

Mock Board Exam

STD: XII
Maximum marks : 40

SUBJECT: Mathematics
13/3/2022 11:00 - 13/3/2022
22:30

ASSESSMENT: Mock Test
Time Limit : 120 Minutes

General Instructions:

1. This question paper contains three sections – A, B and C. Each part is compulsory.
2. Section - A has 6 short answer type (SA1) questions of 2 marks each.
3. Section – B has 4 short answer type (SA2) questions of 3 marks each.
4. Section - C has 4 long answer type questions (LA) of 4 marks each.
5. There is an internal choice in some of the questions.
6. Q14 is a case-based problem having 2 sub parts of 2 marks each.
7. A student has to answer a question either by typing it out, in the space provided, or writing down each answer on paper, and uploading a picture of it using the upload option.
8. A student is advised to write the answers in a clear, legible handwriting using a blue/black ball point pen before uploading it.

Section A

12 Marks

12 Marks

1 Evaluate $\int \cos^4 x dx$ 2 M

OR

Evaluate $\int \frac{dx}{\sqrt{2-4x+x^2}}$ 2 M

2 Solve the differential equation $\frac{dy}{dx} = \frac{1+x^2}{y}$. 2 M

3 If $|\vec{a}| = \sqrt{26}$, $|\vec{b}| = 7$ and $|\vec{a} \times \vec{b}| = 35$, then find the value of $\vec{a} \cdot \vec{b}$. 2 M

4 Find the direction cosines of line $\frac{x-5}{4} = \frac{y-2}{1} = \frac{z-3}{8}$ 2 M

5 Two cards are drawn from a well-shuffled pack of 52 playing cards simultaneously. What is the probability that both are ace cards? 2 M

6 It is known that 10% of certain articles manufactured are defective. What is the probability that in a random sample of 12 such articles, 9 are defective? 2 M

Section B

12 Marks

12 Marks

7 Evaluate $\int x\sqrt{x^4-1}dx$. 3 M

- 8 The solution of the differential equation $\frac{dy}{dx} = \frac{y^2}{xy-x^2}$ is 3 M

OR

Solve $(1 - x^2) \frac{dy}{dx} + xy = ax, x \in (-1, 1)$ 3 M

- 9 Let $\vec{u}, \vec{v},$ and \vec{w} be such that $|\vec{u}| = 1, |\vec{v}| = 2$ and $|\vec{w}| = 3$. If the projection of \vec{v} along \vec{u} is equal to that of \vec{w} along \vec{u}, \vec{v} and \vec{w} are perpendicular to each other, find the value of $|\vec{u} - \vec{v} + \vec{w}|$. 3 M

- 10 Evaluate the integral $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} (3x^3 - x \cos x + \sec^2 x) dx$ 3 M

Section C

16 Marks

16 Marks

- 11 If $I_A = \int_0^{\frac{\pi}{4}} (\sqrt{\tan x} + \sqrt{\cot x}) dx, I_B = \int_0^{\frac{\pi}{4}} \frac{\cos x}{\sqrt{\cos 2x}} dx,$ and $I_A = n I_B,$ find the value of n . 4 M

- 12 Find the area(in sq. units) enclosed by the region $\{(x, y) : x^2 + y^2 \leq 1, y^2 \leq 1 - x\}$ 4 M

OR

Evaluate the area(in sq. units) bounded by $y = x^2, x + y = 2$ 4 M

- 13 Find the image of the point $(1, -5, 9)$ with respect to the plane $x - y + z = 6$. 4 M

OR

Find the shortest distance between the skew lines $\frac{x+3}{-4} = \frac{y-3}{6} = \frac{z}{2}$ and $\frac{x+2}{-4} = \frac{y}{1} = \frac{z-7}{1}$ 4 M

The Bicycle Company

A company has two plants to manufacture bicycles. The first plant manufactures 60% of bicycles and the second 40%. Also, 80% of the bicycles are rated of standard quality at the first plant and 90% of the standard quality at the second plant. A bicycle is picked up at random and found to be of standard quality.

- a What is the probability that it is produced from the first plant? **2 M**
- b What is the probability that it is produced from the second plant? **2 M**