

## PHYSICS

## Rotatory motion

1. A rod of length  $l$  is held vertically stationary with its lower end located at a point 'P', on the horizontal plane. When the rod is released to topple about 'P', the velocity of the upper end of the rod with which it hits the ground is (ENGG-2009)

1)  $\sqrt{\frac{g}{l}}$                       2)  $\sqrt{3gl}$                       3)  $3\sqrt{\frac{g}{l}}$                       4)  $\sqrt{\frac{3g}{l}}$

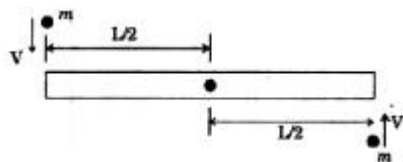
2. Two persons A and B are located in the X-Y plane at the points (0, 0) and (0, 10) respectively. (The distance are measured in MKS units). At a time  $t = 0$ , they start moving simultaneously with velocities  $\vec{u}_A = \hat{j}$  m/s and  $\vec{u}_B = 2\hat{i}$  m/s. The time after which A and B are at their closest distance (M-2009)

1) 2.5 secs                      2) 4 secs                      3) 1 sec                      4)  $\frac{10}{\sqrt{2}}$  secs

3. A rigid uniform rod of mass  $M$  and length 'L' is resting on a smooth horizontal table. Two marbles each of mass ' $m$ ' and travelling with uniform speed ' $V$ ' collide with two ends of the rod simultaneously and inelastically as shown. The marbles get struck to the rod after the collision and continue

to move with the rod. If  $m = \frac{M}{6}$  and  $V = L$  mts/ sec, then the time taken by the rod to rotate through

$p/2$  is (MED-2009)



1) 1 sec                      2)  $2p$  seconds                      3)  $p$  seconds                      4)  $\frac{p}{2}$  seconds

4. The moment of inertia of thin circular disc about an axis passing through its centre and perpendicular to its plane is 1. Then, the moment of inertia of the disc about an axis parallel to its diameter and touching the edge of the rim is (ENGG-2008)

1) I                      2) 2I                      3)  $\frac{3}{2}I$                       4)  $\frac{5}{2}I$

(MED-2008)

5. **Assertion (A)** : A ball connected to a string is in circular motion on a frictionless horizontal table and is in equilibrium.

**Reason (R)** : Magnitude of the centripetal force is equal to the magnitude of the tension in the string. The correct answer is

- 1) Both A and R are true and R is the correct explanation of A  
 2) Both A and R are true but R is not the correct explanation of A  
 3) A is true but R is not true                      4) A is not true but R is true

6. Circular disc of mass 2kg and radius 1 metre is rotating about an axis perpendicular to its plane and passing through its centre of mass with a rotational kinetic energy of 8 Joules. The angular momentum in (J-sec) is (MED-2008)

1) 8                      2) 4                      3) 2                      4) 1

7. If the Earth shrinks such that its density becomes 8 times to the present value, then the new duration of the day in hours will be (MED-2008)

1) 24                      2) 12                      3) 6                      4) 3

8. A bucket filled with water is tied to a rope of length 0.5m and is rotated in a circular path in vertical plane. the least velocity it should have at the lowest point of circle so that water does not spill is, ( $g=10\text{ms}^{-2}$ ) [2007-E]

1)  $\sqrt{5}m/s$                       2)  $\sqrt{10}m/s$                       3)  $5m/s$                       4)  $2\sqrt{5}m/s$

9. Two solid spheres (A and B) are made of metals of different densities  $P_A$  and  $P_B$  respectively. If their masses are equal, the ratio of their moment of inertia ( $I_B/I_A$ ) about their respective diameter is [2007E]

1)  $\left(\frac{P_B}{P_A}\right)^{\frac{2}{3}}$       2)  $\left(\frac{P_A}{P_B}\right)^{\frac{2}{3}}$       3)  $\frac{P_A}{P_B}$       4)  $\frac{P_B}{P_A}$

10. The radius of gyration of rod of length 'L' and mass 'M' about an axis perpendicular to its length and passing through a point at a distance L/3 from one of its ends is [2007-M]

1)  $\frac{\sqrt{7}}{6}L$       2)  $\frac{L^2}{9}$       3)  $\frac{L}{3}$       4)  $\frac{\sqrt{5}}{2}L$

11. A ball of mass 0.6kg attached to a light inextensible string rotates in a vertical circle of radius 0.75m such that it has speed of  $5\text{ms}^{-1}$  when the string is horizontal. Tension in string when it is horizontal on other side is ( $g=10\text{ms}^{-2}$ ) [2007-M]

1) 30N      2) 26N      3) 20N      4) 6N

12. A uniform rod of length '8a' and mass '6m' lies on a smooth horizontal surface. Two point masses 'm' and '2m' moving in the same plane with speed '2v' and 'v' respectively strike the rod perpendicularly at distance 'a' and '2a' from the midpoint of the rod in the opposite directions and stick to the rod. The angular velocity of the system immediately after the collision is: [2006-E]

1)  $\frac{6v}{32a}$       2)  $\frac{6v}{33a}$       3)  $\frac{6v}{40a}$       4)  $\frac{6v}{41a}$

