

## MATHEMATICS

(Two hours and a half)

*Answers 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 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 loss of marks.*

*The intended marks for questions or parts of questions are given in brackets [ ].*

*Mathematical tables are provided.*

### SECTION A (40 Marks)

*Attempt all questions from this Section.*

#### Question 1

(a) Ranbir borrows ₹ 20,000 at 12% per annum compound interest. If he repays ₹ 8400 at the end of the first year and ₹ 9680 at the end of the second year, find the amount of loan outstanding at the beginning of the third year. [

(b) Find the values of  $x$ , which satisfy the inequation  $-2\frac{5}{6} < \frac{1}{2} - \frac{2x}{3} \leq 2$ ,  $x \in W$ . Graph the solution set on the number line. [

(c) A die has 6 faces marked by the given numbers as shown below:

1	2	3	-1	-2	-3
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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. |

**This paper consists of 7 printed pages and 1 blank page.**

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### Question 2

(a) Find  $x, y$  if  $\begin{bmatrix} -2 & 0 \\ 3 & 1 \end{bmatrix} \begin{bmatrix} -1 \\ 2x \end{bmatrix} + 3 \begin{bmatrix} -2 \\ 1 \end{bmatrix} = 2 \begin{bmatrix} y \\ 3 \end{bmatrix}$ .

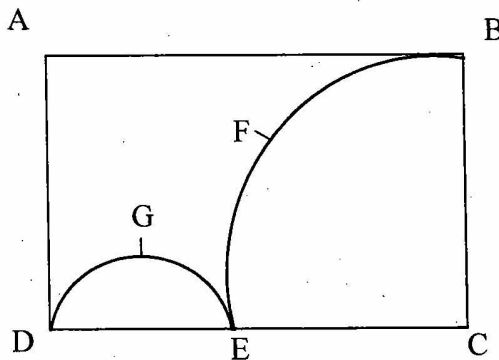
- (b) Shahrukh opened a Recurring Deposit Account in a bank and deposited ₹800 per month for  $1\frac{1}{2}$  years. If he received ₹15,084 at the time of maturity, find the rate of interest per annum.



- (c) Calculate the ratio in which the line joining A(-4, 2) and B(3, 6) is divided by point P(x, 3). Also find (i) x (ii) Length of AP.

### Question 3

- (a) Without using trigonometric tables, evaluate  $\sin^2 34^\circ + \sin^2 56^\circ + 2 \tan 18^\circ \tan 72^\circ - \cot^2 30^\circ$ .
- (b) Using the Remainder and Factor Theorem, factorise the following polynomial:  $x^3 + 10x^2 - 37x + 26$ .
- (c) In the figure given below, ABCD is a rectangle. AB = 14cm, BC = 7cm. From the rectangle, a quarter circle BFEC and a semicircle DGE are removed. Calculate the area of the remaining piece of the rectangle. (Take  $\pi = 22/7$ )

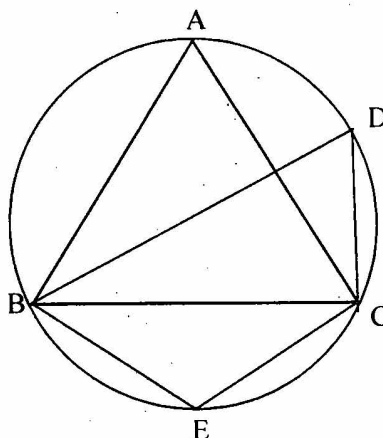


### Question 4

- (a) The numbers 6, 8, 10, 12, 13, and  $x$  are arranged in an ascending order. If the mean of the observations is equal to the median, find the value of  $x$ .

