SAMPLE QUESTION PAPER

BLUE PRINT

Time Allowed : 2 hours

Maximum Marks : 40

S. No.	Unit / Chapter		Section-A (2 marks)	Section-B (3 marks)	Section-C (4 marks)	Total
1.	Unit-III	Integrals	2(4)	–	–	7(18)
2.		Application of Integrals	1(2)	–	1(4)	
3.		Differential Equations	2(4)#	–	1(4)	
4.	Unit-IV	Vector Algebra	–	1(3)*	1(4)*	4(14)
5.		Three Dimensional Geometry	–	1(3)*	1(4)	
6.	Unit-VI	Probability	1(2)	2(6)	–	3(8)
		Total Questions	**6(12)**	**4(12)**	**4(16)**	**14(40)**

*It is a choice based question

MATHEMATICS

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 : $\int \frac{dx}{x^2+4x+8}$

2. Write the sum of the order and degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^2+\left(\frac{dy}{dx}\right)^3+x^4=0$.

OR

Find the solution of the differential equation $e^{\frac{dy}{dx}}=x$.

3. Find the area bounded by the curve $y^2 = 9x$ and the lines $x = 1$, $x = 4$ and $y = 0$ in the first quadrant.

4. Find : $\int \frac{dx}{9+4x^2}$

5. Find the differential equation whose solution is $y = mx$, where m is an arbitrary constant.

6. If $P(A) = 0.4$, $P(B) = 0.8$ and $P(B \mid A) = 0.6$, then find the value of $P(A \cup B)$.

SECTION - B

7. The probabilities of two students A and B coming to the school in time are $\frac{3}{7}$ and $\frac{5}{7}$ respectively. Assuming that the events, 'A coming in time' and 'B coming in time' are independent, find the probability of only one of them coming to the school in time.

8. Prove that the line through $A(0, -1, -1)$ and $B(4, 5, 1)$ intersects the line through $C(3, 9, 4)$ and $D(-4, 4, 4)$.

OR

Find the shortest distance between the lines $\vec{r}=2\hat{i}-5\hat{j}+\hat{k}+\lambda(3\hat{i}+2\hat{j}+6\hat{k})$ and $\vec{r}=7\hat{i}-6\hat{k}+\mu(\hat{i}+2\hat{j}+2\hat{k})$.

9. A bag contains 3 red and 7 black balls. Two balls are selected at random one-by-one without replacement. If the second selected ball happens to be red, what is the probability that the first selected ball is also red?

10. Using vectors, find the area of the triangle with vertices $A(1, 1, 2)$, $B(2, 3, 5)$ and $C(1, 5, 5)$.

OR

If $\vec{a}=\hat{i}+2\hat{j}+3\hat{k}$ and $\vec{b}=2\hat{i}+4\hat{j}-5\hat{k}$ represent two adjacent sides of a parallelogram, find unit vectors parallel to the diagonals of the parallelogram.

SECTION -C

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

OR

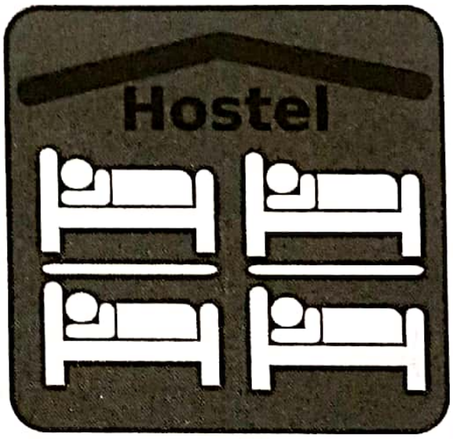
If $\vec{a}, \vec{b}$ and $\vec{c}$ are three vectors such that $|\vec{a}|=3, |\vec{b}|=4$ and $|\vec{c}|=5$ and each one of them is perpendicular to the sum of the other two, then find $|\vec{a}+\vec{b}+\vec{c}|$.

12. If $y = 2\sin x + \sin 2x$ for $0 \le x \le 2\pi$, then find the area enclosed by the curve and x-axis.

13. Show that the lines $\frac{x+1}{3}=\frac{y+3}{5}=\frac{z+5}{7}$ and $\frac{x-2}{1}=\frac{y-4}{3}=\frac{z-6}{5}$ intersect. Also find their point of intersection.

CASE-BASED/DATA-BASED

14. In a college hostel accommodating 1000 students, one of the hostellers came in carrying Corona virus, and the hostel was isolated. The rate at which the virus spreads is assumed to be proportional to the product of the number of infected students and remaining students. There are 50 infected students after 4 days and $n(t)$ denotes the number of students infected by Corona virus.



Based on the above information, answer the following questions.

(i) Find the general solution of the differential equation formed in given situation.

(ii) Find the value of $n(4)$.