13. Assume the earth's orbit around the sun as circular and the distance between their centres as 'D'. Mass of the earth is 'M' and its radius is 'R'. If earth has an angular velocity ' $w_0$ ' with respect to its centre and ' $w$ ' with respect to the centre of the sun, the total kinetic energy of the earth is: [2006-E]

1)  $\frac{MR^2w_0^2}{5} \left[ 1 + \left(\frac{w}{w_0}\right)^2 + \frac{5}{2} \left(\frac{Dw}{Rw_0}\right)^2 \right]$       2)  $\frac{MR^2w_0^2}{5} \left[ 1 + \frac{5}{2} \left(\frac{Dw}{Rw_0}\right)^2 \right]$

3)  $\frac{5}{2}MR^2w_0^2 \left[ 1 + \frac{5}{2} \left(\frac{Dw}{Rw_0}\right)^2 \right]$       4)  $\frac{2}{5}MR^2w_0^2 \left[ 1 + \left(\frac{w}{w_0}\right)^2 + \frac{5}{2} \left(\frac{Dw}{Rw_0}\right)^2 \right]$

14. The kinetic energy of a body rotating at 300 revolutions per minute is 62.8J. Its angular momentum (in  $\text{kgm}^2\text{s}^{-1}$ ) is approximately: [2006 - M]

1) 1      2) 2      3) 4      4) 8

15. A uniform circular disc of radius R lies in the X-Y plane with its centre coinciding with the origin of the coordinate system. Its moment of inertia about an axis, lying in the X-Y plane, parallel to the X-axis and passing through a point on the Y-axis at a distance  $y=2R$  is  $I_1$ . Its moment of inertia about an axis lying in a plane perpendicular to X-Y plane passing through a point on the X-axis at a distance  $x=d$  is  $I_2$ . If  $I_1=I_2$ , the value of 'd' is [2006M]

1)  $\frac{\sqrt{19}}{2}R$       2)  $\frac{\sqrt{17}}{2}R$       3)  $\frac{\sqrt{15}}{2}R$       4)  $\frac{\sqrt{13}}{2}R$

### Gravitation

16. A body is projected vertically upwards from the surface of the earth with a velocity equal to half the escape velocity. If R is the radius of the earth, maximum height attained by the body from the surface of the earth is (ENGG-2009)

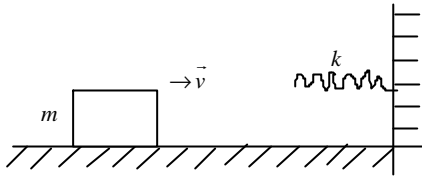
1)  $\frac{R}{6}$       2)  $\frac{R}{3}$       3)  $\frac{2R}{3}$       4) R

17. The acceleration due to gravity at a height 'h' above the earth's surface is  $9ms^{-2}$ . If  $g = 10ms^{-2}$  on the earth's surface, its value at a point at an equal distance 'h' below the surface of the earth is **(MED-2009)**  
 1)  $9ms^{-2}$                       2)  $8.5 ms^{-2}$                       3)  $10ms^{-2}$                       4)  $9.5ms^{-2}$
18. The orbit of geo-stationary satellite is circular, the time period of satellite depends on **(ENGG 2008)**  
 1) mass of the satellite    2) mass of the Earth    3) radius of the orbit  
 4) height of the satellite from the surface of Earth
19. If the Earth shrinks such that its density becomes 8 times to the present value then the new duration of the day in hours will be **(MED 2008)**  
 1) 24                      2) 12                      3) 6                      4) 3
20. The mass of a planet is half that of the earth and the radius of the planet is one fourth that of earth. If we plan to send an artificial satellite from the planet, the escape velocity will be, (escape velocity on earth  $V_e = 11kms^{-1}$ ) **(ENGG 2007)**  
 1)  $11kms^{-1}$                       2)  $5.5 kms^{-1}$                       3)  $15.55 kms^{-1}$                       4)  $7.78 kms^{-1}$
21. A body of mass 'm' is raised from the surface of the earth to a height 'nR' (R -radius of earth). Magnitude of the change in the gravitational potential energy of the body is (g - acceleration due to gravity on the surface of earth) **(MED 2007)**  
 1)  $\left(\frac{n}{n+1}\right)mgR$                       2)  $\left(\frac{n-1}{n}\right)mgR$                       3)  $\frac{mgR}{n}$                       4)  $\frac{mgR}{(n-1)}$
22. Assume the earth's orbit around the sun as circular and the distance between their centres as 'D'. Mass of the earth is 'M' and its radius is 'R'. If earth has an angular velocity ' $w_0$ ' with respect to its centre and ' $w$ ' with respect to the centre of the sun, the total kinetic energy of the earth is : **(EAMCET ENGG 2006)**  
 1)  $\frac{MR^2w_0^2}{5} \left[ 1 + \left(\frac{w}{w_0}\right)^2 + \frac{5}{2} \left(\frac{Dw}{Rw_0}\right)^2 \right]$                       2)  $\frac{MR^2w_0^2}{5} \left[ 1 + \frac{5}{2} \left(\frac{Dw}{Rw_0}\right)^2 \right]$   
 3)  $\frac{2}{5} MR^2w_0^2 \left[ 1 + \frac{5}{2} \left(\frac{Dw}{Rw_0}\right)^2 \right]$                       4)  $\frac{2}{5} MR^2w_0^2 \left[ 1 + \left(\frac{w}{w_0}\right)^2 + \frac{5}{2} \left(\frac{Dw}{Rw_0}\right)^2 \right]$
23. Assertion (A) : A particle of mass 'm' dropped into a hole made along the diameter of the earth from one end to the other end possesses simple harmonic motion.  
 Reason (R) : Gravitational force between any two particles is inversely proportional to the square of the distance between them. **(ENGG 2006)**  
 1) Both A and R are true and R is the correct explanation of A  
 2) Both A and R are true and R is not the correct explanation of A  
 3) A is true but R is false                      4) A is false but R is true
24. How many times more, the mass of the original star is to be larger than that of the sun for the formation of 'Black Hole' ? **(MED 2006)**  
 1) 2                      2) 6                      3) 8                      4) 10

