

**SAMPLE PAPER – 2024-26 (XI MOVING)**  
**(Engineering Entrance)**

Duration : 3 Hours

Total Marks : 300

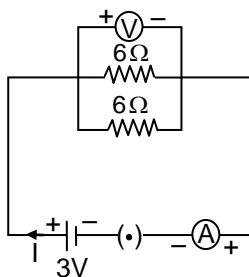
**Instructions :**

- There will be three sections: Section A (PHYSICS); Section B (CHEMISTRY) and Section C (MATHEMATICS).
- Each section will have two parts :  
Part 1: 20 Concept based MCQs (4 marks each)  
Part 2 : 10 Numerical Answer Type Questions (2 marks each)
- Negative marking :  
For Part 1 of each section there is a negative marking of 1 mark for every incorrect answer.  
For Part 2 of each section there is no negative marking.
- Use **black ball point pen** only.

**PHYSICS**

**PART 1: CONCEPT-BASED QUESTIONS  
(20 QUESTIONS- 4 MARKS EACH)**

- Q.1)** The resistivity of a wire depends on :  
(a) the area of cross section of wire  
(b) the nature of the material of wire  
(c) the length of wire  
(d) all of these
- Q.2)** If a wire is stretched to double of its original length then its new resistance will become :  
(a) one fourth                      (b) four times  
(c) three times                      (d) does not changes
- Q.3)** The equivalent resistance in parallel combination is :  
(a) smaller than the largest resistances.  
(b) smaller than the smallest resistances.  
(c) larger than the largest resistances.  
(d) larger than the smallest resistances.
- Q.4)** An electric bulb is rated at 200 V, 40 W. Its resistance will be :  
(a)  $5\Omega$                                       (b)  $500\Omega$   
(c)  $1000\Omega$                                   (d)  $1/5\Omega$
- Q.5)** In the circuit below the voltmeter and ammeter readings would be respectively :

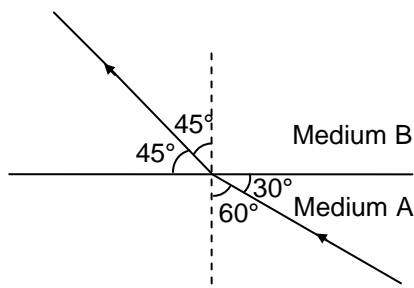


- (a) 0 V and 0 A each                      (b) 3 V and 1 A  
(c) 1 V and 3 A                              (d) 3 V and 3 A

- Q.6)** The phenomenon of electromagnetic induction is :  
(a) the process of charging a body  
(b) the process of generating magnetic field due to a current passing through a coil  
(c) producing induced current in a coil due to relative motion between a magnet and the coil  
(d) the process of rotating a coil of an electric motor
- Q.7)** Choose the incorrect statement :  
(a) Fleming's right-hand rule is a simple rule to know the direction of induced current  
(b) the right-hand thumb rule is used to find the direction of magnetic fields due to current-carrying conductors  
(c) the difference between the direct and alternating currents is that the direct current always flows in one direction, whereas the alternating current reverses its direction periodically  
(d) in India, the AC changes direction after every  $\frac{1}{50}$  second
- Q.8)** In a hydro power plant :  
(a) potential energy possessed by stored water is converted into electricity  
(b) kinetic energy possessed by stored water is converted into potential energy  
(c) electricity is extracted from water  
(d) water is converted into steam to produce electricity

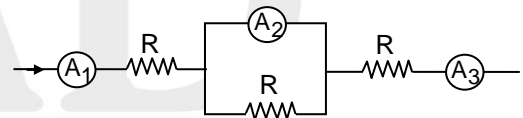
- Q.9)** The image formed by a concave mirror is observed to be virtual, erect and larger than the object. Where should be the position of the object ?  
 (a) Between the principal focus and the centre of curvature  
 (b) At the centre of curvature  
 (c) Beyond the centre of curvature  
 (d) Between the pole of the mirror and its principal focus
- Q.10)** No matter how far you stand from a mirror, your image appears erect. The mirror is likely to be :  
 (a) plane  
 (b) concave  
 (c) convex  
 (d) either plane or convex
- Q.11)** Which of the following lenses would you prefer to use while reading small letters found in a dictionary ?  
 (a) A convex lens of focal length 50 cm  
 (b) A concave lens of focal length 50 cm  
 (c) A convex lens of focal length 5 cm  
 (d) A concave lens of focal length 5 cm
- Q.12)** Magnification produced by a rear view mirror fitted in vehicles :  
 (a) is less than one  
 (b) is more than one  
 (c) is equal to one  
 (d) can be more than or less than one depending upon the position of the object in front of it

