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**Time : 3 Hours****MATHEMATICS REGULAR LEVEL 1 (E)****Subject Code**

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**Total No. of Questions : 42 (Printed Pages : 11)****Maximum Marks : 80**

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- INSTRUCTIONS :**
- (i) This question paper consists of **42** questions. All questions are compulsory.
  - (ii) This question paper is divided into four sections-A, B, C and D.
  - (iii) In Section A–Question Nos. **1** to **16** are multiple choice questions (MCQs) and Question Nos. **17** to **20** are very short answer type questions (VSA) of **1** mark each.
  - (iv) In Section B–Question Nos. **21** to **29** are short answer type-I (SA-I) questions carrying **2** marks each.
  - (v) In Section C–Question Nos. **30** to **39** are short answer type-II (SA-II) questions carrying **3** marks each.
  - (vi) In Section D–Question Nos. **40** to **42** are long answer (LA) questions carrying **4** marks each.
  - (vii) There is no overall choice. However an internal choice has been provided in *two* questions of **2** marks each in Section B and *two* questions of **3** marks each in Section C.
  - (viii) In questions on constructions, the drawing should be clear and exactly as per given measurements. The construction lines and arcs should also be maintained.
  - (ix) Graph page is provided on the answer booklet.
  - (x) Use of calculators and mathematical tables is not permitted.

## Section-A

Select and write the correct alternative from those given below each statement :

1. The HCF and LCM of two numbers is 3 and 216 respectively. If one of the number is 36, then the other number is : 1

- 3
- 18
- 36
- 648

2. The sum of the zeroes of the quadratic polynomial  $2x^2 - 8x - 6$  is : 1

- -4
- -3
- 3
- 4

3. The zeroes of the quadratic polynomial  $3x^2 - 15$  are : 1

- $\sqrt{5}, -\sqrt{5}$
- 5, -5
- $\sqrt{15}, -\sqrt{15}$
- 15, -15

4. If a pair of linear equations in two unknowns is consistent, then the lines representing the system will be : 1

- parallel
- always coincident
- always intersecting
- intersecting or coincident

5. The sum of the ages of two brothers 10 years back was  $x + y - 10$ . Therefore the sum of their present ages is : 1

- $x + y$
- $x + y + 10$
- $x + y + 20$
- $x + y + 30$

6. The thirteenth term of the Arithmetic Progression  $-104, -91, -78$  is : 1

- $-260$
- $-52$
- $52$
- $260$

7. In  $\triangle ABC$ , M and N are points on the sides AB and AC respectively such that  $MN \parallel BC$ . If  $AM = 6$  cm,  $MB = 8$  cm and  $AN = 9$  cm, then AC is equal to : 1

- 9 cm
- 12 cm
- 14 cm
- 21 cm

8. The value of  $\operatorname{cosec}^2 27^\circ - \tan^2 63^\circ$  is equal to : 1

- $-1$
- 0
- 1
- 90

9.  $\cos (x + 30)^\circ = \frac{1}{2}$ , then  $x$  is equal to : 1

- 0
- 15
- 30
- 60

10. If  $\operatorname{cosec} 3A = \sec (A + 30)^\circ$  where  $3A$  is an acute angle, then the value of  $\cos 2A$  is : 1

- $\frac{2}{\sqrt{3}}$
- $\frac{\sqrt{3}}{2}$
- $\frac{1}{\sqrt{2}}$
- $\frac{1}{2}$

11. Point P is 15 cm away from the centre of the circle of radius 5 cm. The length of the tangent segment drawn to the circle from point P is : 1

- $10\sqrt{2}$
- 20
- $\sqrt{250}$
- 200

12. Area of a sector of a circle of radius R and subtending an angle of  $30^\circ$  at the centre of the circle is : 1

- $\frac{\pi R}{6}$

- $\frac{\pi R^2}{12}$

- $\frac{\pi R^2}{6}$

- $\frac{\pi R^2}{3}$

13. The radii of the two bases of a frustum of a cone are 7 cm and 1 cm respectively and its perpendicular height is 8 cm. Therefore its slant height is : 1

- 6 cm

- 8 cm

- 10 cm

- 16 cm

14. The lateral surface area of a cube is  $100 \text{ cm}^2$ , then the volume of the cube is : 1

- $125 \text{ cm}^3$

- $400 \text{ cm}^3$

- $600 \text{ cm}^3$

- $1000 \text{ cm}^3$

15. The X coordinate of the point of intersection of the more than Ogive and less than Ogive gives the : 1

- Mean

- Median

- Mode

- Range

16. If the probability that it will rain on a particular day is 0.03, then the probability that it will not rain on that day is : 1

