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Time : 2½ Hours

MATHEMATICS (E)

Subject Code

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Total No. of Questions : 8

(Printed Pages : 12)

Maximum Marks : 80

- INSTRUCTIONS :**
- (i) Answer each main question on a fresh page.
 - (ii) All questions are compulsory.
 - (iii) The question paper consists of eight questions, each of **10** marks.
 - (iv) There is no overall choice. However, internal choice has been provided in *three* questions of *three* marks each.
 - (v) In questions on constructions, the drawing should be clear and exactly as per the given measurements. The construction lines and arcs should also be maintained.
 - (vi) The last page of the main answer booklet is the graph page.
 - (vii) Use of calculator and Mathematical tables is not permitted.

1. (A) Select and write the most appropriate alternative from those given below : [1]

If the sum and the product of the zeroes of a quadratic polynomial in x are 2 and -6 , then the quadratic polynomial is

- (a) $x^2 + 2x + 6$
- (b) $x^2 - 2x - 6$
- (c) $x^2 - 2x + 6$
- (d) $x^2 + 2x - 6$

(B) Attempt the following : [2]

(i) The HCF and LCM of the two numbers are 9 and 90 respectively.

If one number is 18, find the other number.

(ii) What is the exponent of 2 in the prime factorisation of 864 ?

(C) Assuming that $\sqrt{5}$ is an irrational number,

Prove that : $3\sqrt{5} - 2$ is also an irrational number. [3]

(D) Find the other two zeroes of the polynomial

$3x^4 - 23x^3 + 62x^2 - 68x + 24$, if two of its zeroes are 2 and 3. [4]

2. (A) Select and write the most appropriate alternative from those given below : [1]

The pair of linear equations $x + 2y = 5$ and $3x + ky + 15 = 0$ have no solution. Therefore the value of k is

(a) 6

(b) 5

(c) $\frac{1}{5}$

(d) $\frac{1}{6}$

(B) A two digit number when divided by sum of its digits, the quotient is 7. If 27 is subtracted from the number then its digits are reversed. Write down two equations in x and y to represent the above statements. [2]

(C) Find the solution of ANY ONE of the following pair of linear equations : [3]

(i) $5x + 8y = 9$ and $2x + 3y = 4$ (by elimination method)

(ii) $2x + 3y = 17$ and $3x - 2y = 6$ (by cross multiplication method)

(D) Find the solution of the following pair of linear equations graphically : [4]

$$2x - y = 4 \text{ and}$$

$$2y + x = 7$$

Rewrite and complete the following tables :

$$2x - y = 4$$

x			
y			

$$2y + x = 7$$

x			
y			

(Plot at least 3 points for each line using a graph paper.)

3. (A) Select and write the most appropriate alternative from those given

below : [1]

A die is thrown once, therefore the probability of getting a number

less than 7 on its top face is

(a) 0

(b) $\frac{1}{3}$

(c) $\frac{1}{2}$

(d) 1

(B) A bag contains cards which are numbered from 2 to 90. One card is drawn at random from the bag. Find the probability that it bears : [2]

(i) a two digit number

(ii) a square number

(C) Find the roots of ANY ONE of the following quadratic equations : [3]

(i) $9x^2 - 22x + 8 = 0$ (By factorisation method)

(ii) $2x^2 + 9x + 5 = 0$ (By completing the square method)

(D) A trader bought a certain number of articles for ₹ 700. Three articles were found damaged. He sold each of the remaining articles at ₹ 5 more than what he paid for it. He got a profit of ₹ 50 on the whole transaction. Find the number of articles he bought. [4]

4. (A) Select and write the most appropriate alternative from those given below : [1]

If the n th term of the AP : 3, 7, 11, 15 is 79, then the value of $n = \dots\dots\dots$

(a) 10

(b) 15

(c) 20

(d) 25

(B) Find the mode of the following distribution of marks obtained by 80 students in a Mathematics test : [2]

Marks Obtained	Number of Students
0—10	6
10—20	8
20—30	12
30—40	32
40—50	22

(Write your answer correct to two places of decimal)

- (C) A farmer repays his loan of ₹ 1,18,000 by paying every month starting with the first installment of ₹ 1,000. If he increases the installment by ₹ 100 every month, find the amount paid by him in 30 installments. What loan does he still have to pay after the 30th installment ? [3]
- (D) The following table shows the daily income of 55 people in a village : [4]

Daily Income ₹ (C.I.)	No. of People (f_i)	Class Mark (x_i)	Deviation $d_i = x_i - a$	$f_i \times d_i$
0—50	5	—	—	—
50—100	10	—	—	—
100—150	15	—	—	—
150—200	12	—	—	—
200—250	8	—	—	—
250—300	5	—	—	—
Total	$\Sigma f_i = 55$			$\Sigma f_i d_i = \text{—}$

Taking class-mark (denoted by a) of the class interval 100–150 as the “Assumed mean”, rewrite and complete the table. Also find the mean of daily income by the assumed mean method.