- Q.13)** Figure shows a ray of light as it travels from medium A to medium B. Refractive index of the medium B relative to medium A is :



- (a)  $\sqrt{3} / \sqrt{2}$                       (b)  $\sqrt{2} / \sqrt{3}$   
 (c)  $1 / \sqrt{2}$                          (d)  $\sqrt{2}$
- Q.14)** Rays from sun converge at a point 15 cm in front of a concave mirror. Where should an object be placed so that size of its image is equal to the size of the object ?  
 (a) 15 cm in front of the mirror  
 (b) 30 cm in front of the mirror  
 (c) between 15 cm and 30 cm in front of the mirror  
 (d) more than 30 cm in front of the mirror

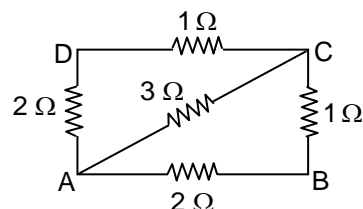
- Q.15)** The image formed by a plane mirror is :  
 (a) virtual, behind the mirror and of the same size as the object  
 (b) virtual, behind the mirror and enlarged  
 (c) real, behind the mirror and enlarged  
 (d) real, behind the mirror and of the same size as the object
- Q.16)** Magnification produced by a concave mirror may be:  
 (a) less than 1 or greater than 1  
 (b) less than 1 or equal to 1  
 (c) greater than 1 or equal to 1  
 (d) less than 1 or equal to 1 or greater than 1
- Q.17)** The source of the sun's energy is :  
 (a) chemical reaction    (b) nuclear fission  
 (c) nuclear fusion        (d) none of these
- Q.18)** The name of the device which converts mechanical energy into electrical energy is :  
 (a) electric generator    (b) electric cell  
 (c) microphone            (d) electric motor
- Q.19)** The unit of magnetic field is :  
 (a) newton                    (b) weber  
 (c) weber meter            (d) tesla
- Q.20)** The statement that is most correct about the following circuit is :



- (a)  $A_1 < A_2$                       (b)  $A_3 < A_2$   
 (c)  $A_1 = A_2 = A_3$                 (d)  $A_1 = A_3$

**PART 2: NUMERICAL ANSWER TYPE QUESTIONS (10 QUESTIONS- 2 MARKS EACH)**

- Q.21)** A current of 0.75 A is drawn by a filament of an electric bulb for 5 minutes. The amount of electric charge (in C) that flows through the circuit is  $25x$  then find  $x$ .
- Q.22)** A conductor has  $2.4 \times 10^{-18} \text{C}$  charge. The number of electrons are in excess or short is equal to  $5x$  then find  $x$ .
- Q.23)** Calculate the equivalent resistance between points A and C.



- Q.24)** A convex lens has focal length of 18 cm. The distance (in cm) from the lens an object be placed so that it forms an real image three times the size of the object is  $3x$  then find  $x$ .
- Q.25)** The radius of curvature of a spherical mirror is 20 cm. Its focal length (in cm) is  $2x$  then  $x$  is
- Q.26)** The size of an object is 3 cm. The magnification produced by a mirror is  $+1$ . What is the size of the image (in cm) ?
- Q.27)** The resistance (in  $\Omega$ ) of an electric bulb which allows a 10 A current, when connected to a 220 V power source is  $11x$  then find  $x$ .
- Q.28)** The current flowing through a conductor is 0.1 A. When a potential difference of 1.5 V is applied across its ends. Resistance of the conductor will be  $(3K)\Omega$  then find  $K$  :
- Q.29)** The value of the frequency of the AC supply, in India is  $(10 K)$  Hz then find  $K$  :
- Q.30)** With respect to air the refractive indices of water and glass are  $\frac{4}{3}$  and  $\frac{3}{2}$  respectively. The refractive index of glass with respect to water is  $\left(1 + \frac{1}{K}\right)$  then find  $K$  :



