Mathematics – Mock Test Paper

**Time Allowed : 2 ½ hours**   **Max. Marks : 80**

General Instructions :

Attempt all questions from **Section A** and any **four** questions from **Section B.**
**All working, including rough work, must be clearly shown and must be done on the same
sheet as the rest of the answer**. Omission of essential working will result in the loss of marks.
Mathematical tables are provided.

Section A (40 Marks)
Attempt **all** questions from this section

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1. (a) Without using trigonometrical tables, prove that $\sin 37° \cos 53° + \cos 37° \sin 53° = 1$.   [3]

    (b) AB and CD are two chords of a circle intersecting at a point P outside the circle when produced, such that PA = 16 cm, PC = 10 cm and PD = 8 cm. Find AB.   [4]

    (c) Find the mean proportional between $\left(7 + \sqrt{3}\right)$ and $\left(7 - \sqrt{3}\right)$.   [3]

2. (a) Solve $7 \le 4x + 2 \le 12$, $x \in R$. Graph the solution set on the number line.   [4]

    (b) The common factor of $2x^2 + 5x + k$ and $2x^2 + 3x + l$ is $(2x - 1)$. Find the values of k and l.   [3]

    (c) If $A = \begin{bmatrix} ab & b^2 \\ -a^2 & -ab \end{bmatrix}$, show that $A^2 = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$.   [3]

3. (a) Show that the opposite angles of a cyclic quadrilateral are supplementary.   [4]

    (b) The marks of 20 students in a test were as follows :

        10, 15, 14, 11, 10, 8, 10, 6, 18, 19, 16, 14, 10, 3, 4, 20, 3, 10, 16, 10

    Find : (i) the mean   (ii) the median   (iii) the mode.   [3]

    (c) In the figure, part of a geometrical figure is given. Complete the figure so that the resulting figure is symmetrical about both the x-axis and the y-axis.   [3]
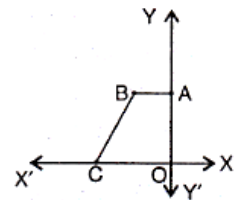
4. (a) Mr. Sagar's savings bank account passbook entries are as follows :

Date	Particulars	Withdrawn (Rs)	Deposited (Rs)	Balance (Rs)
April 1, 2003	B/F	—	—	4175
May 5, 2003	To cheque	835	—	3340
May 15, 2003	By clearing	—	1550	4890
July 6, 2003	To cheque	750	—	4140
August 4, 2003	By cash	—	2300	6440
Sept. 6, 2003	To cheque	500	—	5940

Calculate the interest on minimum balance on or after 10th day of the month from April to September at $4\frac{1}{2}\%$ p.a.   [4]

    (b) Draw a circle of radius 2.5 cm. Draw two tangents to it inclined at an angle of 45° to each other.   [3]

    (c) Find the volume of a solid in the form of a right circular cylinder with hemispherical ends whose extreme length is 22 cm and diameter 3 cm.   [3]

Section B (40 Marks)

Attempt **any four** questions from this section

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5. (a) Angle of elevation of a cloud from a point 20 m above the surface of a lake is 30°. Angle of depression of the reflection of the cloud in the lake from the same point is 60°. Calculate the height of the cloud above the lake. [4]

  (b) Draw two intersecting lines AB and CD. Find the position of the point which is 2 cm away from AB and 1.8 cm away from CD. [3]

  (c) In how many years a sum of Rs 6400 compounded quarterly at the rate of 5% p.a. will amount to Rs 6561? [3]
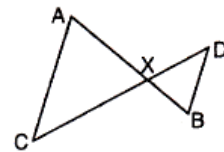
6. (a) Two unbiased coins are tossed simultaneously. Find the probability of getting :

   (i) two heads   (ii) one head   (iii) at least one head

[4]

  (b) In the figure, AX = 2BX and CX = 2XD.
   Prove that :
     (i) ΔAXC and ΔBXD are similar
     (ii) AC ∥ DB [3]

  (c) A manufacturer sold a dininning table to a dealer for Rs 8000. The dealer sold it to the shopkeeper at a profit of Rs 2000. The shopkeeper sold it to the consumer at a profit of Rs 3000. Find (i) the total VAT received by the government at 8% (ii) the amount paid by the consumer inclusive of sales tax. [3]

7. (a) Construct a ΔABC in which AB = AC = 3 cm and BC = 2 cm. Using a ruler and compasses only, draw the reflection A'BC of ΔABC in BC. Draw the lines of symmetry of the figure AB'AC. [3]

  (b) Using the quadratic formula, solve : $\dfrac{x-1}{x-2} + \dfrac{x-2}{x-3} = 4$. [4]

  (c) If A = $\begin{bmatrix} 4 & -5 \\ 3 & 2 \end{bmatrix}$ and B = $\begin{bmatrix} 2 & -3 \\ -1 & 4 \end{bmatrix}$, find 6A − 3B. [3]

8. (a) Neha invests in 12% Rs 25 shares of a company quoted at Rs 36. Her income from this investment is Rs 720. Calculate :
   (i) the total amount of money invested by her in these shares.
   (ii) the number of shares bought by her.
   (iii) % return on her investment. [4]
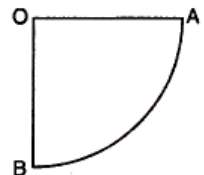
  (b) In the figure, P is a point on AB such that
   AP : PB = 4 : 3 and PQ ∥ AC. Calculate the ratio of PQ : AC. [3]

  (c) In what ratio does the point (−3, 7) divide the join of A(−5, 11) and B (4, − 7)? [3]
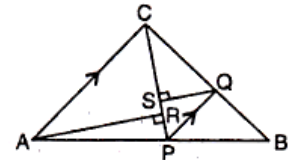
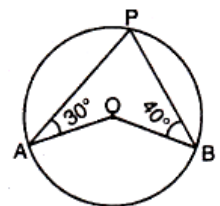9. (a) The area of the quadrant OAB of a circle is $9\dfrac{5}{8}$ cm². Calculate :

   (i) OA   (ii) the perimeter of the quadrant. [4]

  (b) Find the equation of a line that passes through (1, 3) and is parallel to the line $y = -2x + 4$. [3]

  (c) In the figure, O is the centre of the circle. If ∠PAO = 30° and ∠PBO = 40°, find : (i) ∠APB (ii) ∠AOB. [3]

10. (a) Find the value of m such that the lines $3xm + 3y = 5$ and $y = 1 - 2x$ are perpendicular to each other. [4]

(b) Draw an ogive for the following distribution and hence estimate the median.

Marks	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	6	7	9	10	8	7	3

[6]

11. (a) Show that the equation $x^2 + 2px - 3 = 0$ has real and distinct roots for all values of p. [3]

(b) Prove that : $\dfrac{1}{1-\sin\theta} + \dfrac{1}{1+\sin\theta} = 2\sec^2\theta$. [3]

(c) From the following frequency distribution, find mean, mode and median.

Variate	10	11	13	15	18	20	24
Frequency	4	3	7	1	5	2	3

[4]