Mock Board Exam

STD: XII | **SUBJECT: Mathematics** | **ASSESSMENT: Mock Test**

Maximum marks : 40 | **18/3/2022 11:00 - 18/3/2022 22:30** | **Time Limit : 90 Minutes**

The Question paper consists of three sections A, B and C.

Candidates are required to attempt all questions from Section A and all questions EITHER from Section B OR Section C.

A students 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.

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

32 Marks

Answer all questions.

32 Marks

Select the correct option for each of the following questions.

1 The order and degree respectively of the differential equation $\left(\frac{dy}{dx}\right)^2 + 3y\left(\frac{d^2y}{dx^2}\right) = 4$ are **1 M**

(A) 2 and 1 (B) 1 and 2 (C) 2 and 2 (D) 3 and 2

2 If $\int_{-2}^{2} f(t)\,dt = 0$, then $f(t)$ may be **1 M**

(A) $\sin^4 x$ (B) $\tan^6 x$

(C) $\left(x + x^3\right)^3$ (D) $\ln x^2$

3 The value of $\int \left(\frac{12x^{11} + 8^x \ln 8}{x^{12} + 8^x}\right) dx$ is **1 M**

(where c is the constant of integration)

(A) $\ln\left|x^{12} + 8^x\right| + c$ (B) $\frac{x^{13}}{13} + 8^x \ln 8 + c$

(C) $\ln\left|x^{13} + 8^x \ln x\right| + c$ (D) $\frac{x^{12} + 8^x}{2} + c$

4 The general solution of the differential equation $\frac{dy}{dx} = e^{x+y}$ is **1 M**

(A) $e^x + e^{-y} = c$ (B) $e^x + e^y = c$

(C) $e^{-x} + e^y = c$ (D) $e^{-x} + e^{-y} = c$

5 Let A and B be two events such that $P(A) = 0.3$ and $P(A \cup B) = 0.8$. If A and B are independent events, then $P(B)$ is **1 M**

(A) $\frac{5}{7}$ (B) $\frac{3}{7}$

(C) $\frac{1}{2}$ (D) $\frac{1}{7}$

6 Two persons A and B speak the truth with the probabilities 0.7 and 0.8 respectively. The probability that they will say the same thing while describing a single event is **1 M**

(A) 0.56 (B) 0.62 (C) 0.5 (D) 0.42

7 Find the value of $\int \left(2\ \sin^2 x + 4\ \cos^2 x\right) dx$. **2 M**

OR

Find the value of $\int \frac{1}{x^2+13x-2} dx$. **2 M**

8 Find the general solution of the differential equation $x\frac{dy}{dx} + 2y = x^2\ (x \neq 0)$. **2 M**

OR

Find the differential equation which has $y = c_1e^x + c_2e^{-x}$ as the general solution. **2 M**

9 Evaluate $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{1}{1+\sqrt{\cot\ x}} dx$ **2 M**

10 The probability distribution of X is as follows: **4 M**

x	0	1	2	3	4
$P(X = x)$	0.1	k	$2k$	$2k$	k

Find the value of $P(X \geq 3)$.

OR

Find the probability of getting 3 exactly twice in 5 throws of a fair die. **4 M**

11 Find the value of $\int \frac{1}{(2x+3)(x-4)} dx$. **4 M**

12 Every morning, Mr. Ramesh either reads a book or watches T.V. The probability that he watches T.V. is $\frac{4}{5}$. If he watches T.V., there is a probability of $\frac{3}{4}$ that he falls asleep. If he reads a book, the probability that he falls asleep is $\frac{1}{4}$. On one evening, Mr. Ramesh is found to be asleep. Find the probability that he watched T.V. **6 M**

13 Evaluate $\int_0^{\frac{\pi}{2}} \ln(\sin x)\, dx$. **6 M**

OR

Evaluate $\int \frac{e^x\left(x^2+1\right)}{(x+1)^2} dx$ **6 M**

Section B

8 Marks

8 Marks

Select the correct option for each of the following questions.

14 The equation of the plane passing through $A(1, 2, 3)$ and having $3, 2, 5$ as the direction ratios of the normal to the plane, is **1 M**

(A) $3x + 2y - 6z = 9$ (B) $3x + 2y + 5z = 22$

(C) $3x + 4y - 5z = 18$ (D) $3x - 2y + 5z = 22$

15 Find the acute angle between the planes $\vec{r} \cdot \left(\hat{i} + \hat{j} - 2\hat{k}\right) = 8$ and $\vec{r} \cdot \left(-2\hat{i} + \hat{j} + \hat{k}\right) = 3$. **1 M**

(A) $\frac{\pi}{6}$ (B) 0 (C) $\frac{\pi}{2}$ (D) $\frac{\pi}{3}$

16 If lines OA, OB are drawn from O with direction ratios proportional to $1, -2, -1$ and $3, -2, 3$, then find the direction cosines of the normal to the plane AOB. **2 M**

17 Find the area (in sq. units) of the region bounded by $x^2 = 16y,\ y = 1,\ y = 4$ and $x = 0$ in the first quadrant. **4 M**

OR

Section C

8 Marks

8 Marks

Select the correct option for each of the following questions.

18 The two lines of regression are $x + 2y - 5 = 0$ and $2x + 3y - 8 = 0$ and variance of x is 12. Find the variance of y. **1 M**

(A) 2 (B) 1

(C) 2.5 (D) 1.5

19 Let the regression line of x on y be, $mx - y + 10 = 0$ and y and x be, $-2x + 5y + 14 = 0$. If the coefficient of correlation between x and y is $\frac{1}{\sqrt{10}}$, then the value of m is **1 M**

(A) 6 (B) 4

(C) 2 (D) 8

20 Find the value of $b_{yx} - b_{xy}$ for the following observations: **2 M**

$(3, 6), (4, 5), (5, 4), (6, 3), (7, 2)$.

21 A company produces two types of items P and Q. Manufacturing of both items requires the metals gold and copper. Each unit of item P requires 3 grams of gold and 1 gram of copper while that of item Q requires 1 gram of gold and 2 grams of copper. The company has 9 grams of gold and 8 grams of copper in its store. If each unit of item P makes a profit of ₹50 and each unit of item Q makes a profit of ₹ 60 then determine the number of units of each item that the company should produce to maximize profit. What is the maximum profit ? **4 M**