## CHEMISTRY

### PART 1: CONCEPT-BASED QUESTIONS (20 QUESTIONS- 4 MARKS EACH

- Q.31)** Which among the following is a weak acid?  
 (a) Sulphuric acid (b) Hydrochloric acid  
 (c) Nitric acid (d) Carbonic acid
- Q.32)** Assertion (A) : Generally pickles are stored in glass vessels and plastic vessels.  
 Reason (R) : The components of pickles are highly reactive towards glass/plastic.  
 (a) Both A and R are true and R is the correct explanation for A.  
 (b) Both A and R are true and R is not the correct explanation for A.  
 (c) A is true and R is false.  
 (d) Both A and R are false.
- Q.33)** Match the following :

	Column A		Column B
A.	CaO	p.	Deliquescent
B.	MgCl <sub>2</sub> .6H <sub>2</sub> O	q.	Hydrated salt, but not deliquescent
C.	FeSO <sub>4</sub> .7H <sub>2</sub> O	r.	Anhydrous and deliquescent salt
D.	MgSO <sub>4</sub>	s.	Hygroscopic

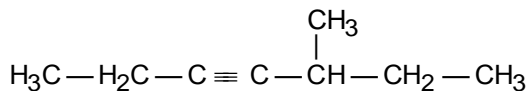
- (a)  $A \rightarrow s, B \rightarrow p, C \rightarrow q, D \rightarrow r$   
 (b)  $A \rightarrow p, B \rightarrow s, C \rightarrow q, D \rightarrow r$   
 (c)  $A \rightarrow q, B \rightarrow r, C \rightarrow s, D \rightarrow p$   
 (d)  $A \rightarrow s, B \rightarrow r, C \rightarrow q, D \rightarrow p$

- Q.34)** Identify the application of neutralization among the following.  
 (a) Addition of slaked lime to soil.  
 (b) Doctors giving antacid to patient suffering from acidity.  
 (c) Usage of lithium hydroxide in submarines.  
 (d) All of these
- Q.35)** Three elements from their respective oxides A, B and C. A and C are gases and B is a solid which on dissolution in water turns red litmus to blue. In presence of moisture, A turns blue litmus to red and C is neutral to litmus. Then, A, B and C may be, respectively :  
 (a) SO<sub>3</sub>, MgO, NO  
 (b) SO<sub>2</sub>, CaO, CO<sub>2</sub>  
 (c) CO, Na<sub>2</sub>O, SO<sub>3</sub>  
 (d) SO<sub>2</sub>, Ca(OH)<sub>2</sub>, NO<sub>2</sub>
- Q.36)** The salt formed by complete neutralization of calcium hydroxide with oxy acid of sulphur having four oxygen atoms is :  
 (a) Calcium sulphite (b) Calcium bisulphate  
 (c) Calcium sulphate (d) Calcium bisulphite
- Q.37)** Which of the following methods of concentration is inappropriate for an oxide ore?  
 (a) Magnetic separation  
 (b) Gravity separation  
 (c) Froth floatation  
 (d) Chemical separation
- Q.38)** Pig iron obtained from blast furnace cannot be used for making tools because  
 (a) High percentage of impurities decrease malleability  
 (b) High percentage of impurities increase malleability  
 (c) low carbon content increases hardness  
 (d) low carbon content decreases hardness
- Q.39)** Which of the following is the gaseous product obtained in roasting?  
 (a) SO<sub>2</sub> (b) O<sub>2</sub>  
 (c) SO<sub>3</sub> (d) H<sub>2</sub>S
- Q.40)** Graphite is generally used as a refractory material in electric furnaces because  
 (a) of its high melting point  
 (b) it has a layered structure  
 (c) both (a) and (b)  
 (d) it is lustrous

- Q.41)** Which of the following changes takes place during the process of calcination of an ore?  
 (a) thermal decomposition of the ore takes place  
 (b) the mass become porous  
 (c) moisture is removed  
 (d) all of these

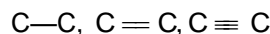
- Q.42)** Which among the following pairs belong to the same homologous series?  
 (a)  $C_3H_4$ ,  $C_5H_{10}$       (b)  $C_2H_6$ ,  $C_4H_8$   
 (c)  $C_2H_4$ ,  $C_3H_8$       (d)  $C_4H_8$ ,  $C_5H_{10}$

- Q.43)** The IUPAC name of the following compound is:



