TELANGANA BOARD OF INTERMEDIATE EDUCATION

MATHEMATICS - IA

MODEL QUESTION PAPER w.e.f. 2026 - 27

Time : 3 Hours **Max. Marks : 60**

Note : The Question Paper consists of three sections A, B and C.

Section - A

10 × 2 = 20 Marks

I. Very Short Answer Questions

(i) Answer all questions

(ii) Each Question carries two marks

1. Find the power set of the set $A = \{-3, 0, 3\}$

2. Find the 10^{th} term of the arithmetic progression 3, 5, 7, 9, ...

3. If $f : R \to R$ and $f(x) = \frac{1-x^2}{1+x^2}$, then show that $f(\tan\theta) = \cos 2\theta$.

4. If $\begin{bmatrix} x-1 & 2 & 5-y \\ 0 & z-1 & 7 \\ 1 & 0 & a-5 \end{bmatrix} = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & 7 \\ 1 & 0 & 0 \end{bmatrix}$, then find the values of x, y, z and a.

5. If $A = \begin{bmatrix} -1 & 2 & 3 \\ 2 & 5 & 6 \\ 3 & x & 7 \end{bmatrix}$ is a symmetric matrix, then find x.

6. If $\bar{a} = \bar{i} - 2\bar{j}$ then find a vector in the direction of $\bar{a}$ that has magnitude 7 units.

7. Find the period of $\text{Tan}(x + 4x + 9x + ... + n^2x)$.

8. Find the range of $7\cos x - 24\sin x + 5$.

9. If $\sinh x = 3$, then show that $x = \log_e(3+\sqrt{10})$.

10. If in triangle ABC, $a = 2$ cm, $b = 3$ cm, $c = 4$ cm, then find $\cos A$.

Section - B

6 × 4 = 24 Marks

II. Short Answer Questions

(i) Answer any Six Questions.

(ii) Each Question carries Four marks.

11. If $f = \{(1, a)\ (2, c), (4, d), (3, b)\}$ and $g^{-1} = \{(2, a)\ (4, b), (1, c), (3, d)\}$, then show that $(gof)^{-1} = f^{-1}og^{-1}$.

12. Prove that $2 + 7 + 12 + ... + (5n-3) = \dfrac{n(5n-1)}{2}\ \forall\ n \in \mathbf{N}$, using mathematical induction.

13. Show that $\begin{vmatrix} bc & b+c & 1 \\ ca & c+a & 1 \\ ab & a+b & 1 \end{vmatrix} = (a-b)\ (b-c)\ (c-a)$.

14. If $\bar{a}$, $\bar{b}$, $\bar{c}$ are three non-coplanar vectors, then verify the collinearity of the following points whose position vectors are given by $\bar{a} - 2\bar{b} + 3\bar{c}$, $2\bar{a} + 3\bar{b} - 4\bar{c}$, $-7\bar{b} + 10\bar{c}$.

15. If $\bar{a} = 2\bar{i} + 2\bar{j} - 3\bar{k}$, $\bar{b} = 3\bar{i} - \bar{j} + 2\bar{k}$, then find the angle between $2\bar{a} + \bar{b}$ and $\bar{a} + 2\bar{b}$.

16. Find the general solutions of the equation $2\sin^2\theta - 4 = 5\cos\theta$.

17. Find the value of $\sin\left(\text{Cos}^{-1}\dfrac{4}{5} + \text{Cos}^{-1}\dfrac{12}{13}\right)$.

18. In ΔABC, prove that $\left(\dfrac{1}{r} - \dfrac{1}{r_1}\right)\left(\dfrac{1}{r} - \dfrac{1}{r_2}\right)\left(\dfrac{1}{r} - \dfrac{1}{r_3}\right) = \dfrac{abc}{\Delta^3} = \dfrac{4R}{r^2 s^2}$.

Section - C

2 × 8 = 16 Marks

III. Long Answer Questions

(i) Answer any Two questions.

(ii) Each Question carries eight marks.

19. Solve the following equations by matrix inversion method

$2x - y + 3z = 8$

$-x + 2y + z = 4$

$3x + y - 4z = 0.$

20. If $\bar{a} = \bar{i} - 2\bar{j} - 3\bar{k}$, $\bar{b} = 2\bar{i} + \bar{j} - \bar{k}$ and $\bar{c} = \bar{i} + 3\bar{j} - 2\bar{k}$, then verify that $\bar{a} \times (\bar{b} \times \bar{c}) \neq (\bar{a} \times \bar{b}) \times \bar{c}$.

21. If A, B, C are angles in a triangle, then prove that

Sin 2A – Sin 2B + Sin 2C = 4 cosA sin B cos C.