**Time Allowed : 3 Hours** **Maximum Marks : 80**

**General Instructions:**

I. ***All questions are compulsory.***
II. *The question paper consists of **40** questions divided into four sections **A, B, C** and **D**.*
III. *Section **A** contains **20** objective questions of **1** mark each. Section **B** contains **6** questions of **2** marks each. Section **C** contains **8** questions of **3** marks each. Section **D** contains **6** questions of **4** marks each.*
IV. *There is no overall choice. However, an internal choice has been provided in **2** questions of section **A**, **2** questions of section **B**, **3** questions of section **C** and **3** questions of section **D**. You have to attempt only one of the alternatives in all such questions.*
V. *Use of **calculators** is not permitted.*

## SECTION - A

**(Q. 1 – Q. 10 ) Multiple choice type questions. Select the correct option.**

**1.** If the sum of n terms of an A.P. is $2n^2 + 5n$, then its nth term is
(a) $4n-3$ (b) $3n-4$ (c) $4n+3$ (d) $3n+4$

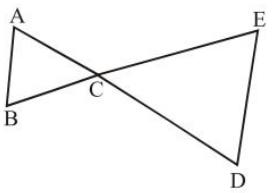
**2.** The roots of the equation $x + \frac{1}{x} = 5\frac{1}{5}$ are:
(a) $5, \frac{1}{5}$ (b) $5, -5$ (c) $-5, -5$ (d) None of these

**3.** If $x = \frac{3m-4}{5}$, $y = \frac{m-7}{3}$ and $x + y = \frac{13}{3}$, then the value of $m$ is :
(a) 6 (b) 8 (c) –8 (d) –4

**4.** If a, b are roots of the equation $x^2 + \sqrt{\alpha}x + \beta = 0$, then find the value of $\alpha^2 + \beta^2 =$
(a) 7 (b) 6 (c) 8 (d) 5

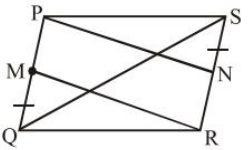
**5.** Cost of 2 apples, 3 bananas and one coconut is ₹ 26. Also the cost of 3 apples, 2 bananas and two coconuts is ₹ 35. Then, find the cost of 12 apples, 13 bananas and 7 coconuts.
(a) ₹ 172 (b) ₹ 148 (c) ₹ 143 (d) ₹ 126

**6.** In the adjoining figure, if AB ‖ ED, then find the relation between the two triangles ABC and DEC.



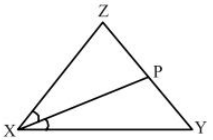

(a) similar (b) congruent
(c) both similar and congruent (d) neither similar nor congruent

**7.** PQRS is a parallelogram and M, N are the mid-points of PQ and RS respectively. Which of the following is not true ?




(a) RM trisects QS (b) PN trisects QS
(c) $\Delta PSN \sim \Delta QMR$ (d) MS is not parallel to QN

**8.** In a $\Delta XYZ$, if the internal bisector of $\angle X$ meets YZ at 'P', then ....




(a) $\frac{XY+XZ}{XZ}=\frac{YZ}{PZ}$ (b) $\frac{XY}{PZ}=\frac{XZ}{YP}$ (c) $\frac{XY}{XZ}=\frac{PZ}{YP}$ (d) $\frac{XZ}{XY}=\frac{YP}{YZ}$

**9.** The number of solution of the equation $\sqrt{x^2}=x-2$ is

(a) 0 (b) 1 (c) 2 (d) 4

**10.** When two dice are thrown, what is the probability that the sum of the numbers is divisible by 3 ?

(a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{2}{5}$ (d) $\frac{1}{6}$

**(Q. 11 – Q. 15 ) Fill in the blanks.**

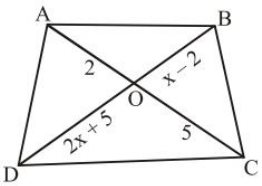
**11.** If the common difference of an A.P. is – 2, then $a_{30}-a_{12}$ is _____ .