(Write your answer correct to one place of decimal)

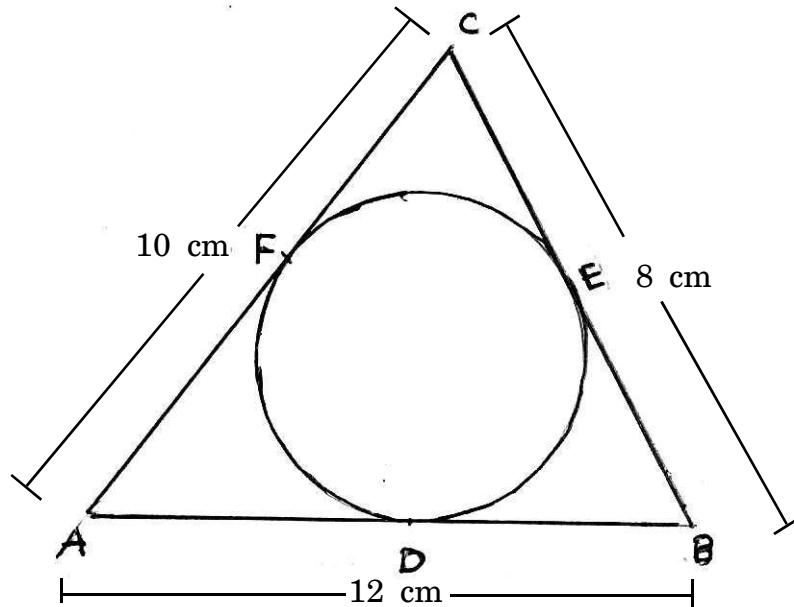
5. (A) Select and write the most appropriate alternative from those given below : [1]

From a point P, 10 cm away from the centre of a circle, a tangent PT of length 8 cm is drawn. Therefore, the radius of the circle is

- (a) 4 cm
- (b) 5 cm
- (c) 6 cm
- (d) 7 cm

- (B) In the adjoining figure, a circle inscribed in a triangle ABC touches its sides AB, BC and AC at points D, E and F respectively. If $AB = 12$ cm, $BC = 8$ cm and $AC = 10$ cm.

Then find the length of AD, BE and CF. [3]



(C) Draw a circle with centre O and radius 3.2 cm. Take a point P at a distance of 7.5 cm from the centre of the circle. Using a pair of compasses and ruler construct two tangents PX and PY to the circle. Measure and state the length of each tangent segment. [3]

(D) Using pair of compasses and ruler, construct ΔPQR with sides $PQ = 6.5$ cm, $QR = 7$ cm and $PR = 6$ cm. Then construct $\Delta P'QR'$ whose sides are $\frac{4}{3}$ of the corresponding sides of ΔPQR . [3]

6. (A) Select and write the most appropriate alternative from those given below : [1]

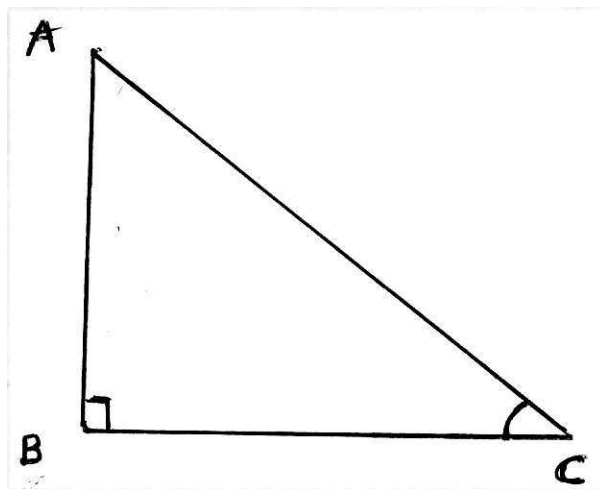
If $\sin (A - B) = \frac{1}{2}$ and $\cos (A + B) = \frac{1}{2}$, then A and B are respectively

- (a) $45^\circ, 15^\circ$ (b) $15^\circ, 45^\circ$ (c) $30^\circ, 60^\circ$ (d) $60^\circ, 30^\circ$

(B) Attempt ANY ONE of the following : [3]

(i) In ΔABC , $\angle B = 90^\circ$ and $\tan C = \frac{5}{12}$.

