مدرسة دلهي الخاصة ذ.م.م.
DELHI PRIVATE SCHOOL L.L.C.
Affiliated to C.B.S.E., DELHI
(Approved & Recognized By Ministry of Education - United Arab Emirates)
DPS SHARJAH

PB-T2/EEE-MAQP/1221/A 14-MAR-2022

EEE CONSORTIUM

PREBOARD EXAMINATION 2021-2022

SUBJECT : Mathematics (Code: 041) Set - I **Maximum Marks: 40**

GRADE : XII **Time Allowed: 2 Hours**

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.

Section– A

1. Find: $\int \left[\log(\log x) + \frac{1}{(\log x)^2}\right] dx$ **2**

OR

Find: $\int \frac{sec^2 x}{\sqrt{tan^2 x+4}} dx$.

2. Write the sum of the order and degree of the differential equation $1 + \left(\frac{dy}{dx}\right)^4 = 7\left(\frac{d^2y}{dx^2}\right)^3$. **2**

3. If the sum of two unit vectors is a unit vector, prove that the magnitude of their difference is $\sqrt{3}$ **2**

4. Find the direction cosines of the line passing through the two points (– 2, 4, – 5) and (1, 2, 3). **2**

5. A refrigerator box contains 2 milk chocolates and 4 dark chocolates. Two chocolates are drawn without replacement. Find the probability distribution of the number of milk chocolates. **2**

6. A die is thrown. If E is the event 'the number appearing is a multiple of 3' and F be the event 'the number appearing is even' then find whether E and F are independent? **2**

Section– B

7. Evaluate $\int \frac{x^3}{x^4+3x^2+2} dx$ **3**

8. Solve: $x(x^2 + 1)\frac{dy}{dx} = y(1 - x^2) + x^3 logx$ **3**

OR

Solve: $\left(y - xcos\left(\frac{y}{x}\right)\right) dy + \left[ycos\left(\frac{y}{x}\right) - 2xsin\left(\frac{y}{x}\right)\right] dx = 0$

9. If $\vec{a} = \hat{\imath}+\hat{\jmath}+\hat{k}$ and $\vec{b} = \hat{\jmath} - \hat{k}$, then find a vector $\vec{c}$ such that $\vec{a} \times \vec{c} = \vec{b}$ and $\vec{a}.\vec{c} = 3$. **3**

10. Find the image of the point (2,-1,5) in the line $\vec{r} = 11\hat{\imath} - 2\hat{\jmath} - 8\hat{k} + \lambda(10\hat{\imath} - 4\hat{\jmath} - 11\hat{k})$ **3**

OR

Find the equation of the line passing through the point (2,1,3) and perpendicular to the lines

$\frac{1-x}{-1} = \frac{2y-1}{4} = \frac{z-3}{3}$ and $\frac{x}{-3} = \frac{y}{2} = \frac{z}{5}$

Section– C

11. Evaluate: $\int_{-1}^{2} |x^3 - x| \, dx$. **4**

12. Find the area enclosed between the parabola $4y = 3x^2$ and the straight line $3x - 2y + 12 = 0$. **4**

OR

Using integration, find the area of the region in the first quadrant enclosed by the $x-axis$, the line $x = \sqrt{3}y$ and the circle $x^2 + y^2 = 4$.

13. Find the coordinates of the foot of perpendicular drawn from the point $A(-1, 8, 4)$ to the line joining the points $B(0, -1, 3)$ and $C(2, -3, -1)$. Hence find the image of the point A in the line BC. **4**

14. **CASE -BASED/ DATA- BASED**

A Company named Bombay Bolts manufactures bolts. There are three machines which are operational: named M1, M2, and M3 manufacturing 25 % , 35% and 40% of the bolts. Of their outputs, 5% , 4% and 2% are respectively defective bolts.

Based on the above information answer the following:

(i) A bolt is drawn at random from the product, what is the probability that it is defective? **2**

(ii) A bolt is drawn at random from the product and is found to be defective. What is the probability that it is manufactured by the machine M2? **2**

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