**12.** If in a group of goats and hens, the number of legs is 24 more than twice the number of heads, then the number of goats in the group is _____ .

**OR**

Solution of px + qy = p – q, qx – py = p + q is _____ .

**13.** In a given figure in trapazium ABCD if AB || CD, then value of x is _____ .




**14.** If $\frac{\tan\theta+\cot\theta}{\tan\theta-\cot\theta}=2, (0^\circ \le \theta \le 90^\circ)$, then the value of θ is _____ .

**15.** If the mean of x and $\frac{1}{x}$ is M, then the mean of $x^2$ and $\frac{1}{x^2}$ is _____ .

**(Q. 16 – Q. 20 ) Answer the following questions.**

**16.** Expressing $0.\overline{23} + 0.2\overline{3}$ as a single decimal

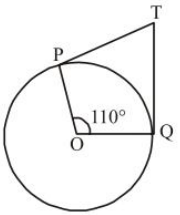
**17.** If the $n$th term of an A.P. is given by $a_n = 5n - 3$, then find the sum of first 10 terms.

**OR**

In an A.P. if 3 times its 3rd term is equal to 7 times its 7th term, then find the 10th term.

**18.** What type of a triangle is formed with points (3, –3), (–3, 3) and $\left(-3\sqrt{3}, -3\sqrt{3}\right)$ as vertices?

**19.** In Fig. if TP and TQ are the two tangents to a circle with centre O so that $\angle POQ = 110°$, then find the measure of $\angle PTQ$.




**20.** The mean of following distribution is 6, find the value of k.

| x : | 2 | 4 | 6 | 10 | k + 5 |
|---|---|---|---|---|---|
| f : | 3 | 2 | 3 | 1 | 2 |

## SECTION - B

**21.** When $2^{256}$ is divided by 17 then find the remainder.

**22.** In what ratio, the line segment joining the points (3, 5) & (–4, 2) is divided by y-axis?

**23.** Find the solution of the pair equations $\frac{x}{10} + \frac{y}{5} - 1 = 0$ and $\frac{x}{8} + \frac{y}{6} = 15$. Hence, find $\lambda$, if $y = \lambda x + 5$.

**OR**

Solve the following pairs of equations by reducing them to a pair of linear equations:

$\frac{1}{2x} + \frac{1}{3y} = 2$ and $\frac{1}{3x} + \frac{1}{2y} = \frac{13}{6}$

**24.** Find the sum of first 24 terms of the sequence whose $n^{th}$ term is $a_n = 3 + \frac{2n}{3}$

**OR**

The first and the last terms of an AP are 5 and 45 respectively. If the sum of all its terms is 400, find its common difference.

**25.** A girl calculates that the probability of her winning the first prize in a lottery is 0.08. If 6000 tickets are sold, how many tickets has she bought?

**26.** A book containing 100 pages is opened at random. Find the probability that a doublet page is found.

## SECTION - C

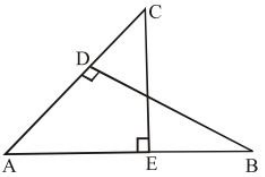
**27.** Show that any positive odd integer is of the form $8q \pm 1$ and $8q \pm 3$, where $q$ is some integer.

