

Time: 2:30 hour M.M. 100 Mock Board Exam Series-III Class XII

General Instructions:

1.All questions are compulsory.

- The question paper consist of 26 questions divided into three sections A, B and C. Section A comprises of 6 questions of one mark each, section B comprises of 13 questions of four marks each and section C comprises of 7 questions of six marks each.
- 3. All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.
- 4. There is no overall choice. However, internal choice has been provided in **4** questions of four marks each and **2** questions of six mark each. You have to attempt only one of the alternatives in all such questions.
- 5. Please note this question paper consist **4** printed pages.
- 6. Use of calculators is not permitted. You may ask for logarithmic tables, if required.

Section-A

1. Write the antiderivative of $\frac{2^x}{1+4^x}$ w.r.t. 'x'.

- 2. If $|\vec{a}| = a$, then find the value of $|\vec{a} \times \hat{i}|^2 + |\vec{b} \times \hat{j}|^2 + |\vec{c} \times \hat{k}|^2$. $\begin{bmatrix} 1527 & 8365 & 92 \end{bmatrix}$
- 3. If A = $\begin{bmatrix} 1527 & 8365 & 92 \\ 26 & 7382 & 8 \\ 77020 & 728 & 90 \end{bmatrix}$ and $|adjA| = |A|^k$, then find k.
- 4. If $f : \mathbf{R} \to \mathbf{R}$ be defined by $f(x) = (3 x^3)^{1/3}$, then find *fof(x)*.
- 5. Evaluate $\int \frac{|x|}{y^{\circ}} dy$.
- 6. Write the Integrating Factor for the linear differential equation $(y^2 1) + 2xy$. $\frac{dy}{dx} = \frac{2}{y^2 1}\frac{dy}{dx}$.

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Section-B

- 7. Evaluate: $\int \frac{\sin^6 x + \cos^6 x}{\sin^2 x \cos^2 x} dx.$
- 8. Prove that for any three vectors $\vec{a}, \vec{b} \text{ and } \vec{c}, \begin{bmatrix} \vec{a} + \vec{b} & \vec{b} + \vec{c} & \vec{c} + \vec{a} \end{bmatrix} = 2 \begin{bmatrix} \vec{a} \vec{b} \vec{c} \end{bmatrix}$.
- 9. Vectors \vec{a}, \vec{b} and \vec{c} are such that $\vec{a} + \vec{b} + \vec{c} = \vec{0}$ and $|\vec{a}| = 3$, $|\vec{b}| = 5$ and $|\vec{c}| = 7$. Find the angle between \vec{a} and \vec{b} .

10. Find the value of
$$\sin^{-1} \left[\cot \left\{ \sin^{-1} \sqrt{\left(\frac{2 - \sqrt{3}}{4} \right)} + \cos^{-1} \frac{\sqrt{12}}{4} + \sin^{-1} \frac{1}{\sqrt{2}} \right\} \right].$$

OR
Prove that $4 \tan^{-1} \left[\frac{1}{5} \right] - \tan^{-1} \left[\frac{1}{70} \right] + \tan^{-1} \left[\frac{1}{99} \right] = \frac{\pi}{4}.$

11. Using properties of determinants prove that:

$$\begin{vmatrix} (b+c)^2 & a^2 & bc \\ (c+a)^2 & b^2 & ca \\ (a+b)^2 & c^2 & ab \end{vmatrix} = (a-b)(b-c)(c-a)(a+b+c)(a^2+b^2+c^2).$$

$$-2\sin x \qquad x \le -\frac{\pi}{2}$$

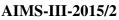
12. Find the value of a and b if $f(x) = \begin{cases} a \sin x + b & -\frac{\pi}{2} < x < \frac{\pi}{2} \text{ is continuous at } x = \pm \frac{\pi}{2} \end{cases}$. $\cos x \qquad x \ge \frac{\pi}{2}$