- (a) 2-ethyl-3-hexyne  
 (b) 3-methyl-4-heptyne  
 (c) 5-methyl-3-heptyne  
 (d) 5-ethyl-3-hexyne
- Q.44)** Which among the following molecular formulae represents a saturated hydrocarbon?  
 (a)  $C_4H_8$       (b)  $C_4H_6$   
 (c)  $C_3H_4$       (d)  $C_5H_{12}$
- Q.45)** Which of the following is an identification test for unsaturation in an organic compound?  
 (a) addition of hydrogen  
 (b) addition of ozone  
 (c) addition of bromine  
 (d) addition of oxygen
- Q.46)** Give the corresponding functional isomer of the product formed when ethanol is treated with ethanoic acid.  
 (a) propanoic acid      (b) ethyl ethanoate  
 (c) butanoic acid      (d) butanone
- Q.47)** During the formation of sodium chloride from its constituents.  
 (a) Na undergoes oxidation and acts as an oxidizing agent.  
 (b) Na undergoes reduction and Cl undergoes oxidation.  
 (c) Cl undergoes reduction and acts as a reducing agent.  
 (d) Na acts as a reducing agent and Cl acts as an oxidizing agent.
- Q.48)** The valence electronic configurations of two elements are  $4s^1$  and  $3s^2 3p^5$ , respectively. The type of bond expected to be present between them is :  
 (a) polar covalent bond  
 (b) non-polar covalent bond  
 (c) metallic bond  
 (d) ionic bond

- Q.49)** Arrange the following in increasing order of their bond lengths.



- (a)  $C\equiv C < C=C < C-C$   
 (b)  $C=C < C-C < C\equiv C$   
 (c)  $C\equiv C < C-C < C=C$   
 (d)  $C-C < C=C < C\equiv C$

- Q.50)** The electrolytic process by which an oxide of a metal is coated over metal surface is called \_\_\_\_\_.  
 (a) electrolysis      (b) electroplating  
 (c) anodizing      (d) electrorefining

## PART 2: NUMERICAL ANSWER TYPE QUESTIONS (10 QUESTIONS- 2 MARKS EACH)

- Q.51)** How many number of 'sigma' bonds are present in  $CH_3-C\equiv N$  ?
- Q.52)** Valency of sulphur atom in  $SO_2$  is
- Q.53)** What is the difference between atomic mass and atomic number of Lithium
- Q.54)** What is the atomicity of 1 molecule of  $H_2SO_4$
- Q.55)** Aluminum react with oxygen to form aluminium oxide. The formula of aluminium oxide is  $Al_2O_x$ . Find the value of x.
- Q.56)** How many electrons are there in  $Li^+$  ion ?
- Q.57)** What is the value of x for given reaction  $FeSO_4 + Mg \rightarrow MgSO_x + Fe$
- Q.58)** How many unpaired electrons are present in  $Na^+$  ion.
- Q.59)** What is the basicity of  $H_3PO_4$  .
- Q.60)** What is  $p^{OH}$  of a 0.001 M NaOH solution.

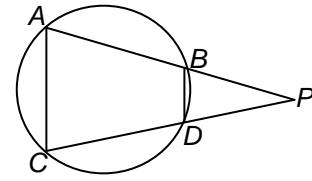


## PART 1: CONCEPT-BASED QUESTIONS (20 QUESTIONS- 4 MARKS EACH)

- Q.61)** If two numbers when divided by a certain divisor give remainder 35 and 30 respectively and when their sum is divided by the same divisor, the remainder is 20, then the divisor is  
 (a) 40      (b) 45  
 (c) 50      (d) 55
- Q.62)**  $\alpha, \beta, \gamma$  are the zeroes of the cubic polynomial  $x^3 - 2x^2 + qx - 6$  and product of  $\beta$  and  $\gamma$  is 4, then  $\alpha$  is equal to  
 (a)  $3/2$       (b)  $-3/2$   
 (c)  $2/3$       (d)  $-2/3$

