

Time: 2 hours

Maximum Marks: 80

General Instructions:

1. All questions are compulsory.
2. Section A of 40 marks
3. Section B of 40 marks

SECTION – A (40 Marks)

Attempt all questions from this Section.

1.

(a) Find the value of 'x' and 'y' if:

$$2 \begin{bmatrix} x & 7 \\ 9 & y-5 \end{bmatrix} + \begin{bmatrix} 6 & -7 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 10 & 7 \\ 22 & 15 \end{bmatrix}$$

(b) Sonia had a recurring deposit account in a bank deposited Rs. 600 per month for $2\frac{1}{2}$ years. If the rate of interest was 10% p.a., find the maturity value of this account.

(c) Cards bearing numbers 2, 4, 6, 8, 10, 12, 14, 16, 18 and 20 are kept in a bag. A card is drawn at random from the bag. Find the probability of getting a card which is:

- (i) a prime number
- (ii) a number divisible by 4.
- (iii) A number that is a multiple of 6.
- (iv) An odd number.

2.

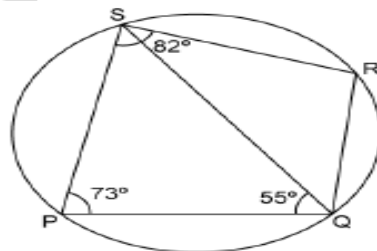
(a) The circumference of the base of a cylindrical vessel is 132 cm and its height is 25 cm. Find the

- (i) Radius of the cylinder
- (ii) Volume of cylinder (use $\pi = \frac{22}{7}$)

(b) If $(k - 3)$, $(2k + 1)$ and $(4k + 3)$ are three consecutive terms of an A.P., find the value of k.

(c) PQRS is a cyclic quadrilateral. Given $\angle QPS = 73^\circ$, $\angle PQS = 55^\circ$ and $\angle PSR = 82^\circ$, calculate:

- (i) $\angle QRS$
- (ii) $\angle RQS$
- (iii) $\angle PRQ$



3.

(a) If $(x + 2)$ and $(x + 3)$ are factors of $x^3 + ax + b$, find the values of 'a' and 'b'.

(b) Prove that $\sqrt{\sec^2\theta + \cot^2\theta} = \tan\theta + \cot\theta$

(c) Using a graph paper draw a histogram for the given distribution showing the number of runs scored by 50 batsmen. Estimate the mode of the data:

Runs scored	3000-4000	4000-5000	5000-6000	6000-7000	7000-8000	8000-9000	9000-10000
No. of batsmen	4	18	9	6	7	2	4

- 4.
- (a) Solve the following in equation, write down the solution set and represent it on the real number line:
 $-2 + 10x \leq 13x + 10 < 24 + 10x, x \in Z$
- (b) If the straight lines $3x - 5y = 7$ and $4x + ay + 9 = 0$ are perpendicular to one another. Find the value of a.
- (c) Solve $x^2 + 7x = 7$ and give your answer correct to two decimal places.

SECTION – B (40 Marks)

Attempt any four questions from this Section

- 5.
- (a) The 4th term of a G.P. is 16 and the 7th term is 128. Find the first term and common ratio of the series.
- (b) A man invests Rs. 22,500 in Rs. 50 shares available at 10% discount. If the dividend paid by the company is 12% calculate:
- (i) The number of shares purchased
- (ii) The annual dividend received.
- (iii) The ratio of return he gets on his investment. Give your answer correct to the nearest whole number.
- (c) Use graph paper for this question (Take 2 cm = 1 unit along both x and y axis). ABCD is a quadrilateral whose vertices are A(2, 2), B(2, -2), C(0, -1) and D(0, 1).
- (i) Reflect quadrilateral ABCD on the y – axis and name it as A'B'CD.
- (ii) Write down the coordinates of A' and B'.
- (iii) Name two points which are invariant under the above reflection.
- (iv) Name the polygon A'B'CD.
- 6.
- (a) Using properties of proportion, solve for x, given that x is positive:
- $$\frac{2x + \sqrt{4x^2 - 1}}{2x - \sqrt{4x^2 - 1}} = 4$$
- (b) If $A = \begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}, B = \begin{bmatrix} 0 & 4 \\ -1 & 7 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 0 \\ -1 & 4 \end{bmatrix}$, find $AC + B^2 - 10C$.
- (c) Prove that $(1 + \cot \theta - \operatorname{cosec} \theta)(1 + \tan \theta + \sec \theta) = 2$
- 7.
- (a) Find the value of k for which the following equation has equal roots.
 $X^2 + 4kx + (k^2 - k + 2) = 0$
- (b) On a map drawn to a scale of 1: 50,000, a rectangular plot of land ABCD has the following dimensions. AB = 6 cm; BC = 8 cm and all angles are right angles. Find:
- (c) A(2, 5), B(-1, 2) and C(5, 8) are the vertices of a triangle ABC, 'M' is a point on AB such that AM : MB = 1 : 2. Find the co-ordinates of 'M'.
 Hence find the equation of the line passing through the points C and M.
- 8.
- (a) Rs. 7500 were divided equally among a certain number of children. Had there been 20 less children, each would have received Rs. 100 more. Find the original number of children.