(b) In the figure,  $\angle DBC = 58^\circ$ . BD is a diameter of the circle. Calculate:

- (i)  $\angle BDC$
- (ii)  $\angle BEC$
- (iii)  $\angle BAC$



(c) Use graph paper to answer the following questions. (Take 2cm = 1 unit on both axis)

- (i) Plot the points A(-4, 2) and B(2, 4).
- (ii) A' is the image of A when reflected in the y-axis. Plot it on the graph paper and write the coordinates of A'.
- (iii) B' is the image of B when reflected in the line AA'. Write the coordinates of B'.
- (iv) Write the geometric name of the figure ABA'B'.
- (v) Name a line of symmetry of the figure formed.

### SECTION B (40 Marks)

*Attempt any four questions from this Section*

#### Question 5

- (a) A shopkeeper bought a washing machine at a discount of 20% from a wholesaler, the printed price of the washing machine being ₹18,000. The shopkeeper sells it to a consumer at a discount of 10% on the printed price. If the rate of sales tax is 8%, find:
- (i) the VAT paid by the shopkeeper.
  - (ii) the total amount that the consumer pays for the washing machine.

(b) If  $\frac{x^2 + y^2}{x^2 - y^2} = \frac{17}{8}$ , then find the value of:

(i)  $x : y$

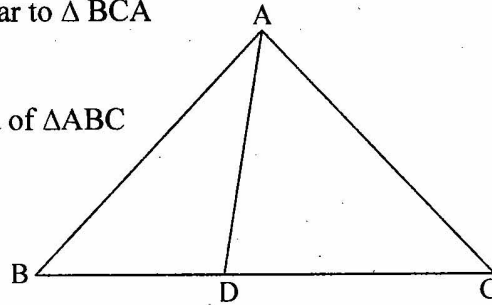
(ii)  $\frac{x^3 + y^3}{x^3 - y^3}$

(c) In  $\triangle ABC$ ,  $\angle ABC = \angle DAC$ .  $AB = 8\text{cm}$ ,  $AC = 4\text{cm}$ ,  $AD = 5\text{cm}$ .

(i) Prove that  $\triangle ACD$  is similar to  $\triangle BCA$

(ii) Find  $BC$  and  $CD$

(iii) Find area of  $\triangle ACD$  : area of  $\triangle ABC$



### Question 6

(a) Find the value of 'a' for which the following points  $A(a, 3)$ ,  $B(2, 1)$  and  $C(5, a)$  are collinear. Hence find the equation of the line.

(b) Salman invests a sum of money in ₹ 50 shares, paying 15% dividend quoted at 20% premium. If his annual dividend is ₹ 600, calculate:

(i) the number of shares he bought.

(ii) his total investment.

(iii) the rate of return on his investment.

(c) The surface area of a solid metallic sphere is  $2464\text{ cm}^2$ . It is melted and recast into solid right circular cones of radius 3.5cm and height 7cm. Calculate:

(i) the radius of the sphere.

(ii) the number of cones recast. (Take  $\pi = 22/7$ )

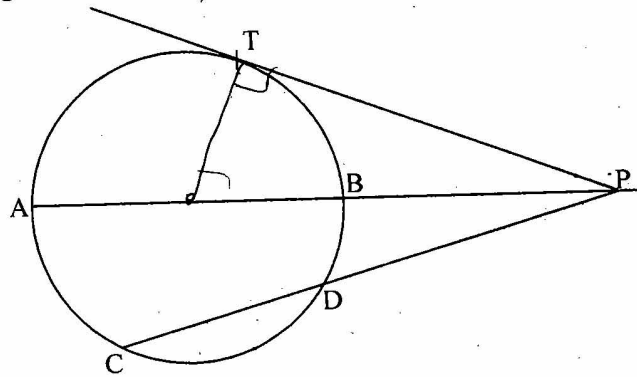
### Question 7

(a) Calculate the mean of the distribution given below using the short cut method.

Marks	11-20	21-30	31-40	41-50	51-60	61-70	71-80
No. of students	2	6	10	12	19	17	4

- (b) In the figure given below, diameter AB and chord CD of a circle meet at P. PT is a tangent to the circle at T. CD = 7.8cm, PD = 5cm, PB = 4cm. Find:

- (i) AB.  
(ii) the length of tangent PT.



