x^2) - \int F(x^2) d(x^2)]$
 (c) $\frac{1}{2} [x^2 F(x) - \frac{1}{2} \int \{F(x)\}^2 dx]$
 (d) None of the above
66. The approximate value of $\int_1^5 x^2 dx$ using trapezoidal rule with $n = 4$ is
 (a) 41 (b) 41.5 (c) 41.75 (d) 42
67. If the distance between the foci of an ellipse is 6 and the length of the minor axis is 8, then the eccentricity is
 (a) $\frac{1}{\sqrt{5}}$ (b) $\frac{1}{2}$ (c) $\frac{3}{5}$ (d) $\frac{4}{5}$
68. If $I_n = \int \sin^n x dx$, then $nI_n - (n-1)I_{n-2}$ equals
 (a) $\sin^{n-1} x \cos x$ (b) $\cos^{n-1} x \sin x$
 (c) $-\sin^{n-1} x \cos x$ (d) $-\cos^{n-1} x \sin x$
69. The adjoining graph
- 
- (a) connected (b) disconnected
 (c) Neither connected nor disconnected
 (d) None of the above
70. The remainder obtained when 5^{124} is divided by 124 is
 (a) 5 (b) 0 (c) 2 (d) 1

ENGLISH AND GENERAL APTITUDE

Directions (Q. Nos. 1-5) Read the given passage carefully and answer the questions that follow by selecting the most appropriate option.

Helicopters are very different from airplanes. They can do three things that airplanes cannot do. First, when airplanes move upward, they must also move forward, but helicopters can move straight up without moving ahead. Second, helicopters can fly backward, which airplanes cannot do. Third, helicopters can use their rotors to hover in the air, which is impossible for airplanes. Helicopters can perform actions that airplanes cannot, they are used for different tasks. Since, helicopters can take off without moving

forward, they do not need a runway for take off. They are used in congested areas where there is no room for airplanes or in isolated areas, which do not have airports. Because they can hover, they are used on firefighting missions to drop water on fires. They are used in logging operations to lift trees out of forests. Helicopters are used as air ambulances to airlift patients out of situations, which are difficult to reach by conventional ambulances.

The police used helicopters to follow suspects on the ground or to search for cars on the ground. Of course, helicopters have military uses because of their design and capabilities.

1. The word 'congested' in the passage means
 - (a) the place is roomy
 - (b) the place has no place
 - (c) the place can be accessed by police vans
 - (d) the place has so much of smoke due to fire
2. A helicopter can hover while an airplane cannot, according to the passage. 'Hover' in the passage means
 - (a) stay at one place in the air
 - (b) move straight up in the air
 - (c) go backward in the air
 - (d) fly sideways
3. Point out the grammatical category of the word 'perform' in the passage.
 - (a) Noun
 - (b) Verb
 - (c) Adverb
 - (d) Helping verb
4. Why is a helicopter used as an ambulance?
 - (a) Its movement can be manoeuvred easily
 - (b) It crosses all difficulties of traffic
 - (c) It reaches the inaccessible places easily
 - (d) It can fire-fight
5. Point out the grammatical category of the word 'very' in the passage.
 - (a) Adverb
 - (b) Adjective
 - (c) Noun
 - (d) Verb

Directions (Q. Nos. 6-8) *Complete the sentence in the following questions with most appropriate choice.*

6. He was very much ashamed his mischief.
 - (a) for
 - (b) of
 - (c) with
 - (d) over
7. he stood first, he would have gone to America.
 - (a) If
 - (b) Had
 - (c) Have
 - (d) Anyways
8. Of the sword and pen, the is more powerful.
 - (a) last one
 - (b) later
 - (c) latter
 - (d) last

Directions (Q. Nos. 9-11) *Each of the following question consist of a word, followed by four words or group of words. Select the antonym of the words given below.*

9. Adverse
 - (a) Hostile
 - (b) Friendly
 - (c) Inimical
 - (d) Unwilling

10. Expansion
 - (a) Depression
 - (b) Negligent
 - (c) Precise
 - (d) Enlargement
11. Thrift
 - (a) Parsimony
 - (b) Dismantle
 - (c) Prodigality
 - (d) Essential
12. Pick out the correct synonym of the word 'cantankerous'.
 - (a) Rash
 - (b) Quarrelsome
 - (c) Noisy
 - (d) Disrespectful

Directions (Q. Nos. 13-15) *In each of the following questions, choose the alternative which best expresses the meaning of the word given in capital letters.*

13. INTREPID
 - (a) Coward
 - (b) Fearless
 - (c) Selfish
 - (d) Ugly
14. LAMENTABLE
 - (a) Deplorable
 - (b) Contemptible
 - (c) Remorseful
 - (d) Scornful
15. DEFT
 - (a) Skilful
 - (b) Vigorous
 - (c) Swift
 - (d) Store

Directions (Q. Nos. 16-20) *In each of the following questions, there is a certain relationship between two given words on one side of (::) and one word is given on another side (::) while another word is to be found from the given alternatives, having the same relation with this word as the words of the given pair bear. Choose the correct alternative.*

16. King : Throne :: Judge : ?
 - (a) Lawyer
 - (b) Bench
 - (c) Court
 - (d) Trial
17. Lion : Roar :: Ass : ?
 - (a) Bark
 - (b) Trumpet
 - (c) Howl
 - (d) Bray
18. Lamb : Frisk :: Mouse : ?
 - (a) Trot
 - (b) Scamper
 - (c) Gallop
 - (d) Flit
19. Circle : Arc :: Square : ?
 - (a) Line
 - (b) Triangle
 - (c) Sphere
 - (d) Rectangle

20. Brinjal : Vegetable :: Orange : ?
 (a) Fruit (b) Stem
 (c) Leaf (d) Root

Direction (Q. Nos. 21-23) *In each of the following questions, a group of four words are given. Choose the word which is odd.*

21. Find the odd word.
 (a) Walking
 (b) Running
 (c) Moving
 (d) Reading
22. Find the odd word.
 (a) Ghaziabad (b) Varanasi
 (c) Gorakhpur (d) Bhagalpur
23. Find the odd word.
 (a) Orange
 (b) Apple
 (c) Guava
 (d) Grapes
24. In the English alphabet, find the position of S from right.
 (a) 8 (b) 5
 (c) 4 (d) 9
25. In the English alphabet, find the position of L from left.
 (a) 12
 (b) 16
 (c) 11
 (d) 15
26. Which letter is 7th from right in the English alphabet?
 (a) P (b) C
 (c) T (d) V

Directions (Q. Nos. 27-28) *In the following series, replace the question mark (?) with the suitable option.*

27. 6, 9, 12, 15, 18, ?
 (a) 21
 (b) 20
 (c) 19
 (d) 22
28. 360, 180, 90, 45, 22.5, ?
 (a) 15
 (b) 11.25
 (c) 20
 (d) 10.5

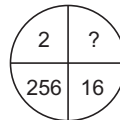
Directions (Q. Nos. 29-30) *In each of the following questions, a set of figures carrying certain characters is given. Assuming that the characters in each set follow a similar pattern, find the missing character in each case.*

29.



- (a) 28 (b) 30
 (c) 35 (d) 27

30.



- (a) 8
 (b) 4
 (c) 32
 (d) 16