PT2 / MID TERM EXAMINATION : 2025-26

CLASS : X

SUBJECT : MATHEMATICS

Time Allowed : 3 Hours **Max. Marks : 80**

Roll No. : 10125

General Instructions:

1. This Question Paper has 5 Sections A, B, C, D, and E.
2. Section A has 20 Multiple Choice Quetions (MCQs) carrying 1 mark each.
3. Section B has 5 Short Answer-I (SA-I) type questions carrying 2 marks each.
4. Section C has 6 Short Answer-II (SA-II) type questions carrying 3 marks each.
5. Section D has 4 Long Answer (LA) type questions carrying 5 marks each.
6. Section E has 3 Case Based integrated units of assessment (4 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Questions of 2 marks, 2 Questions of 3 marks and 2 Questions of 5 marks has been provided. An internal choice has been provided in the 2 marks question of Section E.

SECTION A

Section A consists of 20 questions of 1 mark each.

1. If 'p' and 'q' are natural numbers and 'p' is the multiple of 'q', then the HCF of 'p' and 'q' is **1**

q = p
HCF = p

a) pq b) p

c) q d) $p+q$

2. Prime factorization of 8232 is **1**

a) $2^3 \times 3 \times 7^3$ b) $7^2 \times 3 \times 2^3$

c) $2 \times 3 \times 7^4$ d) $2^2 \times 3^2 \times 7^2$

3. α and β are the zeroes of the polynomial $p(x) = kx^2 - 30x + 45k$ and $\alpha + \beta = \alpha\beta$, then the value of k is : **1**

a) $-\frac{2}{3}$ b) $-\frac{3}{2}$

c) $\frac{3}{2}$ d) $\frac{2}{3}$

4. The pair of linear equations $x + 2y = 5$ and $3x + 12y = 10$ has **1**

a) unique solution
b) no solution
c) more than two solutions
d) infinitely many solutions

5. The upper limit of the modal class from the given distribution is : **1**

Height (in cm)	Below 140	Below 145	Below 150	Below 155	Below 160	Below 165
Number of girls	4	11	29	40	46	51

a) 65
b) 160
c) 155
d) 150

6. If one root of the equation $5x^2 - 13x + m = 0$ is reciprocal of the other, then m = **1**

a) 0
b) 5
c) 6
d) $\frac{1}{6}$

7. A quadratic equation, whose roots are $(3 - \sqrt{2})$ and $(3 + \sqrt{2})$ is **1**

a) $x^2 - 6x + 7 = 0$
b) $x^2 + 6x + 7 = 0$
c) $9x^2 - 2 = 0$
d) $x^2 - 7 = 0$

8. n^{th} term of the AP : $-2, -7, -12, \ldots$ is given by **1**

a) $-(3n - 5)$
b) $-(3n - 3)$
c) $-(5n - 5)$
d) $-(5n - 3)$

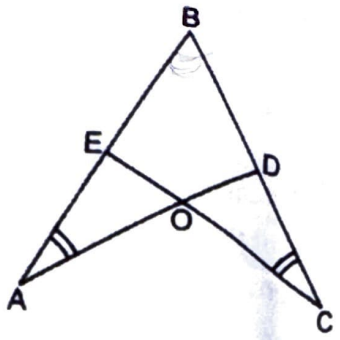
9. If in two triangles DEF and PQR, $\angle D = \angle Q$ and $\angle R = \angle E$, then which of the following statement is not true ? **1**

a) $\frac{EF}{PR} = \frac{DF}{PQ}$
b) $\frac{DE}{PQ} = \frac{EF}{RP}$
c) $\frac{DE}{QR} = \frac{DF}{PQ}$
d) $\frac{EF}{RP} = \frac{DE}{QR}$

10. If $\Delta PQR \sim \Delta ABC$; PQ = 6 cm, AB = 8 cm and the perimeter of ΔABC is 36 cm, then perimeter of PQR is **1**

a) 20.25 cm
b) 27 cm
c) 48 cm
d) 64 cm

11. In the given figure (not drawn to scale), $\angle A = \angle C$ and AB = BC. Then which of the following option is correct? 1



a) $\angle OEB = \angle ODB$ b) $\Delta ABD \cong \Delta CBE$

c) $\angle AEO = \angle CDO$ d) All of these

12. If $sec\theta - tan\theta = \frac{1}{3}$, then the value of $(sec\theta + tan\theta)$ is 1

a) $\frac{4}{3}$ b) $\frac{2}{3}$

c) $\frac{1}{3}$ d) 3

13. If $acot\theta + bcosec\theta = p$ and $bcot\theta + acosec\theta = q$, then $p^2 - q^2 =$ 1

a) $a^2 - b^2$ b) $b^2 - a^2$

c) $a^2 + b^2$ d) $b - a$

14. The angle of elevation of the sun when a shadow of a pole h metres high casts a shadow of $\sqrt{3}\,h$ metres long is 1

