PRE-BOARD EXAMINATION TERM II (2021-22)

CLASS-XII

MATHEMATICS

MAX. HR.: 2 MAX. MARKS: 40

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. Q-14 is a case-based problem having 4 sub parts of 1 mark each.

SECTION- A

Q-1. Evaluate $\int \frac{e^x(1+x)}{cos^2(xe^x)}dx$ 2

Q-2. Write the degree of the differential equation

i) $(\frac{d^2y}{dx^2})^3 + (\frac{dy}{dx})^2+\sin(\frac{dy}{dx})+2=0$ (1,1)

ii) $write\ the\ integrating\ factor\ of$

$$\frac{dy}{dx} + ysecx = tanx$$

Q-3. Verify if the given vectors $\vec{a}, \vec{b}, \vec{c}$, are coplanar 2

$$\vec{a} = \hat{\imath} - 2\hat{\jmath} + 3\hat{k},\ \ \vec{b} = -2\hat{\imath} + 3\hat{\jmath} - 4\hat{k}\ , \vec{c} = \hat{\imath} - 3\hat{\jmath} + 5\hat{k}$$

Q-4. Find the vector equation of the line passing through the points A(1,2,-1) and parallel to the line: 5x-25 = 14-7y = 35z 2

Q-5. The probability of simultaneous occurrence of at least one of the two events A and B is p. If the probability that exactly one of A,B occurs is q, then prove that

$P(\bar{A}) + P(\bar{B})$ = 2 - 2p + q

OR 2

Two friends A and B wanted to take admission in a college. The probability that A got admission in college is 0.7 and the probability that exactly one of them is selected is 0.6. find the probability that B is selected.

Q-6. A refrigerator contains two milk chocolates and 4 dark chocolates. Two chocolates are drawn at random. Find the probability distribution of the number of milk chocolates. What is the most likely outcome? 2

OR

Three cards are drawn successively without replacement from the pack of 52 cards. What is the probability that the first two cards are Kings and the third card is Queen.

SECTION B

Q-7. Evaluate: $\int \frac{(4x+5\ )dx}{\sqrt{2x^2-3-x}}$ or $\int \sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}}dx$ 3

Q-8. Solve (x + y) dy + (x-y) dx = 0 when x = 1, y = 1. 3

OR

Solve $\frac{dy}{dx} - 3ycotx = sin2x\ ; given; (x,y) = (\frac{\pi}{2}, 2)$

Q-9. If the vertices A, B and C of a Δ ABC are (1,2,3), (-1,0,0), (0,1,2) respectively, find ∠ABC 3

Q-10. Find the distance of the point (1,-2,3) from the plane x – y + z = 5 measured parallel to a line whose direction cosines are proportional to 2,3,-6.

OR 3

Find the equation of the plane passing through the points A(3,2,1), B(4,2,-2), C(6,5,-1) and hence find the value of k for which A,B,C and D(k,5,5)are coplanar.

SECTION C

Q-11. Using properties of definite integration evaluate: 4

$$\int_0^{\pi} \frac{x\tan x\, dx}{\sec x + \tan x}$$

OR

$$\int_0^1 \log(1/x - 1)\, dx$$

Q-12. Using integration find the area bounded by : 4

$Y = x^2 + 2$, y = x, x = 0 and x = 3.

OR

Using integration find the area of the region:

$\{(x, y): |x| \leq y \leq \sqrt{4 - x^2}\}$

Q-13. Find the vector equation of a plane through the line of intersection of the plane x + y + z = 1 and 2x + 3y + 4z = 5 which is perpendicular to the plane x – y + z = 0. Hence find if the plane thus obtained contains the line $\frac{x+2}{5} = \frac{y-3}{4} = \frac{z}{5}$. 4

OR

Find the shortest distance between lines

$\vec{r} = 6\,\hat{\imath} + 2\hat{\jmath} + 2\hat{k} + \alpha(\hat{\imath} - 2\hat{\jmath} + 2\hat{k})$ and

$\vec{r} = -4\hat{\imath} - \hat{k} + \beta(3\hat{\imath} - 2\hat{\jmath} - 2\hat{k})$

Q-14. Two friends A and B are playing a game in which they throw a pair of coins alternatively and decide who gets both heads first will win the game. A starts the game, based on the above information, answer the following questions: (2,2)

i) What is the probability that A wins the game

ii) If instead of A, the game was started by B, then what is the probability that A wins the game?