**SHM**

25. The displacement of a particle executing SHM is given by  $y = 5\sin\left(4t + \frac{\pi}{3}\right)$ .  
 If T is the time period and the mass of the particle is 2gms, the kinetic energy of the particle when  $t = \frac{T}{4}$  is given by **(ENGG-2009)**  
 1) 0.4 Joules                      2) 0.5 Joules                      3) 3 Joules                      4) 0.3 Joules

26. A simple pendulum is executing SHM with a period of 6 sec between two extreme positions B and C about a point O. If the length of the arc BC is 10 cm, how long will the pendulum take to move from position C to a position D towards O exactly midway between C and O (MED-2009)  
 1) 0.5 sec                      2) 1 sec                      3) 1.5 sec                      4) 3 sec
27. A block of mass  $m=25\text{kg}$  sliding on a smooth horizontal surface with a velocity  $\vec{v} = 3\text{ms}^{-1}$  meets the spring of spring constant  $k=100\text{ N/m}$  fixed at one end as shown in figure. The maximum compression of the spring and velocity of block as it returns to the original position respectively are (2007-E)



- 1)  $1.5m, -3\text{ms}^{-1}$                       2)  $1.5m, 0.0\text{ms}^{-1}$                       3)  $1.0m, 3\text{ms}^{-1}$                       4)  $0.5m, 2\text{ms}^{-1}$
28. The magnitude of maximum acceleration is  $p$  times that of maximum velocity of a simple harmonic oscillator. The time period of the oscillator in seconds is (2007-E)  
 1) 4                      2) 2                      3) 1                      4) 0.5
29. To the free end of a spring hanging from a rigid support, a block of mass 'm' is hung and slowly allowed to come to its equilibrium position. Then the stretching in the spring is 'd'. If the same block is attached to the same spring and allowed to fall suddenly, the amount of stretching is (force constant,  $k$ ) (2006-E)  
 1)  $\frac{mg}{k}$                       2)  $2d$                       3)  $\frac{mg}{3k}$                       4)  $4d$

### Elasticity

30. A light rod of length 100 cms is suspended from the ceiling horizontally by means of two vertical wires of equal lengths tied to the ends of the rod. One of the wires is made of steel and is of area of cross-section  $0.1\text{ cm}^2$ . The other wire is of brass and of area of cross-section  $0.2\text{ cm}^2$ . The position from the steel wire along the rod at which a load is to be placed to produce equal stresses in both wires is ( $Y_{\text{steel}} = 20 \times 10^{11}\text{ dynes/cm}^2$ ;  $Y_{\text{brass}} = 10 \times 10^{11}\text{ dynes/cm}^2$ ) (MED-2009)  
 1)  $\frac{100}{3}\text{ cm}$                       2)  $\frac{200}{3}\text{ cm}$                       3) 50 cm                      4) 75 cm
31. A load of 1kg weight is attached to one end of a steel wire of cross sectional area  $3\text{ mm}^2$  and Young's modulus  $10^{11}\text{ N/m}^2$ . The other end is suspended vertically from a hook on a wall, then the load is pulled horizontally and released. When the load passes through its lowest position the fractional change in length is ( $g=10\text{m/s}^2$ ) (ENGG 2008)  
 1)  $10^{-4}$                       2)  $10^{-3}$                       3)  $10^3$                       4)  $10^4$
32. When a wire is subjected to a force along its length, its length increases by 0.4% and its radius decreases by 0.2%. Then the Poisson's ratio of the material of the wire is (MED 2008)  
 1) 0.8                      2) 0.5                      3) 0.2                      4) 0.1
33. When a wire of length 10m is subjected to a force of 100 N along its length, the lateral strain produced is  $0.01X$  m. The Poisson's ratio was found to be 0.4. If the area of cross-section of wire is  $0.025\text{ m}^2$ , its Young's modulus is (EAMCET 2007)  
 1)  $1.6 \times 10^8\text{ N/m}^2$                       2)  $2.5 \times 10^{10}\text{ N/m}^2$                       3)  $12.5 \times 10^{11}\text{ N/m}^2$                       4)  $16 \times 10^9\text{ N/m}^2$
34. To the free end of a spring hanging from a rigid support, a block of mass 'm' is hung and slowly allowed to come to its equilibrium position. Then the stretching in the spring is 'd'. If the same block is attached to the same spring and allowed to fall suddenly, the amount of stretching is (force constant,  $k$ ) (EAMCET 2006)  
 1)  $\frac{mg}{k}$                       2)  $2d$                       3)  $\frac{mg}{3k}$                       4)  $4d$

