CBSE EXAMINATION PAPER-2022

MATHEMATICS

(Solved)

Time allowed : 3 hours | Maximum Marks : 48

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **18 questions.** All questions are **compulsory.**

ii. This question paper is divided into **4 sections.**

iii. **Section A** – questions number **1 to 1** are case based questions

iv. **Section B** – questions number **2 to 8** are very short answer

v. **Section C** – questions number **9 to 14** are short answer

vi. **Section D** – questions number **15 to 18** are long answer

vii. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.

viii. Use of calculator is NOT allowed.

Section A

Question 1.

A shopkeeper sells three types of flower seeds A1, A2, A3. They are sold in the form of a mixture, where the proportions of these seeds are 4:4:2, respectively. The germination rates of the three types of seeds are 45%, 60% and 35% respectively.

(1)

Calculate the probability that a randomly chosen seed will germinate:

[2 Marks]

(2)

Calculate the probability that the seed is of type A2, given that a randomly chosen seed germinates.

[2 Marks]

Section B

Question 2.

Find the general solution of the differential equation $e^{dy/dx} = x^2$.

[2 Marks]

Question 3.

Write the projection of the vector $(\vec{a}+\vec{b})$ on the vector $\vec{c}$ where $\vec{a}=2\hat{i}-2\hat{j}+\hat{k}$, $\vec{b}=\hat{i}+2\hat{j}-2\hat{k}$ and $\vec{c}=2\hat{i}-\hat{j}+4\hat{k}$.

[2 Marks]

Question 4.

If the distance of the point (1,1,1) from the plane $x-y+z-\lambda=0$ is $5/\sqrt{3}$, find the value (s) of λ.

[2 Marks]

Question 5.

1. Two cards are drawn successively with replacement from a well shuffled pack of 52 cards. Find the probability distribution of the number of spade cards.

[2 Marks]

Question 6.

A pair of dice is thrown and the sum of the numbers appearing on the dice is observed to be 7. Find the probability that the number 5 has appeared on atleast one die.

[2 Marks]

Question 7.

The probability that A hits the target is 1/3 and the probability that B hits it, is 2/5. If both try to hit the target independently, find the probability that the target is hit

[2 Marks]

Question 8.

Find $\int dx/ x^2-6x+13$

[2 Marks]

Section C

Question 9.

Evaluate:

[3 Marks]

Question 10.

Find the particular solution of the differential equation $x\,dy/dx-y=x^2ex$, given $y(1)=0$.

[3 Marks]

Question 11.

Find the general solution of the differential equation $x\,dy/dx=y(\log y-\log x+1)$

[3 Marks]

Question 12.

The two adjacent sides of a parallelogram are represented by vectors $2\hat{i}-4\hat{j}+5\hat{k}$and $\hat{i}-2\hat{j}-3\hat{k}$. Find the unit vector parallel to one of its diagonals. Also, find the area of the parallelogram

[3 Marks]

Question 13.

If $\vec{a}=2\hat{i}+2\hat{j}+3\hat{k}$, $\vec{b}=-\hat{i}+2\hat{j}+\hat{k}$ and $\vec{c}=3\hat{i}+\hat{j}$are such that the vector $(\vec{a}+\lambda\vec{b})$ is perpendicular to vector $\vec{c}$then find the value of λ.

[3 Marks]

Question 14.

1. Show that the lines:

$\frac{1-x}{2}=\frac{y-3}{4}=\frac{z}{-1}$ and $\frac{x-4}{3}=\frac{2y-2}{-4}=\frac{z-1}{1}$ are coplanar.

[3 Marks]

Section D

Question 15. Find the area of the region bounded by the curve $4x^2 = y$ and the line $y = 8x + 12$, using integration.

[4 Marks]

Question 16.

Find $\int \frac{x^2}{(x^2+1)(3x^2+4)}\,dx$.

[4 Marks]

Question 17.

Evaluate:

[4 Marks]

Question 18.

Find the distance of the point (1,-2,9) from the point of intersection of the line $\vec{r}=4\hat{i}+2\hat{j}+7\hat{k}+\lambda(3\hat{i}+4\hat{j}+2\hat{k})$ and the plane $\vec{r}\cdot(\hat{i}-\hat{j}+\hat{k})=10$

[4 Marks]
