

FIITJEE

ICSE PART TEST – II

MATHEMATICS

Time: 1:30 Hours

Max Marks: 40

Instructions:

1. **Section – A (20 Marks):** Attempt all questions from this section.
Q.1 (a) 3 Marks, (b) 3 Marks, (c) 4 Marks
Q.2 (a) 3 Marks, (b) 3 Marks, (c) 4 Marks
2. **Section – B (20 Marks):** Attempt any 2 questions from this section.
Q.3 (a) 3 Marks, (b) 3 Marks, (c) 4 Marks
Q.4 (a) 3 Marks, (b) 3 Marks, (c) 4 Marks
Q.5 (a) 6 Marks, (b) 4 Marks
Q.6 (a) 3 Marks, (b) 3 Marks, (c) 4 Marks
3. Wherever necessary, neat and properly labeled diagram should be drawn.

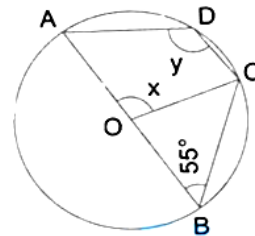
Name of the Candidate :

Enroll Number :

Date of Examination :

SECTION-A

- 1(a) A well with 14 m inside diameter is dugout 15 m deep. The earth taken out of it has been evenly spread all around it to a width of 21 m to form an embankment. What is the height of the embankment?
- 1(b) Mr. Britto deposits a certain sum of money each month in a Recurring Deposit Account of a bank. If the rate of interest of 8% per annum and Mr. Britto gets Rs. 8,088 from the bank after 3 years, find the value of his monthly instalment.
- 1(c) Find the ratio in which the point P (m, 6) divides the join of A(-4,3) and B (2, 8). Also find the value of m.
- 2(a) If the difference of mode and median of a data is 24, then find the difference between median and mean
- 2(b) The sum of first 3 terms of an AP is 27 and the sum of their squares is 293. Find the common difference
- 2(c) In the given figure, O is the centre of the circle and $\angle ABC = 55^\circ$. Calculate the value of x and y.

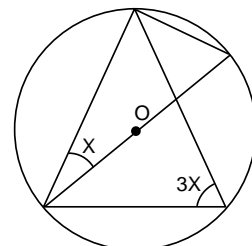


SECTION – B

- 3(a) Four dice are thrown simultaneously. Find the probability that all of them show the same face.
- 3(b) If $2\cos\theta - \sin\theta = x$ and $\cos\theta - 3\sin\theta = y$. Prove that $2x^2 + y^2 - 2xy = 5$.
- 3(c) For the following, find the amount of bill data:

| Rate per piece (in Rs.) | Number of pieces | Discount% | GST% |
|-------------------------|------------------|-----------|------|
| 18 | 360 | 10 | 12 |
| 12 | 480 | 20 | 18 |
| 12 | 120 | 5 | 12 |
| 28 | 150 | 20 | 28 |

- 4(a) A number 20 is divided into four parts that are in A.P. such that the ratio of product of first and fourth is to product of second and third is 2:3, then find the largest part
- 4(b) A metallic solid sphere of radius 10.5 cm is melted and recast into smaller solid cones, each of radius 3.5 cm and height 3 cm. How many cones will be made?
- 4(c) In the given figure O is the centre of the circle. Find the value of x.



5(a) In what ratio does the line $4x + 3y - 13 = 0$ divide the line segment joining the points (2, 1) and (1, 4) ?

5(b) Gopal has a cumulative deposit account and deposits Rs. 900 per month for a period of 4 years he gets Rs. 52,020 at the time of maturity, find the rate of interest.

6(a) If $A : B = 3 : 4$, $B : C = 5 : 2$, then then find $A : B : C$

6(b) Find the value of p , if the mean of following distribution is 20.

| | | | | | |
|-----------|----|----|----|----------|----|
| X | 15 | 17 | 19 | $20 + p$ | 23 |
| Frequency | 2 | 3 | 4 | $5p$ | 6 |

6(c) Two cones A and B have their base radii in the ratio of 4 : 3 and their heights in the ratio 3 : 4. Then find the ratio of volume of cone A to that of cone B

HINTS & SOLUTIONS

- 1(a) Area of embankment \times height of embankment
= Volume of earth dugout

$$\pi(R^2 - r^2) \times h = \pi \times 7 \times 7 \times 15$$

$$h = 1 \text{ m.}$$

- 1(b) Let the value of the monthly instalment be Rs. P.