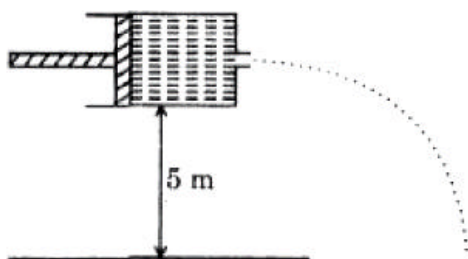
35. **Assertion (A) :** Ductile metals are used to prepare thin wires.  
**Reason (R) :** In the stress-strain curve of ductile metals, the length between the points representing elastic limit and breaking point is very small (EAMCET 2006)
- Both (A) and (R) are true and (R) is the correct explanation of (A)
  - Both (A) and (R) are true and (R) is not correct explanation of (A)
  - (A) is true but (R) is false.
  - (A) is false but (R) is true.

### Surface tension

36. A soap bubble of radius  $r$  is blown up to form a bubble of radius  $2r$  under isothermal conditions. If  $T$  is the surface tension of soap solution, the energy spent in the blowing (ENGG-2009)
- $3pTr^2$
  - $6pTr^2$
  - $12pTr^2$
  - $24pTr^2$
37. Eight drops of water of 0.6 mm radius each merge to form one big drop. If the surface tension of water is 0.072 N/m, the energy dissipated in the process is (MED-2009)
- $16p \times 10^{-7} J$
  - $4.15p \times 10^{-7} J$
  - $2.075p \times 10^{-7} J$
  - $8p \times 10^{-7} J$
38. The surface tension of soap solution is 0.03 N/m. the work done in blowing to form a soap bubble of surface area  $40 \text{ cm}^2$ , in Joules, is (ENGG-2008)
- $1.2 \times 10^{-4}$
  - $2.4 \times 10^{-4}$
  - $12 \times 10^{-4}$
  - $24 \times 10^{-4}$
39. A capillary tube is taken the Earth to the surface of the Moon. The rise of the liquid column on the Moon (acceleration due to gravity on the Earth is 6 times that of the Moon) is (MED-2008)
- six time that on the Earth surface
  - $\frac{1}{6}$  that on the Earth's surface
  - equal to that on the Earth's surface
  - zero
40. A liquid does not wet the solid surface if the angle of contact is (2007-E)
- zero
  - equal to  $45^\circ$
  - equal to  $90^\circ$
  - greater than  $90^\circ$
41. Two soap bubbles combine to form a single bubble. In this process, the change in volume and surface area are respectively 'V' and 'A'. If  $P$  is the atmospheric pressure, and 'T' is the surface tension of the soap solution, the following relation is true (2006-E)
- $4PV+3TA=0$
  - $3PV-4TA=0$
  - $4PV-3TA=0$
  - $3PV+4TA=0$

### Viscosity

42. Eight spherical rain drops of the same mass and radius are falling down with a terminal speed of  $6 \text{ cm-s}^{-1}$ . If they coalesce to form one big drop, what will be the terminal speed of bigger drop? (Neglect the buoyancy of the air) (ENGG-2009)
- $1.5 \text{ cm-s}^{-1}$
  - $6 \text{ cm-s}^{-1}$
  - $24 \text{ cm-s}^{-1}$
  - $32 \text{ cm-s}^{-1}$
43. A syringe of diameter 1 cm having a nozzle of diameter 1 mm, is placed horizontally at a height 5m from the ground as shown below. An incompressible non-viscous liquid is filled in the syringe and the liquid is compressed by moving the piston at a speed of 0.5 m/s, the horizontal distance travelled by the liquid jet ( $g = 10 \text{ ms}^{-2}$ ) (MED-2009)



- 12.5 m
  - 25 m
  - 50 m
  - 75 m
44. Two rain drops reach the Earth with different terminal velocities having ratio 9:4. Then the ratio of their volume is (ENGG-2008)
- 3 : 2
  - 4 : 9
  - 9 : 4
  - 27 : 8

45. A solid sphere falls with a terminal velocity 'v' in  $\text{CO}_2$  gas. If it is allowed to fall in vacuum (**MED-2008**)
- 1) terminal velocity of sphere = v                      2) terminal velocity of sphere < v  
3) terminal velocity of sphere > v                      4) sphere never attains terminal velocity
46. A horizontal pipe of non-uniform cross-section allows water to flow through it with a velocity  $1\text{ms}^{-1}$  when pressure is 50 kPa at a point. If the velocity of flow has to be  $2\text{ms}^{-1}$  at some other point, the pressure at that point should be (**2007-E**)
- 1) 50 kPa                      2) 100 kPa                      3) 48.5 kPa                      4) 24.25 kPa
47. An air bubble of radius 1 cm rises from the bottom portion through a liquid of density 1.5 g/cc at a constant speed of  $0.25\text{ms}^{-1}$ . If the density of air is neglected, the coefficient of viscosity of the liquid is approximately (In pas) (**2006-E**)
- 1) 13000                      2) 1300                      3) 130                      4) 13

