	06 March 2022 11:30 PM **Sample Question Paper** **CLASS: XII** **Session: 2021-22** **Mathematics** **Term - 2** **Time Allowed: 2 hours** **Maximum Marks: 40** **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 $\int \frac{xe^x}{(1+x)^2}\mathrm{d}x$ OR Find $\int_0^2 (x-[x])\cdot \mathrm{d}x$	2
2.	Write the sum of the order and the degree of the following differential equation: $\frac{\mathrm{d}^2y}{\mathrm{d}x^2} = \frac{3y+\frac{\mathrm{d}y}{\mathrm{d}x}}{\sqrt{\frac{d^2y}{dx^2}}}$	2
3.	If $\vec{p} = \left(2\hat{\imath}-3\hat{\jmath}-6\hat{k}\right)$, Find the scalar and vector projections of $\vec{p}$ on the line joining the points $(3.4,-2)$ and $(5,6,-3)$.	2
4.	Find the angle between the line $\frac{x+3}{2} = \frac{y-1}{1} = \frac{z+4}{-2}$ and the plane $x+y+4=0$	2
5.	A couple has 3 children. Find the probability that they have at least one child of each gender ?	2
6.	An anti-aircraft gun fired three shots to a fighter plane. The probability of hitting the target by the first shots is 0.4; second shots is 0.5 and the third shot is 0.7. Find the probability that the target is destroyed.	2
	SECTION B	
7.	Find: $\int \mathrm{e}^x\left(\frac{1+\sin x}{1+\cos x}\right)\mathrm{d}x$	3
8.	Find the particular solution of the following differential equation: $(2x+y+1)\,\mathrm{d}x + (4x+2y-1)\,\mathrm{d}y = 0, y(0) = 1$ OR Find the general solution of the differential equation: $(x+\tan y)\,\mathrm{d}y = (\sin 2y)\,\mathrm{d}x$	3

9.	If $\vec{a},\ \vec{b},\ \vec{c}$ are three mutually perpendicular unit vectors, find the angle inclined by $(\vec{a}+\vec{b}+\vec{c})$ with $\vec{a}, \vec{b}$ and $\vec{c}$.	3
10.	Find the shortest distance between the following lines $\frac{x-3}{2}=\frac{y+15}{-7}=\frac{z-9}{5}$ and $\frac{x+1}{2}=\frac{y-1}{1}=\frac{z-9}{-3}$. OR Find the vector and cartesian equation of the plane(s) passes through the intersection of the planes, $x+3y-z+1=0$ and $3x-y+5z+3=0$ and are at a distance $\frac{2}{3}$ units from origin .	3
	SECTION C	
11.	Evaluate: $\int_0^1 \left\{\frac{\log(1+x)}{1+x^2}\right\} \mathrm{d}x$	4
12.	Using integration, Find the area of the region into which the circle $x^2+y^2=4$ is divided by the line $x+\sqrt{3}y=2$. OR Using integration, determine the area common to the parabola $y^2=x$ and the circle $x^2+y^2=2x$	4
13.	Find the foot of the perpendicular drawn from the point $(5,7,3)$ to the line: $\frac{x-15}{3}=\frac{y-29}{8}=\frac{z-5}{-5}$ Find the length of the perpendicular and its equation.	4
14.	**CASE-BASED/DATA-BASED**  From a survey conducted in a cancer hospital it is found that 10% of the patients were alcoholics, 30% chew gutka and 40% have no specific carcinogenic habits. If cancer strikes 80% of the smokers, 70% of alcoholics, 50% of gutka chewers and 10% of the non-specific, then given that no patient has more than one bad habits, estimate the probability that **Based on the given information, answer the following questions.**	
	(i) A patient is chosen at random from smokers or alcoholics group. What is the probability that the selected person be affected with cancer ?	2
	(ii) A cancer patient chosen from any one of the above types, selected at random, has no specific carcinogenic habits ?	2