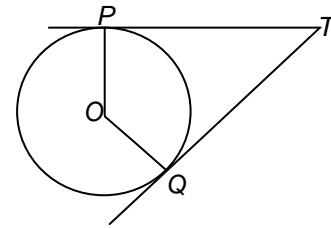
- Q.63)** The 2 digit number which becomes  $(5/6)$ th of itself when its digits are reversed. The difference in the digits of the number being 1 is  
 (a) 45 (b) 54  
 (c) 36 (d) None of these
- Q.64)** If one root of  $x^2 - px + q = 0$  is the  $n^{\text{th}}$  power of the other root, then  $\frac{1}{q^{n+1}} + \frac{n}{q^{n+1}}$  is equal to  
 (a)  $-p$  (b)  $q$   
 (c)  $-q$  (d)  $p$
- Q.65)** If  $\alpha, \beta$  are the roots of  $x^2 - 2px + q = 0$  and  $\gamma, \delta$  are roots of  $x^2 - 2rx + s = 0$  and  $\alpha, \beta, \gamma, \delta$  are in A.P. then  
 (a)  $p - q = r^2 - s^2$  (b)  $s - q = r^2 - p^2$   
 (c)  $r - s = p^2 - q^2$  (d) None of these
- Q.66)** Let  $T_r$  be the  $r^{\text{th}}$  term of an A.P. for  $r = 1, 2, 3, \dots$ . If for some positive integers  $m, n$  we have  $T_m = \frac{1}{n}$  and  $T_n = \frac{1}{m}$ , then  $T_{mn}$  equals  
 (a)  $\frac{1}{mn}$  (b)  $\frac{1}{m} + \frac{1}{n}$   
 (c) 1 (d) 0
- Q.67)** If  $y = ax^2 + 7x - 15$  makes an intercept of  $1\frac{1}{2}$  units on X-axis, then the value of 'a' is  
 (a) 7 (b) -15  
 (c) 2 (d) -8
- Q.68)** If the point  $P(p, q)$  is equidistant from the points  $A(a + b, b - a)$  and  $B(a - b, a + b)$  then  
 (a)  $ap = bq$  (b)  $bp = aq$   
 (c)  $ap + bq = 0$  (d)  $bp + aq = 0$
- Q.69)** The value of  
 $(\sin^2 7\frac{1}{2}^\circ + \cos^2 7\frac{1}{2}^\circ) - (\sin^2 30^\circ + \cos^2 30^\circ)$   
 $+ (\sin^2 7^\circ + \sin^2 83^\circ)$  is equal to  
 (a) 3 (b)  $3\frac{1}{2}$   
 (c) 2 (d) 1
- Q.70)** If  $x = p \sec \theta$  and  $y = q \tan \theta$  then -  
 (a)  $x^2 - y^2 = p^2 q^2$   
 (b)  $x^2 q^2 - y^2 p^2 = pq$   
 (c)  $x^2 q^2 - y^2 p^2 = \frac{1}{p^2 q^2}$   
 (d)  $x^2 q^2 - y^2 p^2 = p^2 q^2$

- Q.71)** In the figure below (not to scale),  $AB = CD$  and  $\overline{AB}$  and  $\overline{CD}$  are produced to meet at the point  $P$ .



- If  $\angle BAC = 70^\circ$  then  $\angle P$  is  
 (a)  $30^\circ$  (b)  $40^\circ$   
 (c)  $45^\circ$  (d)  $50^\circ$

- Q.72)** In the adjoining figure,  $TP$  and  $TQ$  are the two tangents to a circle with centre  $O$ . If  $\angle POQ = 110^\circ$  then  $\angle PTQ$  is



- (a)  $60^\circ$  (b)  $70^\circ$   
 (c)  $80^\circ$  (d)  $90^\circ$

- Q.73)** The base radii of a cone and a cylinder are equal. If their curved surface areas are also equal, then the ratio of the slant height of the cone to the height of the cylinder is  
 (a) 2 : 1 (b) 1 : 2  
 (c) 1 : 3 (d) 3 : 1

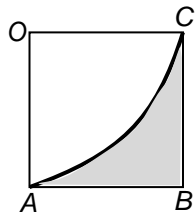
- Q.74)** If the radius of the sphere is increased by 100%, the volume of the corresponding sphere is increased by  
 (a) 200% (b) 500%  
 (c) 700% (d) 800%

- Q.75)** The mean of a set of 20 observation is 19.3. The mean is reduced by 0.5 when a new observation is added to the set. The new observation is  
 (a) 19.8 (b) 8.8  
 (c) 9.5 (d) 30.8

- Q.76)** A fair die is thrown once. The probability of getting a composite number less than 5 is  
 (a)  $\frac{1}{3}$  (b)  $\frac{1}{6}$   
 (c)  $\frac{2}{3}$  (d) 0

- Q.77)** If the perimeter of one face of a cube is 20 cm, then its surface area is  
 (a)  $120 \text{ cm}^2$  (b)  $150 \text{ cm}^2$   
 (c)  $125 \text{ cm}^2$  (d)  $400 \text{ cm}^2$