## CHEMISTRY

### 6. HYDROGEN AND ITS COMPOUNDS

1. Which one of the following statements is correct for  $\text{H}_2\text{O}_2$ ? (**M-2009**)
- 1) It reduces ferricyanide to ferrocyanide in acid medium.  
2) It oxidizes lead monoxide to lead dioxide  
3) It acts as a reducing agent in the decolourisation of acidified  $\text{KMnO}_4$   
4) It oxidises hydrides of chlorine and bromine to their diatomic gases.
2. How many 'ml' of perhydrol is required to produce sufficient oxygen which can be used to completely convert 2 lit of  $\text{SO}_2$  gas to  $\text{SO}_3$  gas? (**E-2009**)
- 1) 10 ml                      2) 5 ml                      3) 20 ml                      4) 30 ml
3. If 11.1 mg of  $\text{CaCl}_2$  and 12 mg of  $\text{MgSO}_4$  are present in 2 litres of water, what is its hardness (in grams  $\text{CaCO}_3$ /ppm)? (**M-2008**)
- 1) 5                      2) 10                      3) 15                      4) 20
4. Which one of the following reactions represents the oxidizing property of  $\text{H}_2\text{O}_2$ ? (**E - 2008**)
- 1)  $2\text{KMnO}_4 + 3\text{H}_2\text{SO}_4 + 5\text{H}_2\text{O}_2 \rightarrow \text{K}_2\text{SO}_4 + 2\text{MnSO}_4 + 8\text{H}_2\text{O} + 5\text{O}_2$   
2)  $2\text{K}_3[\text{Fe}(\text{CN})_6] + 2\text{KOH} + \text{H}_2\text{O}_2 \rightarrow 2\text{K}_4[\text{Fe}(\text{CN})_6] + 2\text{H}_2\text{O} + \text{O}_2$   
3)  $\text{PbO}_2 + \text{H}_2\text{O}_2 \rightarrow \text{PbO} + \text{H}_2\text{O} + \text{O}_2$   
4)  $2\text{KI} + \text{H}_2\text{SO}_4 + \text{H}_2\text{O}_2 \rightarrow \text{K}_2\text{SO}_4 + \text{I}_2 + 2\text{H}_2\text{O}$
5. Match the following: (**M - 2007**)
- | Set – I                           | Set – II      |
|-----------------------------------|---------------|
| (A) 10 Vol $\text{H}_2\text{O}_2$ | (1) Perhydrol |
| (B) 20 Vol                        | (2) 5.358.N   |
| (C) 40 Vol                        | (3) 1.785.M   |
| (D) 100 Vol                       | (4) 3.03%     |
- The correct match is
- 1) A-4, B-3, C-2, D-1    2) A-1, B-2, C-3, D-4    3) A-1, B-3, C-2, D-4    4) A-4, B-2, C-3, D-1
6. The formula of Calgon, used for water softening is (**M - 2007**)
- 1)  $\text{Na}_2[\text{Na}_4(\text{PO}_3)_6]$     2)  $\text{Na}_4[\text{Na}_2(\text{PO}_3)_6]$     3)  $\text{Na}_2[\text{Na}_4(\text{PO}_4)_5]$     4)  $\text{Na}_4[\text{Na}_4(\text{PO}_4)_6]$
7. **Assertion (A)** : NaCl is less soluble in heavy water than in ordinary water. (**2007-E**)  
**Reason (R)** : Dielectric constant of ordinary water is more than that of heavy water.  
The correct answer is
- 1) Both A and R are true and R is the correct explanation of A  
2) Both A and R are true but R is not the correct explanation of A  
3) A is true, R is false                      4) A is false, R is true

- 8) Which of the following is an example of interstitial hydride ? (2007-E)  
 1)  $NH_3$                       2)  $CH_4$                       3)  $ZnH_2$                       4)  $H_2O$
- 9) Electrolysis of X gives Y at anode. Vacuum distillation of Y gives  $H_2O_2$ . The number of peroxy (O-O) bonds present in X and Y respectively are (2006-E)  
 1) 1, 1                      2) 1, 2                      3) zero, 1                      4) zero, zero
- 10) The pH of a solution of  $H_2O_2$  is 6.0. Some chlorine gas is bubbled into this solution. Which of the following is correct?(2005 Engg.)  
 (1) The pH of resultant solution becomes 8.0.  
 (2) Hydrogen gas liberated from resultant solution.  
 (3) The pH of resultant solution becomes less than 6.0 and oxygen gas is liberated.  
 (4)  $Cl_2O$  is formed in the resultant solution.
- 11) Which one of the following reactions does not form gaseous product (2005 Engg.)  
 (1)  $PbO_2 + H_2O_2 \rightarrow$                       (2) Acidified  $KMnO_4 + H_2O_2 \rightarrow$   
 (3)  $PbS + H_2O_2 \rightarrow$                       (4)  $Cl_2 + H_2O_2 \rightarrow$
- 12) Which of the following is not correct regarding the electrolytic preparation of  $H_2O_2$  ? (2005 Med)  
 (1) Lead is used as cathode                      (2) 50%  $H_2SO_4$  is used  
 (3) Hydrogen is liberated at anode                      (4) Sulphuric acid undergoes oxidation
- 13) The value \_\_\_\_\_ is less for  $D_2O$  compared to that of  $H_2O$ . (2005 Medical)  
 (1) density ( $g \cdot ml^{-1}$ ) at  $20^\circ C$                       (2) boiling point  
 (3) dielectric constant at  $20^\circ C$                       (4) latent heat of vapourization ( $J \cdot g^{-1}$ )