Since rate of interest (r) = 8%

Number of months, $n = 3 \times 12 = 36$

Maturity value (MV) = Rs. 8088

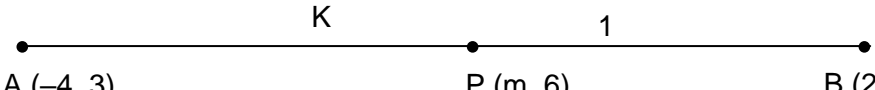
$$\therefore \text{M.V.} = P \times n + P \times \frac{n(n+1)}{2} \times \frac{r}{12 \times 100}$$

$$\Rightarrow 8088 = P \times 36 + P \times \frac{36 \times 37}{2} \times \frac{8}{12 \times 100}$$

$$\Rightarrow 8088 = 36P + 4.44P$$

$$\Rightarrow 8088 = 40.44P$$

$$\Rightarrow P = \frac{8088}{40.44} = 200$$

- 1(c) 

Let AP : PB = k : 1 then by section formula coordinates of P are $P\left(\frac{2k-4}{k+1}, \frac{8k+3}{k+1}\right) = P(m, 6)$

$$\Rightarrow \frac{8k+3}{k+1} = 6 \text{ and } \frac{2k-4}{k+1} = m$$

$$\Rightarrow k = \frac{3}{2} \text{ and } m = \frac{2\left(\frac{3}{2}\right) - 4}{\frac{3}{2} + 1} = \frac{-2}{5}$$

- 2(a) Using mode - median = 2 (median - mean)

We get median - mean = 12

- 2(b) Let first 3 terms of AP are

a - d, a, a + d

then sum = $3a = 27 \Rightarrow a = 9$

Also, $(a-d)^2 + a^2 + (a+d)^2 = 293$

$$\Rightarrow (9-d)^2 + 9^2 + (9+d)^2 = 293$$

$$\Rightarrow d = \pm 5$$

So, numbers are 4, 9, 14

- 2(c) $\angle AOC = 2\angle ABC = 2 \times 55^\circ$

(Angle at the centre is double the angle at the circumference subtended by the same chord)

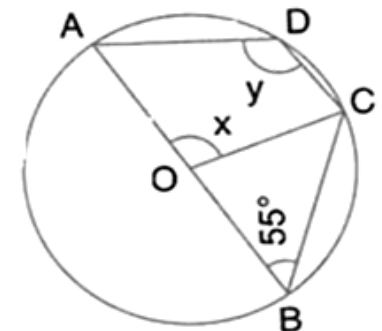
$$\therefore x = 110^\circ$$

ABCD is a cyclic quadrilateral

$$\therefore \angle ADC + \angle ABC = 180^\circ$$

(Pair of opposite angles in a cyclic quadrilateral are supplementary)

$$\Rightarrow y = 180^\circ - 55^\circ = 125^\circ$$



3(a) Total possible outcomes = 6^4

\therefore Favourable outcome = $\{(1,1,1,1), (2,2,2,2), (3,3,3,3), \dots, (6,6,6,6)\}$

$$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{6}{6^4} = \frac{1}{6^3} = \frac{1}{216}$$

3(b) $2x^2 + y^2 - 2xy$

$$\Rightarrow 2(2\cos\theta - \sin\theta)^2 + (\cos\theta - 3\sin\theta)^2 - 2(2\cos\theta - \sin\theta)(\cos\theta - 3\sin\theta)$$

$$= 2[4\cos^2\theta + \sin^2\theta - 4\sin\theta\cos\theta] + (\cos^2\theta + 9\sin^2\theta - 6\sin\theta\cos\theta)$$

$$-4\cos^2\theta + 12\sin\theta\cos\theta + 2\sin\theta\cos\theta - 6\sin^2\theta$$

$$= 8\cos^2\theta + 2\sin^2\theta - 8\sin\theta\cos\theta + \cos^2\theta + 9\sin^2\theta - 6\sin\theta\cos\theta$$

$$-4\cos^2\theta + 12\sin\theta\cos\theta + 2\sin\theta\cos\theta - 6\sin^2\theta$$

$$= 5\cos^2\theta + 5\sin^2\theta$$

$$= 5(\sin^2\theta + \cos^2\theta) = 5$$

3(c)

| Rate per piece (in Rs.) | Number of pieces | Discount% | MRP (in Rs.) | Selling price (in Rs.) | GST% | GST (in Rs.) |
|-------------------------|------------------|-----------|--------------|------------------------|------|--------------|
| 18 | 360 | 10 | 6480 | 5832 | 12 | 699.84 |
| 12 | 480 | 20 | 5760 | 4608 | 18 | 829.44 |
| 12 | 120 | 5 | 1440 | 1368 | 12 | 164.16 |
| 28 | 150 | 20 | 4200 | 3360 | 28 | 940.8 |
| | | | | 15,168 | | 2634.24 |

