

PHYSICS

1. If Q be the amount of liquid (viscosity) flowing per second through a capillary tube of radius r and length l under a pressure difference P , then which of the following relation is correct?

2. The unit of $(\text{velocity})^2$

is equivalent to the unit of

A) $(\text{force})^2$

(B) latent heat

(C) energy (D) heat capacity

3. Figure shows the velocity time graphs of the two particles A and

B. Which of the following statements is true

(A) their relative velocity is zero

(B) their relative velocity is the function of time

(C) if they starting from the same point they will never meet again

(D) both (B) and (C)

4. A man walks in rain with a velocity of 5 km/hr. The rain drops strike at him at an angle of 45° with the horizontal. The downward velocity of the rain drops will be

(A) 5 km/hr (B) 4 km/hr

(C) 3 km/hr (D) 1 km/hr

5. A particle is projected with 20

2

m/sec making an angle 45° with the horizontal the

magnitude of the velocity of the particle at time $t = 1$ sec. after projection

(A) 25 m/sec (B) 20 m/sec

(C) 20

2

m/sec (D) 10 m/sec

6. A particle is moving along the circular path with a speed v and speed start increasing uniformly with acceleration a then net acceleration of the particle at the initial moment

7. The shortest time over which a car can be brought to rest by applying brakes is 10 second. If its speed is made two times, the car can be brought to rest in time t equal to

- (A) 10 sec (B) 15 sec
(C) 20 sec (D) 5 sec

8. Two blocks of mass 4 kg and 6 kg are placed in contact with each other on a frictionless horizontal surface as shown in figure. If we apply a force of 5N on 6 kg and another force of 5N on 4 kg in opposite direction. The contact force between

5N 4 kg 6 kg 5N

MATHEMATICS

1. The real value of n for which the expression

$$1 + 2i \sin n$$

$$1 + i \sin n$$

is purely real is

- (A) $(n + 1)^2$
(B) $(2n + 1)^2$
(C) n (D) none of these

2. If $e^{iA} = \cos A + i \sin A$, then for the triangle ABC, $e^{iA} \cdot e^{iB} \cdot e^{iC}$ is

- (A) $-i$ (B) -1
(C) 1 (D) none of these

3 The value of $16r^{11} 2r^{12} \cos 172^\circ \sin 172^\circ$ is

- (A) 1 (B) i
(C) $-i$ (D) -1

4. If $z = (\sin \theta + i \cos \theta)(\cos \theta + i \sin \theta) (\sin \theta + i \cos \theta)^{kn}$

then $|z|$ is

- (A) 0 (B) 1
(C) 2 (D) none of these

5. If $x = \cos 2 + i \sin 2$, $y = \cos 2 + i \sin 2$, $z = \cos 2 + i \sin 2$, then xyz is

(A) $2 \cos(2 + 2i)$ (B) $2i \sin(2 + 2i)$

(C) $e^{i(2 + 2i)}$

(D) None of these

6. A square matrix A is invertible iff $\det A$ is equal to

(A) 0 (B) 1

(C) non zero (D) -1

7. Which of the following is not true

(A) Every skew-symmetric matrix of odd order is non-singular

(B) If determinant of a square matrix is non-zero, then it is non-singular

(C) Adjoint of a symmetric matrix is symmetric

(D) Adjoint of a diagonal matrix is diagonal

10. If the system of equations $kx + 3y - 4z = 0$, $x - ky + z = 0$, $5x + 4y - 3z = 0$ has a non-zero solution, then $k =$

(A) $-2, 6$ (B) $1, -5$

(C) $-1, 5$ (D) none of these

CHEMISTRY

1. What will be the % of N_2H_4 that has reacted with water in solution, when 0.32 gm of N_2H_4 are dissolved in water and the total volume was made 4L (given K_b for $N_2H_4 = 6 \times 10^{-8} \text{ m}$)

(A) 3 % (B) 3.6 %

(C) 2 % (D) 0.489%

2. The reaction $A + B \rightleftharpoons C + D$ is studied in one liter vessel at 250°C . The initial concentration of A was $3n$ and that of B was n . When equilibrium was attained equilibrium concentration of C was found to be equal to the equilibrium concentration of B then concentration of D at equilibrium will be

3. Which of the following behaviour is true for an ideal binary liquid solution.

(A) plot of P_{total} v/s $1/Y_A$ (mole fraction of A in vapour phase) is linear.

(B) plot of P_{total} v/s $1/Y_B$ is linear.

(C) plot of $1/P_{\text{total}}$ vs $1/Y_A$ is linear.

(D) plot of P_{total} v/s $1/(Y_A)$ is linear.

4. For the reaction $\text{N}_2\text{O}_4(\text{g}) \rightleftharpoons 2\text{NO}_2(\text{g})$ the relation connecting the degree of dissociation (α) of $\text{N}_2\text{O}_4(\text{g})$ with the equilibrium constant K_p is

5. A metal crystallizes into two cubic faces (FCC) and (BCC) whose unit cell lengths are 3.5 respectively. The ratio of densities of FCC and BCC will be

(A) 1.26 (B) 3.14

(C) 2.18 (D) 4.26

6. An organic compound crystallises in an orthorhombic system with two molecules per unit cell. The unit cell dimensions are 12.05, 15.05 and 2.69

Å

A

. If the density of the crystal is

1.419 g cm^{-3}

, then molar mass of compound will be

(A) 207 g mol^{-1}

(B) 209 g mol^{-1}

(C) 308 g mol^{-1}

(D) 317 g mol^{-1}

7. 50gm of saturated aqueous solution of potassium chloride at 30°C is evaporated to dryness, when 13.2 gm of dry KCl was obtained. The solubility of KCl in water at 30°C is

(A) 35.87 g (B) 25.62 g

(C) 28.97 g (D) 27.81 g

8. $^{235}_{92}\text{U}$ belongs to group III B of periodic table. If it loses one α -particle, then the new element will belong to group.

(A) I B (B) III B

(C) II B (D) IV B

8. According to Bohr's theory the energy required for an electron in He^+ ion to be emitted from

$n = 2$ state is

(A) 10.2 eV (B) 13.6 eV

(C) 3.4 eV (D) 27.2 eV