

MODEL TEST PAPER 13

Time Allowed : 2½ hours

General Instructions : Same as in MTP-1.

Max. Marks : 80

SECTION A (40 Marks)

(Attempt all questions from this Section)

1. (a) ABCD is a cyclic quadrilateral in which $\angle ACB = 44^\circ$ and $\angle BDC = 56^\circ$. Find $\angle ABC$. [3]

(b) Show that the progression $6, 5\frac{1}{2}, 5, 4\frac{1}{2}, 4, \dots$ is an AP. Also, find its common difference. [3]

(c) A shopkeeper buys an almirah at a discount of 20% from the wholesaler, the printed price of the almirah being ₹ 6,000 and the rate of sales tax is 8%. The shopkeeper sells it to the buyer at the printed price and charges sales tax at the same rate. Find :

(i) The price at which the almirah can be bought. [4]

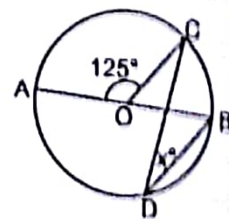
(ii) The VAT paid by the shopkeeper.

2. (a) Piyush opened a Recurring Deposit Account and deposited ₹ 400 per month for 1 year. The bank paid him ₹ 4930 on maturity. Find the rate of interest paid by the bank. [4]

(b) The diameter of a sphere is 5 cm. Find the length of the edge of a cube which has the same surface as that of the sphere. [3]

(c) If $\frac{x}{b-c} = \frac{y}{c-a} = \frac{z}{a-b}$, then show that $ax + by + cz = 0$. [3]

3. (a) In the figure, O is the centre of the circle. Find the value of x . [3]



(b) Find the mean of the following data :

Variate (x)	20	30	40	50	70
Frequency f	20	15	10	10	5

(c) Find the GP for which the sum of first two terms is -4 and the fifth term is 4 times the third term. [4]

4. (a) State with reason whether the following are true or false :

A, B, C are matrices of order 2×2 .

(i) $A \cdot B = B \cdot A$

(ii) $A \cdot (B \cdot C) = (A \cdot B) \cdot C$

(iii) $(A + B)^2 = A^2 + 2A \cdot B + B^2$ [3]

(b) Find the values of p and q if $q(x) = (x - 1)$ is a factor of $f(x) = x^3 + x^2 - px + q$ and $f(-1) = 18$. [3]

(c) Solve the inequality and graph the solution set on the number line :

$$2x - 5 \leq 5x + 4 < 11, x \in \mathbb{R}$$
[4]

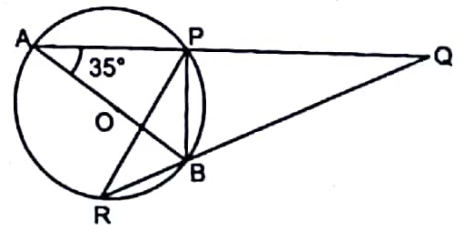
SECTION B (40 Marks)

(Attempt any four questions from this Section)

5. (a) A man has a choice to invest in 100 rupee shares of two firms at ₹ 120 each or at ₹ 132 each. The first firm pays a dividend of 5% per annum and the second firm pays a dividend of 6% per annum. How much more will his annual return be if he invests ₹ 26400 with the firm from which he gets a better return on his investment? [4]

- (b) Find the values of x , y , a and b when $\begin{bmatrix} x+y & a-b \\ a+b & 2x-3y \end{bmatrix} = \begin{bmatrix} 5 & 3 \\ -1 & -5 \end{bmatrix}$ [3]
- (c) Draw a circle of radius 2.4 cm. Take a point O outside it. Without using the centre, draw two tangents to the circle from O. [3]
6. (a) (i) Point P (a , b) is reflected in the x -axis to P' (5, -2). Write down the values of a and b .
(ii) P'' is the image of P when reflected in the y -axis. Write down the co-ordinates of P''.
(iii) Name a single transformation that maps P' to P''. [3]
- (b) In an auditorium seats were arranged in rows and columns. The number of rows was equal to the number of seats in each row. When the number of rows was doubled and the number of seats in each row was reduced by 10, the total number of seats was increased by 300. Find :
(i) the number of rows in the original arrangement.
(ii) the number of seats in the auditorium after rearrangement. [4]
- (c) A die is thrown once. Find the probability of getting a number less than 5. [3]
7. (a) The area of a triangle ABC is 25.6 cm^2 and XY drawn parallel to BC, cuts AB in the ratio 5 : 3. Find the area of the Δ AXY. [3]
- (b) Prove that the roots of equation $(p^2 + q^2) + 2(pr + qs)x + (r^2 + s^2) = 0$ are real and equal, if $ps = qr$. [4]
- (c) Two concentric circles are of radii 13 cm and 5 cm. Find the length of the chord of the outer circle which touches the inner circle. [3]
8. (a) The angles of depression of top and bottom of a building from the top of a tower are 35° and 60° respectively. If the height of the building is 20 m, find the height of the tower. [4]
- (b) Find the point which is equidistant from three given non-collinear points. Give the point a specific name. [3]
- (c) If the n th term of the AP 9, 7, 5, ... is same as the n th term of the 15, 12, 9, ..., find n . [3]
9. (a) The base radii of two cylinders are in the ratio 1 : 2 and their heights are in the ratio 3 : 2. Find the ratio of their curved surface areas. [4]
- (b) Write down the equation of the line whose gradient is $\frac{3}{2}$ and which passes through P, where P divides the line segment joining A (-2, 6) and B (3, -4) in the ratio of 2 : 3. [3]

- (c) In the figure, AB is a diameter. APQ and RBQ are straight lines. Find \angle BPR. [3]



10. (a) Calculate the co-ordinates of the point P which divides the line joining A (-3, 3) and B (2, -7) internally in the ratio 2 : 3. [4]
- (b) Using the data given below, construct the cumulative frequency table and draw the ogive. From the ogive determine the median.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of students	3	8	12	14	10	6	5	2

[6]

11. (a) A box contains 19 balls bearing numbers 1, 2, 3, ...19. A ball is drawn at random from the box. Find the probability that the number on the ball is :

(i) a prime number

(ii) divisible by 3 or 5.

[4]

(b) Prove that : $\frac{\sec \theta - 1}{\sec \theta + 1} = \left(\frac{\sec \theta}{1 + \cos \theta} \right)^2$

[3]

(c) Find the mean, mode and median of the following data.

9, 3, 3, 7, 4, 8, 12, 14, 10, 10, 10, 15

[3]