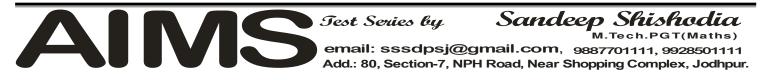
13. If
$$y = \sin^{-1}\left(\frac{4\sin x + 3\cos x}{5}\right)$$
 show that $\frac{dy}{dx} = 1$.
If $x^2 - xy + y^2 = a^2$ show that $\frac{d^2y}{dx^2} = \frac{6a^2}{(x - 2y)^3}$.
14. Prove that $y = \frac{4\sin\theta}{2 + \cos\theta} - \theta$ is an increasing function in $\left[0, \frac{\pi}{2}\right]$

15. Evaluate : $\int \sqrt{1 + \cot x} \, dx$. *How andwhy entropy of youth is integrating day by day? Give two points only.*

OR

Evaluate: $\int \cos^{-1}(\sin x) dx$. How and why entropy of youth is integrating day by day? Give two points only.





16. Solve :
$$x \frac{dy}{dx} = y(\log x - \log y + 1).$$

- 17. A bag contains 4 balls. Two balls are drawn at random, and are found to be blue. What is the probability that 50% balls were blue in colour in that bag?
- Ball is associated in most of the outdoor and indoor games, how one can enhance maths learning by playing games. Give in brief.

18. Find the value of x, y, z if the matrix $A = \begin{bmatrix} 0 & 2y & z \\ x & y & -z \\ x & -y & z \end{bmatrix}$, satisfy the equation A'A = I.

19. If plane x - y + z = 7 is $4\sqrt{3}$ units far from point $(-3, 5, \lambda)$, then what is the value of λ ?

Show that the lines $\frac{x-1}{2} = \frac{y+1}{-1} = \frac{z}{3}$ and $\frac{x}{2} = \frac{y-2}{-1} = \frac{-z+1}{-3}$ are lying on a plane/are coplanar.

Section-C

20. Find the area of the circle $x = \sqrt{16 - y^2}$ which is exterior to the parabola $y^2 = 6x$, using integration.

OF

Find the area between the curve $(x-1)^2 = 4y$ and $(x-2)^2 = 4-y$ using integration.

21. A card being lost from a deck of 52 playing card. From the remaining cards two card drawn and found both were diamond cards. Find the probability that the lost card was a card other than diamond.

22. Solve the differential equation
$$x \frac{dy}{dx} + y - x + xy \cot x = 0$$
; $x \neq 0$
23. Given two matrix $A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$ verify that $BA = 6I$. Use the result to solve $x - y = 3$;

the system: 2x + 3y + 4z = 17;

$$y + 2z = 7$$

24. If the straight lines $\frac{x-1}{2} = \frac{y+1}{k} = \frac{z}{2}$ and $\frac{x+1}{5} = \frac{y+1}{2} = \frac{z}{k}$ are coplanar, find the equations of Plane (s) containing these two lines.

OR

Find the equation of plane that passing through the line of intersection of planes

$$x + 2y + 3z = 2$$
 and $x - y + z = 3$ and at a distance $\frac{2}{\sqrt{3}}$ from the point (3,1,-1).

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Test Series by Sandeep Shishedia M.Tech.PGT(Maths) email: sssdpsj@gmail.com, 9887701111, 9928501111 Add.: 80, Section-7, NPH Road, Near Shopping Complex, Jodhpur. 25. Find the equation of tangents to the curve $y = \cos(x + y)$, $-2\pi \le x \le 2\pi$ that are parallel to the linex + 2y = 0.

OR

- A rectangular sheet of width 1 m is folded in such a way that its one corner is touching the edge of other side find the length of minimum size of creases.
- 26. The manager of an oil refinery must decide on the optimal mix of two possible blending processes of which the inputs & outputs per production run, are as follows:

	Input		Output	
Process	Crude	Crude	Gasoline	Gasoline
	А	В	Р	Q
1	5	3	5	8
2	4	5	4	4

The max. Crude A& B available are 200 & 150 units resp. Market requirements are at least 100 & 80 units P & Q respectively .The profit from process 1 & process 2 are Rs.300/- & Rs 400/- resp. Formulate LPP & solve for maximising the profit. A greedy petrol pump owner is mixing kerosene in petrol. What value you will suggest him to stop such crime on your level best.

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