a) 60° b) 45°

c) 30° d) 90°

15. A wheelchair ramp needs to be built from the ground to a door that is 2 m above the ground. If the angle of inclination for the ramp is 30°, then the length of the ramp should be 1

a) $2\sqrt{3}\,m$ b) $\frac{4}{\sqrt{3}}\,m$

c) $2\,m$ d) $4\,m$

16. If a cone, a hemisphere and a cylinder have equal bases and same height, then the ratio of their volumes is 1

a) 1 : 3 : 2 b) 2 : 3 : 1

c) 2 : 1 : 3 d) 1 : 2 : 3

17. A sphere of maximum volume is cut out from a solid hemisphere of radius 7 cm. Then the ratio of the volume of the original hemisphere to that of the cut out sphere is **1**

a) 2 : 1 b) 16 : 1

c) 3 : 1 d) 4 : 1

18. The sum of the radius of base and height of a right circular cylinder is 37 cm. If the total surface area of the solid cylinder is 1628 sq.cm, then the volume of the cylinder is **1**

a) 4264 cm^3 b) 4620 cm^3

c) 4624 cm^3 d) 4640 cm^3

Direction for questions 19 & 20: In question numbers 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

(c) Assertion (A) is true but Reason (R) is false.

(d) Assertion (A) is false but Reason (R) is true.

19. Assertion (A): The value of k for which the system of equations $kx - y = 2$, $6x - 2y = 3$ has a unique solution is 3. **1**

Reason (R) : The system of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has a unique solution if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

20. Assertion (A): If the median and mode of a frequency distribution are 50 and 60 respectively then its mean is 45. **1**

Reason (R) : Mean, median and mode of a frequency distribution are related as :

Mode = 3(Median) – 2 (Mean)

SECTION - B

Section B consists of 5 questions of 2 marks each.

21. Find the zeroes of the polynomial $x^2 + \frac{1}{6}x - 2$, and verify the relation between the coefficients and zeroes of the polynomial. **2**

22. Determine the positive value(s) of p for which the equation $x^2 + px + 64 = 0$ and $x^2 - 8x + p = 0$ will both have real roots. **2**

23. If θ is acute and $3\sin\theta = 4\cos\theta$, find the value of $4\sin^2\theta - 3\cos^2\theta + 2$. 2

OR

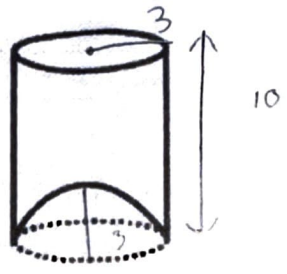
If $5\cot\theta = 7$, then find the value of $\frac{7\sin\theta + 5\cos\theta}{5\sin\theta + 7\cos\theta}$.

24. A tree 12 m high, broken by the wind in such a way that its top touches the ground and makes an angle of 60° with the ground. At what height from the bottom the tree is broken by the wind. 2

25. Water in a canal 1.5 m wide and 6 m deep is flowing with the speed of 10 km/hr. How much area will it irrigate in 30 mins if 8 cm of standing water is required ? 2

OR

A juice seller has a glass with hemispherical raised bottom as shown in the figure. Find the actual capacity of the glass in litres if the inner radius of the glass is 3 cm and height of the glass is 10 cm.



SECTION - C

Section C consists of 6 questions of 3 marks each.

26. A forester wants to plant 66 apple trees, 88 banana trees and 110 mango trees in equal rows (in terms of number of trees). Also he wants to make distinct rows of the trees (only one type of trees in one row). Find the minimum number of rows required. 3

OR

Three bulbs red, green and yellow flash at intervals of 80 seconds, 90 seconds and 110 seconds. All three flash together at 8 : 00 am. At what time will the three bulbs flash altogether again ?

27. Solve the following pair of linear equation : 3

$43x + 67y = -24$

$67x + 43y = 24$

OR

Which term of the AP : 121, 117, 113, ... is its first negative term ?

28. Solve for x : $1 + 4 + 7 + 10 + ... + x = 287$

29. In the adjoining figure, $\angle D = \angle E$ and $\frac{AD}{DB} = \frac{AE}{EC}$. Prove that ΔBAC is an isosceles triangle. 3

30. Prove that : 3

$$\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \frac{1}{\sec\theta - \tan\theta}$$

31. If the mean of the following frequency distribution is 91, find the missing frequencies x and y. 3

Classes	0-30	30-60	60-90	90-120	120-150	150-180	Total
Frequencies	12	21	x	52	y	11	150

SECTION - D

Section D consists of 4 questions of 5 marks each.