(b) If the mean of the following distribution is 24, find the value of 'a'.

Marks	0-10	10-20	20-30	30-40	40-50
Number of students	7	a	8	10	5

(c) Using ruler and compass only, construct a ΔABC such that $BC = 5$ cm and $AB = 6.5$ cm and $\angle ABC = 120^\circ$

(i) Construct a circum-circle of ΔABC

(ii) Construct a cyclic quadrilateral $ABCD$, such that D is equidistant from AB and BC .

9.

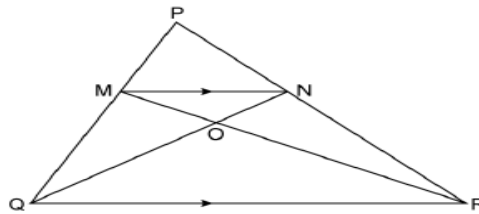
(a) Priyanka has a recurring deposit account of Rs. 1000 per month at 10% per annum. If she gets Rs.5550 as interest at the time of maturity, find the total time for which the account was held.

(b) In ΔPQR , MN is parallel to QR and $\frac{PM}{MQ} = \frac{2}{3}$

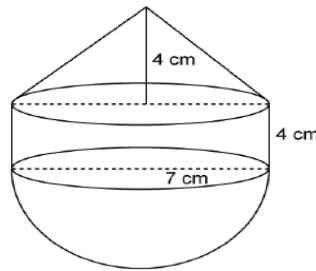
(i) Find $\frac{MN}{QR}$

(ii) Prove that ΔOMN and ΔORQ are similar.

(iii) Find, Area of ΔOMN : Area of ΔORQ



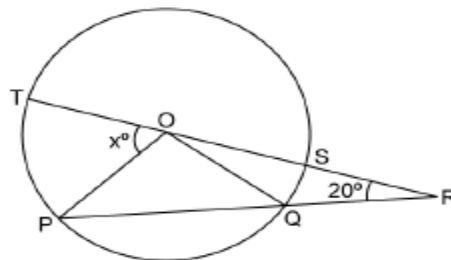
(c) The following figure represents a solid consisting of a right circular cylinder with a hemisphere at one end and a cone at the other. Their common radius is 7 cm. The height of the cylinder and cone are each of 4 cm. Find the volume of the solid.



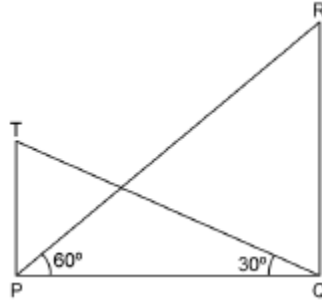
10.

(a) Use remainder theorem to factorize the following polynomial: $2x^3 + 3x^2 - 9x - 10$.

(b) In the figure given below 'O' is the centre of the circle. If $QR = OP$ and $\angle ORP = 20^\circ$. Find the value of 'x' giving reasons.



- (c) The angle of elevation from a point P of the top of a tower QR. 50 m high is 60° and that of the tower PT from a point Q is 30° . Find the height of the tower PT. correct to the nearest metre.



11.

- (a) The 4th term of an A.P. is 22 and 15th term is 66. Find the first terms and the common difference. Hence find the sum of the series to 8 terms.
- (b) Use Graph paper for this question.
A survey regarding height (in cm) of 60 boys belonging to class 10 of a school was conducted. The following data was recording:

Height in cm	135-140	140-145	145-150	150-155	155-160	160-165	165-170
No. of boys	4	8	20	14	7	6	1

Taking 2 cm = height of 10 cm along one axis and 2 cm = 10 boys along the other axis draw an ogive of the above distribution. Use the graph to estimate the following:

- (i) The median
- (ii) Lower Quartile
- (iii) If above 158 cm is considered as the tall boys of the class. Find the number of boys in the class who are tall.