

**TARGET PLUS DIAGNOSTIC MOCK**

Class XII (CBSE)

**MATHEMATICS**

(Three hours)

Paper Code  
**Z 202**

*(Candidate are allowed additional 15 minutes for only reading the paper.*

*They must NOT start writing during this time)*

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- (i) All questions are compulsory.
  - (ii) Please check that this Question Paper contains 26 Questions.
  - (iii) Questions 1 to 6 in Section-A are Very Short Answer Type Questions carrying one mark each.
  - (iv) Questions 7 to 19 in Section- B are Long Answer I Type Questions carrying 4 marks each.
  - (v) Questions 20 to 26 in Section- C are Long Answer II Type Questions carrying 6 marks each
  - (vi) Please write down the serial number of the Question before at tempting it.
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**SECTION A**

*Questions 1 to 6 carry one mark each.*

1. Write the principal value of  $\cos^{-1}\left(\cos\frac{7\pi}{6}\right)$ .
2. Determine the distance of the given plane  $2x - y + 2z + 1 = 0$  from origin?
3. Find  $\vec{a}(\vec{b} \times \vec{c})$ , if  $\vec{a} = 2\hat{i} + \hat{j} + 3\hat{k}$ ,  $\vec{b} = -\hat{i} + 2\hat{j} + \hat{k}$  and  $\vec{c} = 3\hat{i} + \hat{j} + 2\hat{k}$
4. Find the value of  $\Delta = \begin{vmatrix} x+z & y+x & z+x \\ z & x & y \\ -3 & -3 & -3 \end{vmatrix}$ .
5. Find the vector component of  $\vec{AB}$  with initial point  $A(2,1)$  and terminal point  $B(-5,7)$ .
6. The binary operation  $*R \times R \rightarrow R$  is defined as  $a * b = 2a + b$ . Find the value of  $(2 * 3) * 4$ .

**SECTION B**

*Questions 7 to 19 carry four marks each.*

7. Find the value of  $\begin{vmatrix} a^2 & bc & ac+c^2 \\ a^2+ab & b^2 & ac \\ ab & b^2+bc & c^2 \end{vmatrix}$
8. Find the value of  $x + y$  in  $2 \begin{bmatrix} x & 5 \\ 7 & y-3 \end{bmatrix} + \begin{bmatrix} 3 & -4 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 7 & 6 \\ 15 & 14 \end{bmatrix}$

9. Let  $f : \mathbb{R} \rightarrow \mathbb{R}$  be defined as  $f(x) = 10x + 7$ . Find the function  $g : \mathbb{R} \rightarrow \mathbb{R}$  such that  $g \circ f = f \circ g = I_{\mathbb{R}}(x)$
10. The scalar product of vector  $\hat{i} + \hat{j} + \hat{k}$  with the unit vector along the sum of vectors  $2\hat{i} + 4\hat{j} - 5\hat{k}$  and  $\lambda\hat{i} + 2\hat{j} + 3\hat{k}$  is equal to one. Find the value of  $\lambda$ .
11. If  $y = e^{m \sin^{-1} x}$ , then find  $(1 - x^2) \frac{d^2 y}{dx^2} - x \frac{dy}{dx} - m^2 y$ .
12. For 6 trials of an experiment let  $x$  be a binomial variate which satisfies the relation  $9P(x = 4) = P(x = 2)$ . Find the probability of success.
13. Find the value of  $\frac{dy}{dx}$  at  $\theta = \frac{\pi}{4}$ , if  $x = ae^{\theta}(\sin \theta - \cos \theta)$  and  $y = ae^{\theta}(\sin \theta + \cos \theta)$
14. If  $x = \sqrt{a \sin^{-1} t}$ ,  $y = \sqrt{a \cos^{-1} t}$ , find  $\frac{dy}{dx}$ .
15. Find the value of  $\tan \frac{1}{2} \left[ \sin^{-1} \frac{2x}{1+x^2} + \cos^{-1} \frac{1-y^2}{1+y^2} \right]$ .
16. Coordinates of the point of intersection of the line  $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{2}$  and the plane  $x - y + z = 0$ , find the angle between the line and the plane.
17. Using the properties of determinants solve the following for

$$\begin{vmatrix} x-2 & 2x-3 & 3x-4 \\ x-4 & 2x-9 & 3x-16 \\ x-8 & 2x-27 & 3x-64 \end{vmatrix} = 0$$

18. Find the value of  $x$  for which  $y = [x(x-2)]^2$  is an increasing function
19. Find  $\frac{d}{dx} (\log x)^x + x^{\log x}$ .

### SECTION C

*Questions 20 to 26 carry six marks each.*

20. Evaluate  $\int \frac{x \sin^{-1} x}{\sqrt{1-x^2}} dx$ .
21. Assume that the chances of a patient having a heart attack are 40%. Assuming that a meditation and yoga course reduces the risk of heart attack by 30% and prescription of certain drug reduces its chance by 25%. At a time a patient can choose any one of the two options with equal probabilities. It is given that after going through one of the two

options, the patient selected at random suffers a heart attack. Find the probability that the patient followed the course of meditation and yoga. Interpret the result and state which of the above stated methods is more beneficial for the patient.

22. Evaluate  $\int \frac{1}{\cos^4 x + \sin^4 x} dx$

23. The right circular cone of least curved surface and given volume has an altitude equal to \_\_\_\_\_.

24. Find the solution of the differential equation  $\frac{dy}{dx} = \frac{y^2}{xy - x^2}$ .

25. Find the radius of the right circular cylinder of greatest curved surface area which can be inscribed in a given cone.

26. A merchant plans to sell two types of personal computers a desktop model and a portable model that will cost Rs. 25000 and Rs 40000 respectively. He estimates that total monthly demand of computers will not exceed 250 units. Determine the number of units of each type of computers which the merchant should stock to get maximum profit if he does not want to invest more than 70 lakhs and his profit on the portable model is Rs. 5000 and on desktop model is Rs. 4500 . Make an L.P.P. and solve it graphically.

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