

Time : 2½ hrs.

MATHEMATICS

M.M.: 80

Answer to this paper must be written on the paper provided separately. You will not be allowed to write during the first 15 minutes. This time is to be spent in reading the question paper. The time given at the head of this paper is the time allowed for writing the answers. Attempt all questions from Section I and any four from Section II. All working, including rough work must be clearly shown and should be done on the same sheet as the rest of the answer.

Omission of essential working will result in loss of marks. The intended marks for the questions or parts are given in brackets.

SECTION - I [40 Marks]
(Attempt all questions from this section)

- Q.1. (a) List the solution set of $\frac{11-2x}{5} \geq \frac{9-3x}{8} + \frac{3}{4}$, $x \in \mathbb{N}$ [3]
- (b) Ahmed opened a recurring deposit account with a nationalised bank for a period of 2 years. If the bank pays interest at the rate of 6% per annum and the monthly instalment is ₹1000, find the : [3]
- (i) interest earned in 2 years (ii) matured value
- (c) Use factor theorem to factorise x^3+2x^2-5x-6 [4]
- Q.2. (a) A man invests ₹9600 on ₹100 shares at ₹80. If the company pays him 18% dividend, find : [3]
- (i) the number of shares he buys (ii) his total dividend
- (iii) his percentage return on the shares.
- (b) The mid-point of the line segment joining $(2a, 4)$ and $(-2, 2b)$ is $(1, 2a+1)$. Find the values of a and b . [3]
- (c) Using ruler and compass construct a triangle ABC in which $AB=7$ cm, $\angle CAB=60^\circ$ and $AC=5$ cm. Construct the locus of : [4]
- (i) points equidistant from AB and AC.
- (ii) points equidistant from BA and BC
- Hence, construct a circle touching the three sides of the triangle internally.
- Q.3. (a) A die has 6 faces marked by the given numbers as shown below : [3]
- 1
2
3
-1
-2
-3
- The die is thrown once. What is the probability of getting:
- (i) a positive integer (ii) an integer greater than -3
- (iii) the smallest integer
- (b) Find the ratio in which the point $P(-3, p)$ divides the line segment joining the points $(-5, -4)$ and $(-2, 3)$. Hence find the value of p . [3]
- (c) Using a graph paper, plot the points $A(6, 4)$ and $B(0, 4)$: [4]
- (i) Reflect A and B in the origin to get image A' and B' .
- (ii) Write the co-ordinates of A' and B' .
- (iii) State the geometrical name for the figure $ABA'B'$.
- (iv) Find its perimeter.
- Q.4. (a) A box contains 5 red marbles, 8 white marbles and 4 green marbles. One marble is taken out of the box at random. Find the probability that the marble taken out is : [3]
- (i) red (ii) not green (iii) white
- (b) Which is better investment 6% ₹ 100 shares at ₹ 120 or 8% ₹ 10 shares as ₹ 15 ? [3]
- (c) If $(x+2)$ and $(x-3)$ are factors of x^3+ax+b , find the values of a and b . [4]

SECTION II [40 Marks]
(Attempt any four questions from this section)

- Q.5. (a) Simplify : $-\frac{1}{3} \leq \frac{x}{2} - 1 \frac{1}{3} < \frac{1}{6}$; $x \in \mathbb{R}$
Represent the solution on the number line. [3]
- (b) The equation of a straight line is $3x-3y-7=0$. Find : [3]
(i) the gradient of the line (ii) the inclination of the line
(iii) the y-intercept of the line
- (c) Construct a triangle ABC in which $BC=6\text{cm}$, $AB=5.5\text{ cm}$ and $\angle ABC=120^\circ$.
(i) Construct a circle circumscribing the triangle ABC
(ii) Draw a cyclic quadrilateral ABCD so that D is equidistant from B and C. [4]
- Q.6. (a) Draw a circle of radius 3.5 cm. Mark a point P out side the circle at a distance of 6 cm from the centre. Construct two tangents from P to the given circle. Measure and write down the length of one tangent. [3]
- (b) Two vertices of a triangle are (3, -5) and (-7, 4). find the third vertex given that the centroid is (2, -1) [3]
- (c) $A=\{x: 11x-5>7x+3, x \in \mathbb{R}\}$ and $B=\{x: 18x-9 \geq 15+12x, x \in \mathbb{R}\}$.
Find the range of set $A \cap B$ and represent it on a number line. [4]
- Q.7. (a) Find the value of a , if $(x - a)$ is a factor of $x^3 - ax^2 + x + 2$ [3]
(b) Prove by section formula that the points (10, -6), (2,-6) (-4, -2) and (4, -2), taken in this order, are the vertices of a parallelogram. [3]
(c) Vivek invests ₹ 4500 in 8%, ₹ 10 shares at ₹ 15. He sells the shares when the price rises to ₹ 30 and invests the proceeds in 12% ₹ 100 shares at ₹ 125 . Calculate : [4]
(i) the sale proceeds (ii) the number of ₹ 125 shares he buys
(iii) the change in his annual income from dividend.
- Q.8. a) A box contains 150 apples. If one apple is taken out from the box at random and the probability of its being rotten is 0.06, then find the number of good apples in the box. [3]
(b) Haneef has a cumulative bank account and deposits ₹600 per month for a period of 4 years. If he gets ₹ 5880 as interest at the time of maturity, find the rate of interest. [3]
(c) Draw a regular hexagon of side 4cm and construct its incircle. [4]
- Q.9. (a) $P'(-4, -3)$ is the image of a point P under reflection in the origin, find : [3]
(i) the co-ordinates of P.
(ii) the co-ordinates of the image of P under reflection in the line $y= - 2$.
(b) The polynomials $ax^3 - 7x^2+7x - 2$ and $x^3 - 2ax^2+8x - 8$ when divided by $(x-2)$ leave the same remainder. Find the value of a . [3]
(c) Find the value of 'p' for which the lines $2x+3y - 7=0$ and $4y - px - 12 = 0$ are perpendicular to each other. [4]
- Q.10. (a) Determine the ratio in which the line $2x+y-4=0$ divides the line segment joining the points A(2, -2) and B(3, 7). [3]
(b) In $\triangle ABC$ given that A(7, -3), B(5, 3) and C(3, -1), find the equation of line passing through A which is parallel to BC. [3]
(c) Construct a triangle ABC with $AB=3.5\text{ cm}$, $BC=5\text{ cm}$ and $\angle ABC=120^\circ$. Construct an isosceles $\triangle PBC$ in which $PB=PC$ and equal in area to $\triangle ABC$. [4]
- Q.11. (a) Two different dice are thrown simultaneously. What is the probability that the sum of two numbers appearing on the top of dice is : [3]
(i) 8 (ii) at least 10 (iii) less than or equal to 12 ?
(b) Find the equation of the perpendicular from the point P(-1, -2) on the line $3x+4y-12=0$ [3]
(c) If $(x-2)$ is a factor of $2x^3-x^2-px-2$, then : (i) find the value of p
(ii) with this value of p, factorise the above expression completely. [4]

#####