Find the value of : $\frac{\cos C + \sin C}{\sin C}$.



- (ii) Evaluate the following expression using known numerical values of trigonometric ratios :

$$\frac{\cos 30^\circ + \sin 60^\circ}{1 + \cos 60^\circ + \sin 30^\circ}$$

- (C) Prove the following identity : [2]

$$\sec^2 \theta - \left[\frac{\sin^2 \theta - 2 \sin^4 \theta}{2 \cos^4 \theta - \cos^2 \theta} \right] = 1.$$

- (D) Attempt the following :

- (i) Find the distance between the points A(-3, -14) and B(3, -6). [2]
 (ii) Find the value of m if the points D(3, 7), E(-1, 2) and F(-5, m) are collinear. [2]

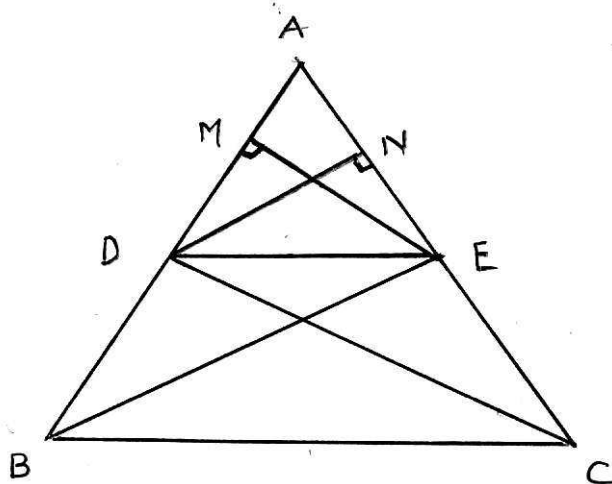
7. (A) Select and write the most appropriate alternative from those given below : [1]

$\Delta ABC \sim \Delta DEF$ and their areas are 64 cm^2 and 49 cm^2 respectively. If $AB = 5.6 \text{ cm}$ then $DE = \dots\dots\dots$

- (a) 63 cm (b) 49 cm (c) 6.3 cm (d) 4.9 cm

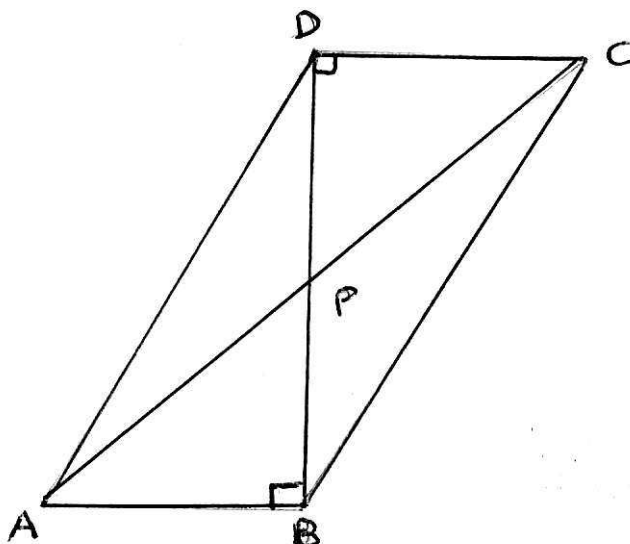
- (B) Given : In ΔABC , $DE \parallel BC$ where the points D and E lie on AB and AC respectively, $EM \perp AB$ and $DN \perp AC$: [3]