## 7, 8. ALKALI & ALKALINE EARTH METALS

14. Which one of the following statements is not correct ? (M-2009)  
 1) The conductivity decreases from  $Li^+$  to  $Cs^+$  in the hydrated ions  
 2) The stability of +5 oxidation state decreases from nitrogen to bismuth.  
 3) In Hall's process, bauxite is fused with  $Na_2CO_3$ .  
 4) The atomic radius in III A group elements increases from boron to aluminum and thereafter remains constant upto gallium.
15. **Assertion (A):** K, Rb and Cs form superoxides (E-2009)  
**Reason (R):** The stability of the superoxides increase from 'K' to 'Cs' due to decrease in lattice energy.  
 1) Both A and R are true and is R the correct explanation of A.  
 2) Both A and R are true but R is not the correct explanation of A  
 3) A is true but R is not true                      4) A is not true but R is true
16. The correct order of stability for the following superoxides is (M-2008)  
 1)  $KO_2 > RbO_2 > CsO_2$                       2)  $RbO_2 > CsO_2 > KO_2$   
 3)  $CsO_2 > RbO_2 > KO_2$                       4)  $KO_2 > CsO_2 > RbO_2$
17. Which of the following statements are correct for alkali metal compounds ? (E-2008)  
 i) Superoxides are paramagnetic in nature  
 ii) The basic strength of hydroxides increases down the group  
 iii) The conductivity of chlorides in their aqueous solution decreases down the group  
 iv) The basic nature of carbonates in aqueous solutions is due to cationic hydrolysis  
 1) i, ii and iii only                      2) i and ii only                      3) ii, iii and iv only                      4) iii and iv only
18. Which of the following carbonates decomposes readily at low temperatures? (M-2007)  
 1)  $Na_2CO_3$                       2)  $K_2CO_3$                       3)  $Li_2CO_3$                       4)  $Rb_2CO_3$



32. Observe the following statements regarding purification of bauxite. **(2005 Engg.)**  
 I) During Hall's process, silica is removed as Si (vapour).  
 II) Bauxite are contaminated with  $Fe_2O_3$  is purified in Baeyer's process.  
 III) During Serpak's process,  $AlN$  is formed.  
 The correct answer is  
 (1) I, II & III are correct (2) Only I and II are correct  
 (3) Only I and III are correct (4) Only II and III are correct
33. X reacts with aqueous NaOH solution to form Y and  $H_2$ . Aqueous solution of Y is heated to 323 - 333 K and on passing  $CO_2$  into it,  $Na_2CO_3$  and Z were formed. When Z is heated to  $1200^\circ C$ ,  $Al_2O_3$  is formed. X, Y and Z respectively are **(2005 Medical)**  
 (1)  $Al, AlCl_3, NaAlO_2$  (2)  $Zn, Na_2ZnO_2, Al(OH)_3$   
 (3)  $Al, Al(OH)_3, AlCl_3$  (4)  $Al, NaAlO_2, Al(OH)_3$

#### IV A GROUP ELEMENTS

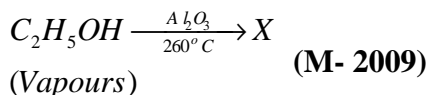
34.  $SiCl_4$  on hydrolysis forms 'X' and HCl. Compound 'X' loses water at  $1000^\circ C$  and gives 'Y'.  
 Compounds 'X' and 'Y' **(E-2009)**  
 1)  $H_2SiCl_6, SiO_2$  2)  $H_4SiO_4, Si$  3)  $SiO_2, Si$  4)  $H_4SiO_4, SiO_2$
35. Hydrolysis of  $SiCl_4$  gives compound X and HCl. On heating to  $1000^\circ C$ , X loses water and forms Y.  
 Identify X and Y respectively. **(M-2008)**  
 1)  $SiO_2$  and Si 2)  $H_4SiO_4$  and  $SiO_2$  3)  $SiO_2$  and SiC 4)  $H_4SiO_4$  and SiC
36. Identify B in the following reaction : **(E-2008)**  

$$H_4SiO_4 \xrightarrow[-H_2O]{1000^\circ C} A \xrightarrow[\Delta]{Carbon} B + CO$$
 1) Corundum 2) Quartz 3) Silica 4) Carborundum
37.  $SiCl_4 \xrightarrow{H_2O} X \xrightarrow{1000^\circ C} Y$  **(M-2007)**  
 In the above reaction, X and Y respectively are  
 1)  $SiO_2$  and Si 2)  $H_4SiO_4$  and  $SiO_2$  3)  $H_2SiCl_6$  and  $SiO_2$  4)  $H_4SiO_4$  and Si
38. Which of the following statements is correct ? **(2007-E)**  
 1) Silicon doped with Boron is an n-type semiconductor  
 2) Silicon doped with Arsenic is a p-type semiconductor  
 3) Metals are good conductors of electricity  
 4) Electrical conductivity of semiconductors decreases with increasing temperature
- 39) Calorific value of producer gas is low because of **(2007-E)**  
 1) High percent of  $N_2$  2) Low percent of  $CO_2$   
 3) High percent of  $CO$  4) Low percent  $N_2$
40. Which of the following is used for making optical instruments ? **(2006-E)**  
 1)  $SiO_2$  2)  $Si$  3)  $SiH_4$  4)  $SiC$
41. Which of the following is not correct? **(2005 Engg.)**  
 (1)  $SiO_2$  is used as acid flux.  
 (2) The distance between the layers in graphite is  $3.35 \times 10^{-8}$  cm.  
 (3)  $SiO_2$  reacts with  $Na_2CO_3$  and liberates CO.  
 (4) The hybridization of 'C' in graphite is  $sp^2$ .
42.  $SiO_2$  is reacted with sodium carbonate. What is the gas liberated? **(2005 Medical)**  
 (1) CO (2)  $O_2$  (3)  $CO_2$  (4)  $O_3$