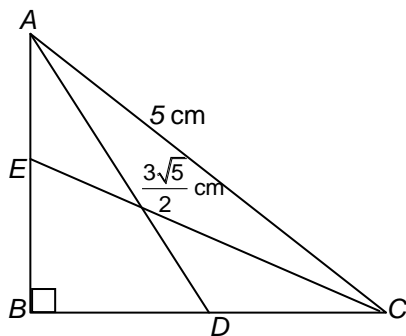
- Q.78)** In the adjoining figure,  $OABC$  is a square of side 7 cm.  $OAC$  is a quadrant of a circle with  $O$  as centre. The area of the shaded region is



- (a)  $10.5 \text{ cm}^2$                       (b)  $38.5 \text{ cm}^2$   
 (c)  $49 \text{ cm}^2$                         (d)  $11.5 \text{ cm}^2$
- Q.79)**  $\cos 1^\circ \cdot \cos 2^\circ \cdot \cos 3^\circ \dots \cos 179^\circ$  is equal to  
 (a)  $-1$                                       (b)  $0$   
 (c)  $1$                                         (d)  $1/\sqrt{2}$
- Q.80)** If  $(x+1)$  and  $(x-2)$  are the factor of the expression  $(2x^3 - px^2 + x + q)$ , then the values of  $p$  and  $q$  are given by  
 (a)  $p = 5, q = 2$                       (b)  $p = 7, q = 8$   
 (c)  $p = 7, q = 10$                       (d)  $p = 15, q = 12$

**PART 2: NUMERICAL ANSWER TYPE QUESTIONS  
 (10 QUESTIONS- 2 MARKS EACH)**

- Q.81)** If value of  $\frac{\sec^2 54^\circ - \cot^2 36^\circ}{\operatorname{cosec}^2 57^\circ - \tan^2 33^\circ} + 2\sin^2 38^\circ \sec^2 52^\circ - \sin^2 45^\circ + \frac{2}{\sqrt{3}} \tan 17^\circ \tan 60^\circ \tan 73^\circ$  is  $\frac{\lambda}{2}$ , then  $\lambda$  is
- Q.82)** In the given figure  $ABC$  is a right triangle, right angled at  $B$ .  $AD$  and  $CE$  are the two medians drawn from  $A$  and  $C$  respectively. If  $AC = 5 \text{ cm}$  and  $AD = \frac{3\sqrt{5}}{2} \text{ cm}$ , if the length of  $CE$  is  $2\sqrt{k}$ , then  $k$  is



- Q.83)** If  $\alpha$  and  $\beta$  are the zeroes of the quadratic polynomial  $p(s) = 3s^2 - 6s + 4$ , find the value of  $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} + 2\left(\frac{1}{\alpha} + \frac{1}{\beta}\right) + 3\alpha\beta$ .

- Q.84)** If the value of  $p$  is negative and  $\alpha^2 + \beta^2 - \alpha\beta = 3\frac{1}{4}$  where  $\alpha$  and  $\beta$  are roots of  $x^2 + px + 1 = 0$ , is  $-\frac{5}{\lambda}$ , then  $\lambda$  is \_\_\_\_\_

- Q.85)** For what value of  $k$  will the following system of linear equations have no solutions?  
 $3x + y = 1$  and  $(2k-1)x + (k-1)y = 2k+1$

- Q.86)** The sum of  $n$  terms of two arithmetic series are in the ratio  $2n+3 : 6n+5$ , then if the ratio of their 13<sup>th</sup> terms is  $\frac{p}{q}$ , where  $p$  and  $q$  are co-prime then unit digit of  $p+q$  is

- Q.87)** If the co-ordinates of the points of trisection of the line segment joining  $(4, -1)$  and  $(-2, -3)$  is  $\left(k, -\frac{7}{3}\right)$ , then  $k =$

- Q.88)** A vertical tower stands on a horizontal plane and is surmounted by a vertical flag staff of height 6 meters. At point on the plane, the angle of elevation of the bottom and the top of the flag staff are respectively  $30^\circ$  and  $60^\circ$ . If the height of tower is  $\frac{6}{\lambda}$ , then  $\lambda$  is

- Q.89)** A hollow sphere of internal and external diameters 4 cm and 8 cm respectively, is melted into a cone of base diameter 8 cm. Find unit digit of the height of the cone.

- Q.90)** Find the value of  $k$  if mean of the following data is 14

$x_i$	5	10	15	20	25
$F_i$	7	$k$	8	4	5