- 0.01

- 0.03

- 0.07

- 0.97

17. A piggy bank collection consisted of coins of Rs. 2 and Rs. 5. In all there were 77 coins totalling Rs. 220. Write a pair of linear equations in two variables  $x$  and  $y$  to represent the above information. 1
18. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at an angle of  $70^\circ$ , then find  $m \angle POA$ . 1
19. Find the perimeter of a quadrant of a circle of radius 7 cms.  $\left( \text{Take } \pi = \frac{22}{7} \right)$ . 1
20. A bag contains 8 black balls and some red balls. If the probability of drawing a red ball is  $\frac{1}{3}$ , then find the number of red balls. 1

### Section-B

21. Without performing actual division state whether the rational number  $\frac{27}{480}$  has a terminating decimal or a non-terminating decimal expansion. If it is a terminating decimal, then write its decimal expansion. 2
22. Two friends met together at a club. After how many days will they meet again if one of them visits the club after every 64 days and the other visits the club after every 72 days. 2
23. A vertically held stick 20 cm long casts a shadow 5 cm long on the ground. At the same time a tower casts a shadow of 7.5 meters on the ground. Draw an appropriate figure and find the height of the tower in meters. 2

24. A point R  $(-1, 2)$  divides the line segment joining the points P  $(2, 5)$  and Q  $(a, b)$  in the ratio  $3 : 4$ . Find  $a$  and  $b$ . 2

25. The coordinates of the vertices of  $\triangle ABC$  are A  $(4, 1)$ ; B  $(-3, 2)$  and C  $(0, K)$ . Given that the area of  $\triangle ABC$  is 12 sq units, find the value of 'K'. 2

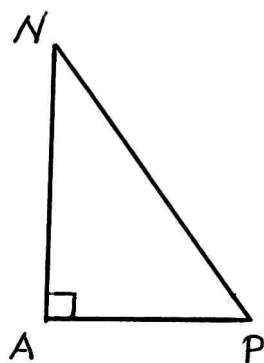
*Or*

If E  $(5, 2)$ ; F  $(4, 7)$  and G  $(7, -4)$  are the vertices of  $\triangle EFG$ , find area of  $\triangle EFG$ .

26. In  $\triangle PAN$   $\angle A = 90^\circ$ . If  $\sec P = \frac{17}{8}$ , then find : 2

(i) length of AN

(ii)  $\tan N$ .



*Or*

Evaluate the following expression using known numerical values of trigonometrical ratios :

$$2 \operatorname{cosec}^2 60 - 3 \sin^2 45$$

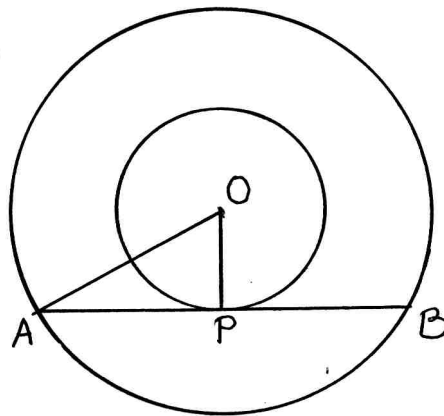
27. Prove the following identity :

2

$$\frac{\sqrt{\sec \theta - 1}}{\sqrt{\sec \theta + 1}} + \frac{\sqrt{\sec \theta + 1}}{\sqrt{\sec \theta - 1}} = 2 \operatorname{cosec} \theta$$

28. In the following figure point O is the centre of two concentric circles of radii 25 and 7 units. AB is a chord of the outer circle which touches the inner circle at point P. Find the length of chord AB :

2



29. The following grouped distribution table shows the distribution of marks of 60 students in a mathematics test :

2

Marks obtained	Number of students
0 – 20	6
20 – 40	22
40 – 60	18
60 – 80	12
80 – 100	2

Find the mode of the data given above.

### Section-C

30. If two zeroes of a polynomial  $2x^4 - 3x^3 - 5x^2 + 9x - 3$  are  $\sqrt{3}$  and  $-\sqrt{3}$ , find the other remaining zeroes. 3

31. Find the solution of the following pair of linear equations :

$3x + 2y = 32$  and  $11x - 5y = 31$  (by elimination method). 3

*Or*

$8x + 5y = 9$  and  $3x + 2y = 4$  (by cross multiplication method).