**28.** If $\alpha$ and $\beta$ are the zeroes of the quadratic polynomial $f(x) = ax^2 + bx + c$ then evaluate $\frac{\alpha^2}{\beta^2} + \frac{\beta^2}{\alpha^2}$

**29.** In the given fig, BD $\perp$ AC and CE $\perp$ AB. Prove that

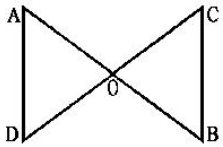
(i) $\Delta AEC \sim \Delta ADB$

(ii) $\frac{CA}{AB} = \frac{CE}{DB}$




**OR**

In the given fig, $\frac{OA}{OC} = \frac{OD}{OB}$, prove that $\angle A = \angle C$ and $\angle B = \angle D$

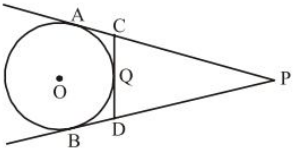



**30.** Prove that the area of a triangle with vertices $(t, t-2)$, $(t+2, t+2)$ and $(t+3, t)$ is independent of t.

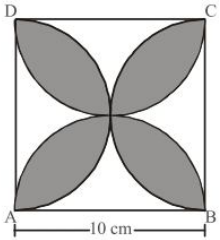
**OR**

The three vertices of a parallelogram , taken in order, are $(1, -2)$, $(3, 6)$ and $(5, 10)$. Find the coordinates of its fourth vertex .

**31.** In the given figure, PA and PB are tangents to the circle from an external point P. CD is another tangent touching the circle at Q. If PA = 12 cm, QC = QD = 3 cm, then find PC + PD.




**32.** In figure, *ABCD* is a square of side 10 cm and semicircles are drawn with each side of the square as diameter. Find area of the shaded region.




**33.** Without using trigonometric tables, prove that:- $\tan 7° \tan 23° \tan 60° \tan 67° \tan 83° = \sqrt{3}$

**OR**

If $5\tan\theta = 4$, then find the value of $\frac{5\sin\theta - 3\cos\theta}{5\sin\theta + 2\cos\theta}$

**34.** A copper rod of diameter 1cm and length 8 cm, is drawn into a wire of length 18 m of uniform thickness. Find the thickness of wire.

## SECTION - D

**35.** What is the value of x if $\cot x = \frac{5}{3}\tan 13° \tan 37° \tan 45° \tan 53° \tan 77° - \frac{2}{3}\text{cosec}^2 58° + \frac{2}{3}\cot 58° \tan 32°$.

**36.** Solve the equation : $\left(\frac{2x-3}{x-1}\right) - 4\left(\frac{x-1}{2x-3}\right) = 3,\ x \neq 1,\ 3/2$

**OR**

The sum of the reciprocals of Rehman's ages, (in years) 3 years ago and 5 years from now is $\frac{1}{3}$. Find his present age.

**37.** Find the median of the following data :

| Height (in cm) | Number of students |
|---|---|
| Less than 120 | 12 |
| Less than 140 | 26 |
| Less than 160 | 34 |
| Less than 180 | 40 |
| Less than 200 | 50 |

**OR**

The median of the following data is 525. Find the values of $x$ and $y$ if the total frequency is 100.

| Class Interval | Frequency |
|---|---|
| 0 – 100 | 2 |
| 100 – 200 | 5 |
| 200 – 300 | x |
| 300 – 400 | 12 |
| 400 – 500 | 17 |
| 500 – 600 | 20 |
| 600 – 700 | y |
| 700 – 800 | 9 |
| 800 – 900 | 7 |
| 900 – 1000 | 4 |

**38.** Find the volume and total csurface area of a tumbler in the form of a frustum of a cone, if the diameter of the ends are 6.50 cm and 3.50 cm and the perpendicular height of the tumbler is 7.80 cm.

**39.** Draw a circle of radius 4 cm. Draw two tangents to the circle inclined at an angle of 60° to each other.

**40.** An aeroplane is flying at a height of 300 m above the ground. Flying at this height, the angles of depression from the aeroplane of two points on both banks of a river in opposite directions are 45° and 60° respectively. Find the width of the river. [Use $\sqrt{3} = 1.732$]

**OR**

The angle of elevation of a cloud from a point 60 m above the surface of the water of a lake is 30° and the angle of depression of its shadow in water of lake is 60°. Find the height of the cloud from the surface of water.