

MATHS:

1 The angle of elevation of the top of a tower at any point on the ground is $\pi/6$ and after moving 20m forwards the tower it becomes $\pi/3$. The height of the tower is equal to

- (A) 10 m (B) 103m (C) $10\sqrt{3}$ m
(D) 53m

2. A vertical pole subtends an angle $\tan^{-1} 11/2$ at a point P on the ground. The angle subtended by the upper half of the pole at the point P is

- (A) $\tan^{-1} 1/4$ (B) $\tan^{-1} 12/9$
(C) $\tan^{-1} 11/8$ (D) $\tan^{-1} 12/3$

3 A pole of height h stands at one corner of a park in the shape of an equilateral triangle. If θ is the angle which the pole subtends at the mid point of the opposite side, the length of each side of the park is

- (A) $3/2 h \cot \theta$
(B) $2/3 h \cot \theta$
(C) $3/2 h \tan \theta$
(D) $(2/3)h \tan \theta$

4. From a point on the ground 100m away from the base of a building, the angle of elevation of the top of the building is 60°

. Which of the following is the best approximation for the height of the building?

- (A) 172m (B) 173 m
(C) 174 m (D) 175 m

5. The points P(a, b + c), Q(b, c + a) and R(c, a + b) are such that PQ = QR if

- (A) a, b, c are in A.P. (B) a, b, c are in G.P.
(C) a, b, c are in H.P. (D) None of these

6. The points A(2, 3); B(3, 5), C(7, 7) and D (4, 5) are such that

- (A) ABCD is a parallelogram (B) A, B, C, D are collinear

(C) D lies inside the triangle ABC (D) D lies on the boundary of the triangle ABC 47. Q, R and S are the point on the line joining the point P(a, x) and T(b, y) such that

$PQ = QR = RS = ST$, then $85x - 3y = 85a - 3b$,

is the mid-point of

(A) PQ (B) QR

(C) RS (D) ST

8 The extremities of a diagonals of parallelograms are the points (3, -4) and (-6, 5). If third vertex is (-2, 1) then the coordinates of the fourth vertex are

(A) (1, 0) (B) (-1, 0)

(C) (1, 1) (D) none of these 49. If one end of diameter of the circle $2x^2 + 2y^2 - 4x - 8y + 2 = 0$ is (3,2), the other end is

(A) (2, 3) (B) (4, -2)

(C) (2, -1) (D) (-1, 2)

10. Locus of the centre of the circle which always passes through the fixed points (-a, 0) and (a, 0) is

(A) $x = 1$ (B) $x + y = 63$

CHEMISTRY:

1. Identify A in the given sequence of reaction: $\text{H}_3\text{CCH}_3 \xrightarrow{\text{HCl}} \text{peroxide} \xrightarrow{\text{aq. KOH}} \text{A}$

(A) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$

(B) $\text{CH}_3\text{CH}_2\text{CH}_3$

(C) $\text{CH}_3\text{CH}_2\text{CH}_2$

(D) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COH}$ (A) $\text{HO}-$

(B)

2. In the above reaction the compound C is :

(A) $\text{CH}_3\text{CH}_2\text{Br}$ (B) CH_3COBr

(C) CHBr_3 (D) CH_3COONa

3. Carbyl amine reaction will be given by:

(A) $\text{CH}_3\text{CH}_2\text{NH}_2$ (B) $(\text{CH}_3)_2\text{CHNH}_2$

(C) $(\text{CH}_3)_3\text{CNH}_2$ (D) All of them

4. $\text{CCl}_4 + \text{KOH} + \text{phenol X}$; Which of the following is true for X:

- (A) It gives effervescence with NaHCO_3 (B) Gives silver mirror with Tollen's reagent.
(C) Does not give the blue colour with FeCl_3 (D) All of the above

5. In $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4$, copper has following hybridization:

- (A) dsp^2
(B) sp^3
(C) $\text{sp}^3 \text{ d}$ (D) sp^2

6. The electronegativity of C, H, O, N and S are 2.5, 2.1, 3.5, 3.0 and 2.5 respectively. Which of following bond is most polar?

- (A) O-H (B) S-H
(C) N-H (D) C-H

7. Which of the following has minimum no. of unpaired electrons?

- (A) O_2 (B) O^+
(C) O_2^-
(D) O_2^{2-}

8. Molecule having minimum dipole moment is:

- (A) CH_3Cl (B) CH_2Cl_2
(C) CHCl_3 (D) CCl_4

9. ZnS can be existing in the structure other than zinc blend structure

- (A) BCC (B) Wurtzite
(C) Simple cubic (D) Rock salt
(C) $x + y = 2a$ (D) $x = 0$

PHYSICS:

1. A double convex lens of focal length 20 cm is made of glass of refractive index $\frac{3}{2}$. When placed completely in water ($n_w = \frac{4}{3}$), the focal length will be

- (A) 80 cm (B) 15 cm
(C) 17.7 cm (D) 22.5 cm

2. A thin prism P_1 with angle 40°

and made from glass ($n = 1.54$) is combined with another prism

P2 made of another glass of $n = 1.72$ to produce dispersion without deviation. The angle of prism P2 is

- (A) 53.30
- (B) 40
- (C) 30 (D) 2.60

3. The astronomical telescope consists of objective and eyepiece. The focal length of the objective is

- (A) equal to that of the eye piece (B) greater than of the eye piece
- (C) shorter than that of eye piece (D) five times shorter than that of eye piece

4. In young's experiments, the ratio of maximum and minimum intensities in the fringe system is 9 : 1. The ratio of amplitudes of coherent sources is

- (A) 9 : 1 (B) 3 : 1
- (C) 2 : 1 (D) 1 : 1

5. Two slits, 4 mm apart, are illuminated by light of wavelength 6000 Å

. What will be the fringe

width on a screen placed 2m from the slits

- (A) 0.12 mm (B) 0.3 mm
- (C) 3.0 mm (D) 4.0 mm

6. Two fixed point charges $+4e$ and $+e$ are separated by a distance 'a'. Where should a third point charge q be placed for it to be in equilibrium?

- (A) $2a/3$ from $+4e$ (B) $a/3$ from $+4e$
- (C) $a/4$ from $+e$ (D) $3a/4$ from $+e$

7. A uniform electric field pointing in positive x-direction exists in a region. Let A be the origin, B be the point on the x-axis at $x = +1$ cm, C be the point on the y-axis at $y = +1$ cm. Then the potentials at the points A, B and C satisfy

- (A) $V_A < V_B$ (B) $V_A > V_B$ (C) $V_A < V_C$ (D) $V_A > V_C$

8. A 2 microfarad capacitor of a TV is subjected to 4000 V potential difference. The energy

stored in capacitor is

(A) 8 J (B) 16 J

(C) 4 J (D) 2×10^{-3} J

9. A wire of resistance 1 is stretched to double its length. The resistance will become:

(A) $\frac{1}{4}$ (B) 1

(C) 2 (D) 4

10. A current of 2 ampere passes through a cell of e.m.f. 1.5 volt having internal resistance of 0.15 ohm. The potential difference measured, in volt across both the ends of the cell will be

(A) 1.35 (B) 1.50

(C) 1.00 (D) 1.20