[3]

(c) Let  $A = \begin{bmatrix} 2 & 1 \\ 0 & -2 \end{bmatrix}$ ,  $B = \begin{bmatrix} 4 & 1 \\ -3 & -2 \end{bmatrix}$  and  $C = \begin{bmatrix} -3 & 2 \\ -1 & 4 \end{bmatrix}$ .

Find  $A^2 + AC - 5B$ .

[4]

### Question 8

- (a) The compound interest, calculated yearly, on a certain sum of money for the second year is ₹1320 and for the third year is ₹1452. Calculate the rate of interest and the original sum of money. [3]
- (b) Construct a  $\Delta ABC$  with  $BC = 6.5$  cm,  $AB = 5.5$  cm,  $AC = 5$  cm. Construct the incircle of the triangle. Measure and record the radius of the incircle. [3]
- (c) (Use a graph paper for this question.) The daily pocket expenses of 200 students in a school are given below:

Pocket expenses (in ₹)	Number of students (frequency)
0 - 5	10
5 - 10	14
10 - 15	28
15 - 20	42
20 - 25	50
25 - 30	30
30 - 35	14
35 - 40	12



Draw a histogram representing the above distribution and estimate the mode from the graph.

**Question 9**

- (a) If  $(x - 9) : (3x + 6)$  is the duplicate ratio of  $4 : 9$ , find the value of  $x$ .
- (b) Solve for  $x$  using the quadratic formula. Write your answer correct to two significant figures.  $(x - 1)^2 - 3x + 4 = 0$ .
- (c) A page from the savings bank account of Priyanka is given below:

Date	Particulars	Amount withdrawn (₹)	Amount deposited (₹)	Balance (₹)
03/04/2006	B/F			4000.00
05/04/2006	By cash		2000.00	6000.00
18/04/2006	By cheque		6000.00	12000.00
25/05/2006	To cheque	5000.00		7000.00
30/05/2006	By cash		3000.00	10000.00
20/07/2006	By self	4000.00		6000.00
10/09/2006	By cash		2000.00	8000.00
19/09/2006	To cheque	1000.00		7000.00

If the interest earned by Priyanka for the period ending September, 2006 is ₹ 175, find the rate of interest.

**Question 10**

- (a) A two digit positive number is such that the product of its digits is 6. If 9 is added to the number, the digits interchange their places. Find the number.
- (b) The marks obtained by 100 students in a Mathematics test are given below:

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No of students	3	7	12	17	23	14	9	6	5	0

Draw an ogive for the given distribution on a graph sheet.

Use a scale of 2cm = 10 units on both axis).

Use the ogive to estimate the:

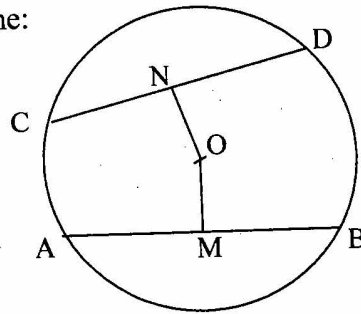
- (i) median.
- (ii) lower quartile.
- (iii) number of students who obtained more than 85% marks in the test.
- (iv) number of students who did not pass in the test if the pass percentage was 35.

[6]

**Question 11**

- (a) In the figure given below, O is the centre of the circle. AB and CD are two chords of the circle. OM is perpendicular to AB and ON is perpendicular to CD. AB = 24cm, OM = 5cm, ON = 12cm. Find the:

- (i) radius of the circle.
- (ii) length of chord CD.



[3]

- (b) Prove the identity

$$(\sin \theta + \cos \theta) (\tan \theta + \cot \theta) = \sec \theta + \operatorname{cosec} \theta.$$

[3]

- (c) An aeroplane at an altitude of 250 m observes the angle of depression of two boats on the opposite banks of a river to be  $45^\circ$  and  $60^\circ$  respectively. Find the width of the river. Write the answer correct to the nearest whole number.

[4]



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