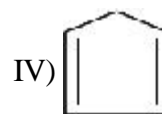
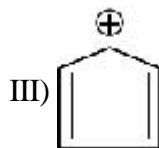
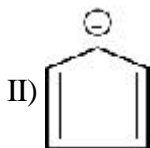
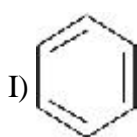
## CHEMISTRY OF CARBON COMPOUNDS

43. Which one of the following statements is *true* for the optical rotation exhibited by (2R,3R) and (2S,3S) dibromobutanes ? (M- 2009)
1. The direction and magnitude are same
  2. The direction is opposite, but magnitude is same
  3. The direction is same, but magnitude different
  4. Both the direction and magnitude are different

44. What is the hybridization state (s) of the atoms in X formed in the following reaction ?

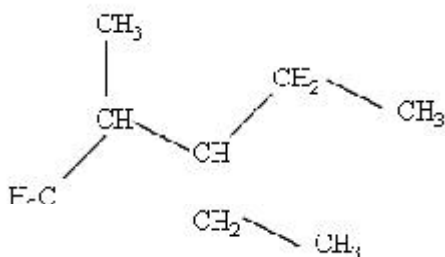


- 1)  $sp^3$  only      2)  $sp^2$  and  $sp^3$       3)  $sp^2$  only      4)  $sp$  only
45. Which of the following do not obey Huckel's rule for aromaticity ? (M- 2009)

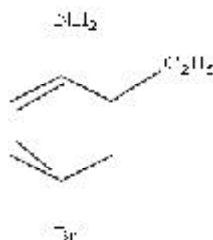


- 1) All the above      2) I, II      3) III, IV      4) I, IV

46. The correct IUPAC name of the hydrocarbon X : (M- 2009)

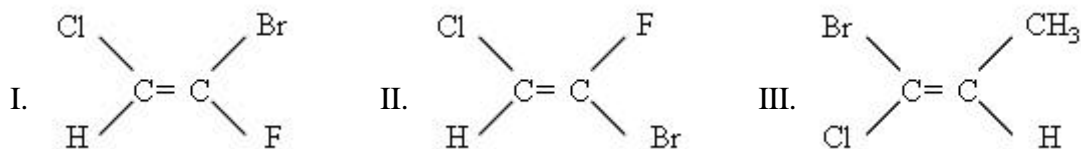


- 1) 2-Methyl -3-ethyl pentane      2) 3- Ethyl – 2-methyl pentane  
 3) 3-Isopropyl pentane      4) 1,1-Diethyl-2-methyl propane
47. The number of a *s* and *p* bonds present in 1 – butene -3 yne is (M- 2009)
- 1) 7 and 3      2) 5 and 5      3) 7 and 2      4) 6 and 4
48. The latest IUPAC name of the following compound (M- 2009)



- 1) 2-Ethyl – 4 – bromoaniline      2) 4- Bromo – 2- ethylaniline  
 3) 4 – Bromo-2ethyl benzene amine      4) 2-Ethyl-4-bromobenzene amine
49. One mole of alkene X on ozonolysis gave one mole of acetaldehyde and one mole of acetone. The IUPAC name of X is: (E-2009)
- 1) 2- Methyl -2 – butene      2) 2- Methyl – 1- butene  
 3) 2- Butene      4) 1- Butene
50. Which one of the following reactions yield 2E-butene as the major product ? AM 2008 A
- 1)  $CH_3 - C \equiv C - CH_3 + Na / NH_3(liq.)$       2)  $CH_3 - CH = CH - CH_3 + Li / NH_3(liq.)$   
 3)  $CH_3 - C \equiv C - CH_3 + Na / NH_4OH$       4)  $CH_3 - C \equiv C - CH_3 + Pd / BaSO_4$

51. Which of the following compound(s) has 'Z' configuration ? **E- 2008**



- 1) I only                      2) II only                      3) III only                      4) I and III

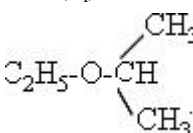
52. According to Cahn-Ingold-Prelog sequence rules, the correct order of priority for the given groups is: **(E- 2008)**

- 1)  $-COOH > -CH_2OH > OH > CHO$                       2)  $-COOH > -CHO > -CH_2OH > -OH$   
 3)  $OH > -CH_2OH > -CHO > -COOH$                       4)  $-OH > -COOH > CHO > CH_2OH$

