MODEL TEST PAPER 15

Time Allowed : 2½ hours *Max. Marks : 80*

General Instructions : Same as in MTP-1.

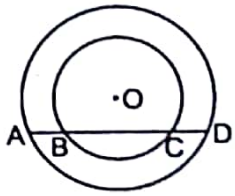
SECTION A (40 Marks)
(Attempt all questions from this Section)

1. (a) Manisha has a recurring deposit account in a bank for $3\frac{1}{2}$ years. If the bank pays the interest at the rate of 12% p.a. and Manisha gets ₹ 3061.82 on maturity, find the value of monthly instalment. [3]

(b) A spherical metallic ball of radius 3 cm is melted and recast into three spherical balls. The radii of two of these balls are 2.5 cm and 2 cm respectively. Find the radius of the third ball. [4]

(c) Show that the sequence $a_n = \frac{5}{7^n}$ is a GP. Also, find its common ratio. [3]

2. (a) In the figure, O is the centre of two concentric circles and AD is a chord of larger circle. Prove that AB = CD. [4]



(b) Find the mean of the following distribution.

x	5	6	7	8	9
f	3	7	5	9	1

[3]

(c) What is the probability that an ordinary year has 53 Sundays? [3]

3. (a) Solve the following inequation and represent the solution set on the number line :

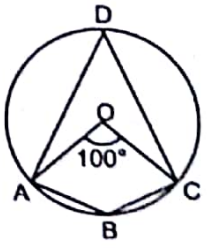
$$-\frac{2}{3} < 1 + \frac{x}{3} \leq \frac{2}{3},\ x \in R$$ [4]

(b) Determine the value of k such that $(x - 2)$ is a factor of the polynomial $x^3 + kx^2 - 5x - 6$. [3]

(c) Solve for x, y and z if $\begin{bmatrix} x & y-1 \\ 0 & 2-z \end{bmatrix} - 3\begin{bmatrix} x-1 & 3-y \\ 0 & z-1 \end{bmatrix} = 4\begin{bmatrix} 2x & 5y \\ 0 & 2z-1 \end{bmatrix}$. [3]

4. (a) Two numbers are in the ratio of 3 : 5. If 8 is added to each number, the ratio becomes 2 : 3. Find the numbers. [3]

(b) In figure, O is the centre of the circle and $\angle AOC = 100°$. Calculate $\angle ADC$ and $\angle ABC$. [4]



(c) Find the 19th term from the end of the AP 2, 6, 10, 14, ... 86. [3]

SECTION B (40 Marks)
(Attempt any four questions from this Section)

5. (a) A man sold 400 ₹ 20 shares paying 5% at ₹ 18 and invested the proceeds in ₹ 10 shares, paying 7% at ₹ 12. How many ₹ 10 shares did he buy and what was the change of income? [3]

(b) Construct a regular hexagon of side 2.8 cm. Circumscribe a circle to it. [4]

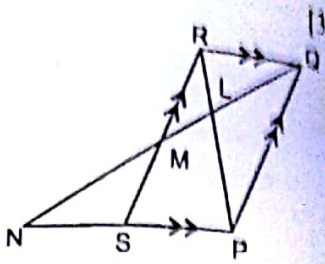
(c) If $A = \begin{bmatrix} 3 & 2 \\ -1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 14 & 3 \\ 2 & 4 \end{bmatrix}$, find a matrix C such that AC = B. [3]

6. (a) A triangle with vertices A(1, 2), B(4, 4) and C(3, 7) is first reflected in the line $y = 0$ onto $\Delta A'B'C'$ and then $\Delta A'B'C'$ is reflected in the origin onto $\Delta A''B''C''$. Write down the co-ordinates of (i) A', B' and C' (ii) A'', B'' and C''. [3]

(b) Solve the following equation using quadratic formula : $6x^2 + (12 - 8a)\,x - 16a = 0$ [4]

(c) Show that the equation $2x^2 - 5x + 7 = 0$ has no real roots. [3]

7. (a) In the figure, PQRS is a parallelogram. PQ = 16 cm, QR = 10 cm. L is a point on PR such that RL : LP = 2 : 3. QL produced meets RS at M and PS produced at N.



(i) Prove that $\Delta RLQ \sim \Delta PLN$ and find PN.

(ii) Name a triangle similar to ΔRLM. [4]

(b) Three unbiased coins are tossed simultaneously. Find the probability of getting exactly 2 heads [3]

(c) A shopkeeper buys an article at a discount of 10% from the wholesaler, the printed price of the article being ₹ 20,000 and the rate of sales tax is 8%. The shopkeeper sells it to the customer at the printed price and charges tax at the same rate. Find :

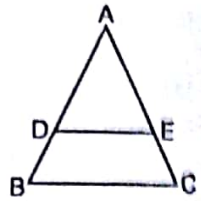
(i) the price at which the article can be bought.

(ii) The VAT paid by the shopkeeper. [3]

8. (a) The angle of elevation of an aeroplane from a point P on the ground is 60°. After a flight of 15 seconds, the angle of elevation changes to 30°. If the aeroplane is flying at a constant height of $1500\sqrt{3}$ m, find the speed of the aeroplane. [4]

(b) Draw a circle of radius 3.5 cm and mark two chords AB and AC of the circle. Construct the locus of points inside the circle that are equadistant from AB and AC. [3]

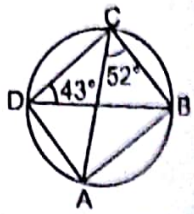
(c) In the figure, AD = 5.6 cm, AB = 8.4 cm, AE = 3.8 cm and AC = 5.7 cm. Show that DE || BC. [3]



9. (a) Water is flowing at the rate of 3 km/h through a circular pipe of 20 cm internal diameter into a circular cistern of diameter 10 m and depth 2 m. In how much time will the cistern be filled? [4]

(b) Show that y-axis bisects the line segment joining A (–5, 7) and B (5, 2). [3]

(c) In the figure, $\angle ACB = 52°$ and $\angle BDC = 43°$.
Calculate : (i) $\angle ADB$ (ii) $\angle BAC$ (iii) $\angle ABC$ [3]



10. (a) Find the equation of the line parallel to $2x + 5y - 9 = 0$ and passing through the mid-point of the line segment joining A (2, 7) and B (–4, 1). [4]

(b) Use graph paper for this question.

The following table shows the weight in gm of a sample of 100 potatoes taken from a large consignment.

Weight (in gm)	50-60	60-70	70-80	80-90	90-100	100-110	110-120	120-130
Frequency	8	10	12	16	18	14	12	10

(i) Calculate the cumulative frequencies.

(ii) Draw the cumulative frequency curve and from it determine the median weight of the potatoes. [6]

11. (a) Prove that : $\dfrac{\cos\theta}{\text{cosec}\,\theta + 1} + \dfrac{\cos\theta}{\text{cosec}\,\theta - 1} = 2\tan\theta$ [3]

(b) How many terms of the AP 17, 15, 13, 11, ... must be added to get the sum 72? Explain the double answer. [4]

(c) A (2, –4), B(3, 3) and C(–1, 5) are the vertices of ΔABC. Find the equation of the altitude of the triangle through C. [4]