Amount of bill = selling price + GST

$$= 15,168 + 2634.24$$

$$= \text{Rs. } 17,802.24$$

4(a) Let four parts are $a - 3d, a - d, a + d$ and $a + 3d$

$$\Rightarrow a - 3d + a - d + a + d + a + 3d = 20$$

$$\Rightarrow a = 5$$

$$\text{Now, } \frac{a^2 - 9d^2}{a^2 - d^2} = \frac{2}{3}$$

$$\Rightarrow d = 1, a = 5$$

$$\text{Largest part} = a + 3d = 5 + 3(1) = 8$$

4(b) Radius of sphere = 10.5 cm

radius of cone = 3.5 cm

height of cone = 3 cm

volume of sphere = $N \times$ volume of cone

$$\frac{4}{3}\pi r^3 = N \times \frac{1}{3}\pi r^2 h$$

$$\Rightarrow \frac{4}{3}\pi \times (10.5)^3 = N \times \frac{1}{3}\pi \times (3.5)^2 \times 3$$

$$\Rightarrow \frac{4}{3}\pi \times 10.5 \times 10.5 \times 105 = N \times \frac{1}{3}\pi \times 3.5 \times 3.5 \times 3$$

$$\Rightarrow 4 \times \frac{105}{10} \times \frac{105}{10} \times \frac{105}{10} = N \times \frac{35}{10} \times \frac{35}{10} \times 3$$

$$\Rightarrow 4 \times 3 \times 3 \times \frac{21}{2} = N \times 3$$

$$\Rightarrow 4 \times 3 \times \frac{21}{2} = N$$

$$N = 126 \text{ cones}$$

Number of cones will be made 126.

4(c) $90^\circ - x = 3x$
 $\Rightarrow x = 22.5^\circ$

5(a) Let the ratio be $k : 1$, then point on line joining $(2, 1)$ & $(1, 4)$ is $\left(\frac{k+2}{k+1}, \frac{4k+1}{k+1}\right)$ which lies on

$$4x + 3y - 13 = 0$$

$$\Rightarrow \frac{4(k+2)}{k+1} + \frac{3(4k+1)}{k+1} - 13 = 0$$

$$\Rightarrow 3k - 2 = 0 \Rightarrow k = \frac{2}{3}$$

5(b) Installment per month (P) = Rs. 900
 Number of months (n) = 48
 Let rate of interest (r) = r% p.a.

$$\therefore \text{S. I.} = P \times \frac{n(n+1)}{2 \times 12} \times \frac{r}{100}$$

$$= 900 \times \frac{48(48+1)}{2 \times 12} \times \frac{r}{100}$$

$$= 900 \times \frac{2352}{24} \times \frac{r}{100} = \text{Rs. } 882r$$

Maturity value = Rs. $(900 \times 48) + \text{Rs. } (882) r$

Given maturity value = Rs. 52,020

Then Rs $(900 \times 48) + \text{Rs } (882) r = \text{Rs. } 52,020$

$$\Rightarrow 882r = \text{Rs. } 52,020 - \text{Rs. } 43,200$$

$$\Rightarrow r = \frac{8820}{882} = 10\%$$

6(a) $A : B = 3 : 4$, $B : C = 5 : 2$
 $A : B : C = (3 \times 5) : (4 \times 5) : (4 \times 2)$
 $= 15 : 20 : 8$

6(b) $\sum f = 2 + 3 + 4 + 6 + 5P = 15 + 5P$
 $\sum xf = 30 + 51 + 76 + (20 + P)5P + 138$
 $= 295 + (100P + 5P^2)$

$$\text{Mean} = 20 = \frac{295 + (100P + 5P^2)}{15 + 5P}$$

$$300 + 100P = 295 + 100P + 5P^2$$

$$P^2 = 1 \Rightarrow P = 1$$

6(c) Ratio = $\frac{\frac{1}{3}\pi(4x)^2 \times 3y}{\frac{1}{3}\pi(3x)^2 \times 4y} = 4 : 3$