32. Find the roots of the following :

$2x^2 + 3x - 27 = 0$  (by Factorisation method). 3

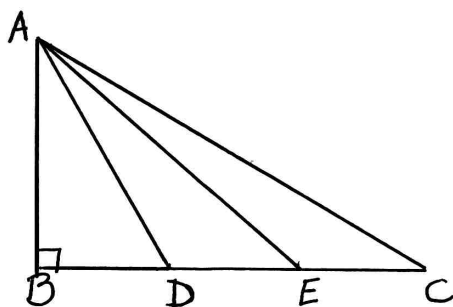
*Or*

$5x^2 + 7x - 6 = 0$  (by completing the square method).

33. A farmer undertakes to pay off a debt of Rs. 6,240 by monthly instalments. He pays Rs. 300 as the first instalment and increases every instalment by Rs. 40 over the immediate previous instalment. Calculate the number of months he will take to clear his debt. 3

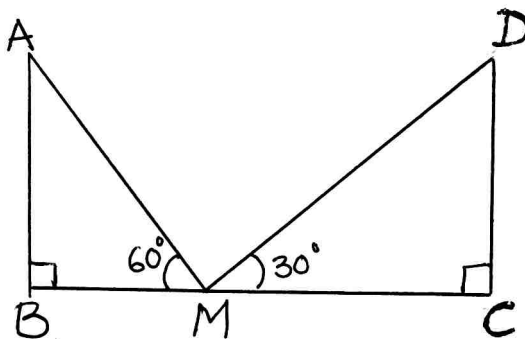
34. In the following figure  $\triangle ABC$  is right-angled at B. Points E and D trisect BC.

Prove that  $8AE^2 = 3AC^2 + 5AD^2$  3



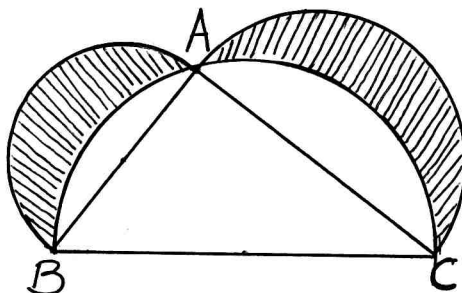


35. Two pillars of equal height stand on either side of the road BC which is 80 meters wide. The angles of elevation of the top of the pillars from a point M on the road between the pillars is  $60^\circ$  and  $30^\circ$ . Find the height of the pillars and the distance of the point M from both the pillars AB and CD. (Take  $\sqrt{3} = 1.73$ )



36. Draw a circle with centre P and radius 3.5 cm. Then take a point Q at a distance of 7.5 cm from the centre of the circle. Using a pair of compass and ruler construct two tangent segments QA and QB touching the circle at points A and B respectively. Measure and state the length of the tangent segments.
37. Using a pair of compass and ruler construct  $\triangle XYZ$  with  $XY = 5$  cm,  $XZ = 7$  cm and  $m \angle X = 60^\circ$ . Then construct  $\triangle XY'Z'$  whose sides are  $\frac{5}{3}$  of the corresponding sides of  $\triangle XYZ$ .

38. In the following figure, semicircles are drawn using AB, AC and BC as diameters. Find the area of the shaded region if AB = 3 cm and AC = 4 cm. 3



39. A solid metallic sphere of diameter 18 cm is melted to make solid right circular cones of base diameter 9 cm and height 4 cm. Find the number of cones that can be made. 3

### Section-D

40. Find the solution of the following pair of linear equations graphically : 4

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

$$x - 3y = -3$$

Rewrite and complete the following tables :

$$2x - y = 4$$

$x$			
$y$			

$$x - 3y = -3$$

$x$			
$y$			

41. If the length of a rectangle is increased by 1 unit and the breadth is decreased by 2 units, its area becomes 30 square units. If the length of the same rectangle is decreased by 1 unit and the breadth is increased by 2 units its area becomes 56 square units. Find the length and breadth of the original rectangle. 4
42. The following table gives the distribution of total household expenditure (in Rs.) of 200 farmers in a village : 4

<b>Expenditure in Rs. (CI)</b>	<b>Number of Farmers (<math>f_i</math>)</b>	<b>Class Mark (<math>x_i</math>)</b>	$u_i = \frac{x_i - a}{h}$	$f_i u_i$
2000 – 3000	34			
3000 – 4000	38			
4000 – 5000	31			
5000 – 6000	43			
6000 – 7000	32			
7000 – 8000	22			
	$\Sigma f_i = 200$			

Take the class mark denoted as 'a' of the class interval 5000 to 6000 as the assumed mean and 'h' as the class size. Rewrite and complete the table and also find the mean expenditure by the step deviation method.