53. What are X and Y respectively in the following reaction ? **(E- 2008)**



- 1)  $Na/NH_3(liq)$  and  $Pd/BaSO_4+H_2$                       2)  $Ni/140^\circ C$  and  $Pd/BaSO_4+H_2$   
 3)  $Ni/140^\circ C$  and  $Na/NH_3(liq)$                       4)  $Pd/BaSO_4+H_2$  and  $Na/NH_3(liq)$

54. The IUPAC name of  is **(E- 2008)**

- 1) Ethoxy propane                      2) 1,1- dimethyl ether                      3) 2-Ethoxy isopropane                      4) 2 Ethoxy propane

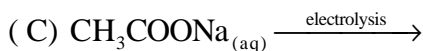
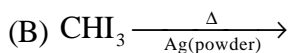
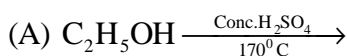
IUPAC name of  $CH_3-CH_2-CH-CH=CH_2$

55.  **(M-2007)**

- 1) 2 - methyl - 3 ethyl - 1 - pentane                      2) 3 - ethyl - 4 methyl - 4 - pentane  
 3) 3 - ethyl - 2 methyl - 1 - pentane                      4) 3 - methyl - 2 ethyl 1 - pentane

56. Match the following : **(M-2007)**

**SET - I**



(1) A - 2, B - 4, C - 5, D - 1

(3) A - 4, B - 2, C - 5, D - 1

**SET - II**

(1) Methene

(2) Ethylene

(3) Benzene

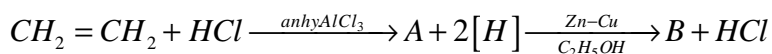
(4) Acetylene

(5) Ethane

2) A - 2, B-4, C - 5, D - 3

4) A - 4, B - 2, C - 5, D - 3

57) Identify 'B' in the following reaction **(2007-E)**



- 1)  $CH_4$                       2)  $C_2H_6$                       3)  $C_2H_5Cl$                       4)  $C_2H_5OH$

- 58). The IUPAC name of the compound  $(CH_3)_2CH - CH = CH - CHOH - CH_3$  is **(2007-E)**  
 1) 5 - Methylhex -3-en-2-ol                      2) 2-Methylhex -3 -en - 5-ol  
 3) 2 -Hydroxy -5- methyl -3 - hexene            4) 5 - Hydroxy -2-methyl -3- hexene
- 59) Aqueous solution of an organic compound 'A' on Electrolysis liberates acetylene and  $CO_2$  at anode. A is **(2007-E)**  
 1) Potassium acetate                                  2) Potassium succinate  
 3) Potassium citrate                                  4) Potassium maleate
- 60) Which of the following reagents when heated with ethyl chloride, forms ethylene ? **(2006-E)**  
 1) aqueous KOH      2) Zn/HCl                      3) Alcoholic KOH      4) HI
- 61) Which of the following reacts with benzene in presence of anhydrous aluminum chloride and forms acetophenone ? **(2006-E)**  
 1)  $CH_3Cl$                       2)  $CH_3COOH$                       3)  $CH_3CHO$                       4)  $CH_3COCl$
- 62) The number of sigma and pi ( $p$ ) bonds present in benzene respectively are **(2006-E)**  
 1) 12, 6                      2) 6, 6                      3) 6, 12                      4) 12, 3
- 63) The compound prepared by a substitution reaction of benzene is **(2005 Engg.)**  
 (1) Acetophenone      (2) Glyoxal                      3) Cyclohexane                      (4) Hexabromo cyclohexane
- 64) Which of the following is a pair of functional isomers? **(2005 Engg.)**  
 (1)  $CH_3COCH_3, CH_3CHO$                       (2)  $CH_3CH_2COOH, CH_3COOCH_3$   
 (3)  $C_2H_5COOH, CH_3COOC_2H_5$                       (4)  $CH_3COOH, CH_3CHO$
- 65) The chemical and the reaction conditions required for the preparation of ethane are **(2005 Engg.)**  
 (1)  $C_2H_5I, Zn - Cu, C_2H_5OH$                       (2)  $CH_3Cl, Na, H_2O$   
 (3)  $KOOC - CH = CH - COOK$ , electrolysis      (4)  $CH_3CO_2Na, NaOH, CaO, \Delta$
- 66) 1,2-dibromo ethane reacts with alcoholic KOH to yield a product "X". The hybridization state of the carbons present in "X", respectively are **(2005 Medical)**  
 (1)  $sp, sp$                       2)  $sp^3, sp^3$                       3)  $sp^2, sp^2$                       4)  $sp^3, sp^2$
- 67) The compounds formed at anode in the electrolysis of an aqueous solution of potassium acetate are **(2005 Medical)**  
 (1)  $C_2H_6$  &  $CO_2$       (2)  $C_2H_4$  &  $CO_2$       (3)  $CH_4$  &  $H_2$                       4)  $CH_4$  &  $CO_2$
- 68)  $C_2H_2 + 2HCl \rightarrow C_2H_4Cl_2$  is an example of \_\_\_\_ reaction. **(2005 Medical)**  
 (1) Addition                      (2) Hydrogenation                      (3) Substitution                      (4) Chlorination