32. (a) Determine graphically, the vertices of the triangle formed by the lines $y = x$, $3y = x$ and $x + y = 8$. **(3+2)**

(b) Find the value(s) of k for which the given pair of linear equation has infinite solutions.

$2x + 3y - 7 = 0$

$(k-1)x + (k+1)y = 3k - 1$

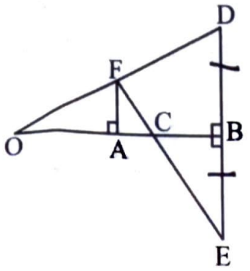
33. A two digit number is seven times the sum of its digits and is also equal to 12 less than three times the product of its digits. Find the number. 5

OR

A bus travels at a certain average speed for a distance of 75 km and then travels a distance of 90 km at an average speed of 10 km/hr more than its original speed. If it takes 3 hours to complete the journey, what is its original average speed.

34. In the adjoining figure, OB is perpendicular bisector of the line segment DE. FA ⊥ OB and FE intersects OB at the point C. Prove that 5

$$\frac{1}{OA} + \frac{1}{OB} = \frac{2}{OC}$$



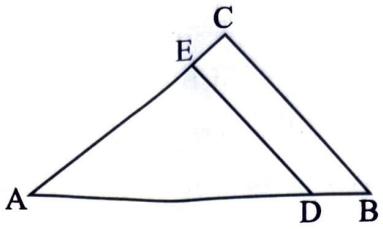
OR

B) (a) ABCD is a quadrilateral in which the diagonals AC and BD intersect at O such that $\frac{AO}{OC} = \frac{BO}{OD}$ **(3+2)**

Show that quadrilateral ABCD is a trapezium.

If $\frac{AO}{OC} = \frac{BO}{OD} = \frac{1}{2}$ and AB = 5 cm, then find the length of DC.

(b) In the adjoining figure, DE || BC. If AE = 8 cm, EC = 2 cm and BC = 6 cm, then find DE.



35. The angles of elevation and depression of the top and the bottom of the tower from the top of a building, 60 m high, are 30° and 60° respectively. Find the difference between the height of the building and tower and the distance between them. (Use $\sqrt{3} = 1.732$). **5**

SECTION - E

Case study based questions are compulsory.

36. The figure given alongside shows the path of a diver, when she takes jump from the diving board, clearly it is a parabola.

Ritu was standing on a diving board, 48 feet above the water level. She took dive into the pool. Her height (in feet) above the water at any time t seconds is given by the polynomial $h(t)$ such that

$h(t) = -16t^2 + 8t + k$

Based on the given information ,answer the following questions:

(i) What is the value of k ? **1**

(ii) At what time will she touch the water in the pool? **1**

(iii) Rita's height (in feet) above the water level is given by another polynomial $p(t)$ with zeroes -1 and 2. Find the polynomial $p(t)$. **2**

OR

A polynomial $q(t)$ with sum of zeroes as 1 and the product as -6 is modelling Anu's height (in feet) above the water level at any time t (in seconds). Find $q(t)$. **2**

37. On a sunday, your parents took you to a fair .You could see a lot of toys displayed, and you wanted them to buy a RUBIK's cube and a strawberry ice cream for you.

Observe the figures, answer the following questions:

(i) Find the length of the diagonal of RUBIK's cube if each edge measures 6 cm. $H = ?$ **1**

(ii) Find the volume of the RUBIK's cube if the length of the edge is 7 cm. a^3 **1**

(iii) (a) What is the curved surface area of the hemisphere (ice cream) if the base radius is 7 cm? $2\pi r^2$ **2**

OR

(b) If two cubes of edges 4 cm are joined end to end, then find the surface area of the resulting cubiod. **2**

38. Vocational training complements traditional education by providing practical skills and hands on training. While education equip individuals with a broad knowledge base, vocational training focuses on job specific skills, enhancing emplobility thus making the students self reliant. Keeping this in view, a teacher made a following table giving the frequency distribution of students / adults undergoining vocational training from the training institute.

Age (in years)	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54
No. of participants	62	132	96	37	13	11	10	4

Based on the above information, answer the following questions:

~~(i)~~ Find the range of the above data. **1**

(ii) Find the number of participants of age less than 50 years who undergo vocational training. **1**

~~(iii)~~ (a) Find the median of the above data. **2**

OR

(b) Find the mode of the above data. $l + \left(\frac{f_1 + f_0}{2f_1 - f_1 - f_2}\right) \times$