Prove that : $\frac{AD}{DB} = \frac{AE}{EC}$

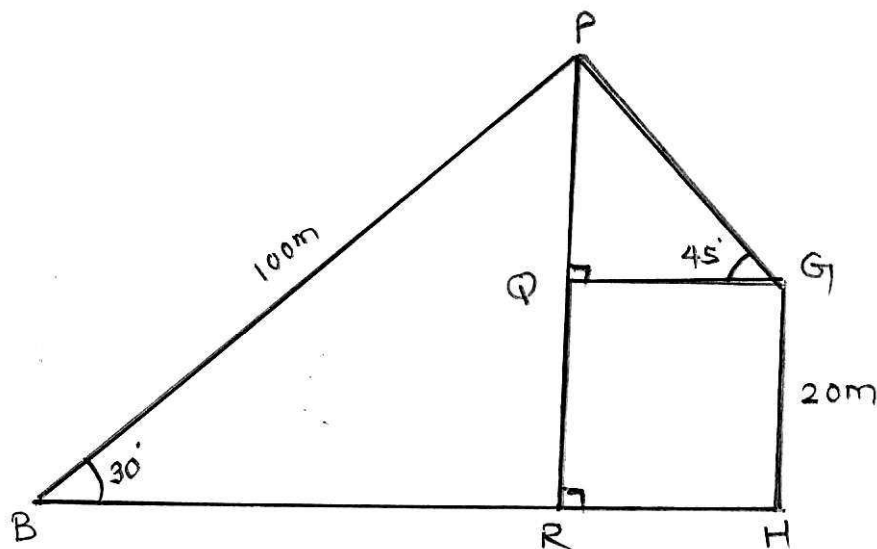


- (C) In the adjoining figure, smaller diagonal BD of a parallelogram ABCD is perpendicular to the sides AB and CD. P is the point of intersection of the two diagonals. Prove that : [3]

$$3AB^2 = AC^2 - BC^2$$



- (D)



A boy standing on a horizontal plane at B, watches the top of the flag post 'PR' at a distance of 100 m from him at an angle of elevation of 30° as shown in the figure. A girl standing at G on the roof of 20 m high building 'GH', finds the angle of elevation of the top of the same flag post to be 45° . Both the boy and the girl are on the opposite sides of the flag post. Find the distance of the top of the flat post from the girl. (Take $\sqrt{2} = 1.41$) [3]

8. (A) Select and write the most appropriate alternative from those given below : [2]

(i) The area of a ring whose outer and inner radii are 5 cm and 2 cm respectively is

- (a) $3\pi \text{ cm}^2$
- (b) $7\pi \text{ cm}^2$
- (c) $21\pi \text{ cm}^2$
- (d) $66\pi \text{ cm}^2$

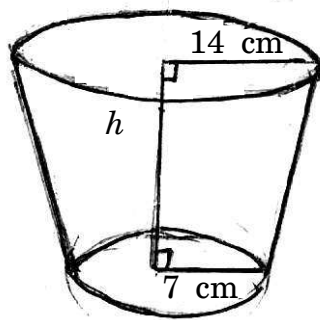
(ii) In a circle of a radius 12 cm, an arc subtends an angle of 60° at the centre. Therefore, the length of the arc is

- (a) $2\pi \text{ cm}$
- (b) $4\pi \text{ cm}$
- (c) $12\pi \text{ cm}$
- (d) $24\pi \text{ cm}$

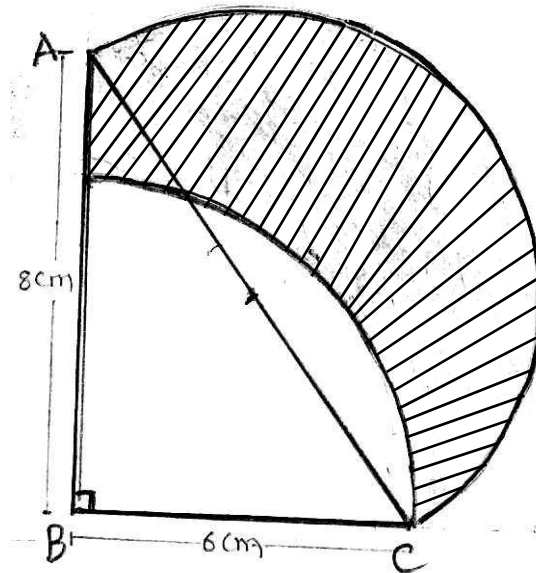
(B) A metal cup is in the form of a frustum of a cone whose radii of bottom and top are 7 cm and 14 cm respectively, as shown in the figure. If the capacity of the cup is 2156 cm^3 , find the height of the cup.

(Use $\pi = \frac{22}{7}$)

[2]



- (C) In the adjoining figure, ABC is a right triangle with $\angle B = 90^\circ$, $AB = 8$ cm and $CB = 6$ cm. With AC as a diameter a semicircle is drawn and with BC as radius a quadrant of a circle is drawn, as shown in the figure. Find the area of the shaded region. (Use $\pi = 3.14$) [3]



- (D) A house has an overhead cylindrical tank which is filled by pumping water from an underground cuboidal tank. The dimensions of the cuboidal tank are $2.5 \text{ m} \times 2 \text{ m} \times 1.5 \text{ m}$ and it is completely filled with water. The overhead tank which is empty, has a height of 2 m with radius of its base as 70 cm. If water is pumped to fill the overhead tank completely with water, find the height of the water left in the cuboidal tank. (Use $\pi = \frac{22}{7}$) [3]