Class – XII
MATHEMATICS- 041
SAMPLE QUESTION PAPER 2019-20

Time: 3 Hrs. **Maximum Marks: 80**

General Instructions:

(i) All the questions are compulsory.
(ii) The question paper consists of 36 questions divided into 4 sections A, B, C, and D.
(iii) Section A comprises of 20 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each. Section C comprises of 6 questions of 4 marks each. Section D comprises of 4 questions of 6 marks each.
(iv) There is no overall choice. However, an internal choice has been provided in three questions of 1 mark each, two questions of 2 marks each, two questions of 4 marks each, and two questions of 6 marks each. You have to attempt only one of the alternatives in all such questions.
(v) Use of calculators is not permitted.

	SECTION A	
Q1 - Q10 are multiple choice type questions. Select the correct option		
1	If A is any square matrix of order 3×3 such that $\lvert A\rvert = 3$, then the value of $\lvert adjA\rvert$ is ? (a) 3 (b) – (c) 9 (d) 27	1
2	Suppose P and Q are two different matrices of order $3\times n$ and $n\times p$, then the order of the matrix $P \times Q$ is? (a) $3\times p$ (b) $p\times 3$ (c) $n\times n$ (d) 3×3	1
3	If $2\hat{i}+6\hat{j}+27\hat{k}\times\hat{i}\ \ +p\hat{j}+q\hat{k}\ \ =\vec{0}$,then the values of p and q are ? (a) p= 6 ,q=27(b)p=3,q=— (c) p=6,q= — (d) p=3 ,q=27	1
4	If A and B are two events such that P(A)=0.2 , P(B)=0.4 and P($A\cup B$)=0.5 , then value of P(A/B) is ? (a)0.1 (b)0.25 (c)0.5 (d) 0.08	1
5	The point which does not lie in the half plane $2\ \ +3\ \ -12\le 0$ is (a) $(1,2)$ (b) $(2,1)$ (c) $(2,3)$ (d)$(-3,2)$	1
6	If $\sin\ \ x+\sin\ \ y=$ — , then the value of $\cos\ \ x+\cos\ \ y$ is _________ (a)—(b)–(c)–(d) π	1

7	An urn contains 6 balls of which two are red and four are black. Two balls are drawn at random. Probability that they are of the different colours is (a) –(b) — (c) —(d) —	1
8	$\sqrt{9-25x}$ (a) $\sin$ — $+ c$ (b)– $\sin$ — $+ c$ (c) – $\log$ —— $+ c$ (d)— $\log$ —— $+ c$	1
9	What is the distance(in units) between the two planes $3x + 5y + 7z = 3$ and $9x + 15y + 21z = 9$? (a) 0(b) 3(c) $\frac{}{\sqrt{}}$(d) 6	1
10	The equation of the line in vector form passing through the point $(-1,3,5)$ and parallel to line —— = ——, $z = 2$. is (a) $\vec{r} = -\hat{i} + 3\hat{j} + 5k + \lambda\ 2\hat{i} + 3\hat{j} + k$. (b) $\vec{r} = -\hat{i} + 3\hat{j} + 5k + \lambda\ (2\hat{i} + 3\hat{j})$ (c) $\vec{r} = 2\hat{i} + 3\hat{j} - 2k + \lambda -\hat{i} + 3\hat{j} + 5k$ (d) $\vec{r} = (2\hat{i} + 3\hat{j}) + \lambda -\hat{i} + 3\hat{j} + 5k$	1
(Q11 - Q15) Fill in the blanks		
11	If f be the greatest integer function defined as $f(x) = [x]$ and g be the modulus function defined as $g(x) = \lvert x \rvert$, then the value of g of – – is____________	1
12	If the function ( ) = —— when ≠ 1; when = 1 is given to be continuous at = 1 , then the value of is _____	1
13	If $\begin{matrix} 1 & 2 \\ 2 & 1 \end{matrix}\ \begin{matrix} x \\ y \end{matrix} = \begin{matrix} 5 \\ 4 \end{matrix}$,then value of y is ______.	1
14	If tangent to the curve $y + 3x - 7 = 0$ at the point $(h, \ )$ is parallel to line $x - y = 4$, then value of k is ___? **OR** For the curve $= 5 \ - 2$,if increases at the rate of 2units/sec, then at $= 3$ the slope of the curve is changing at__________	1
15	The magnitude of projection of $2\hat{i} - \hat{j} + k$ on $\hat{i} - 2\hat{j} + 2k$ is__________ **OR** Vector of magnitude 5 units and in the direction opposite to $2\hat{i} + 3\hat{j} - 6k$ is____	1
(Q16 - Q20) Answer the following questions		
16	Check whether (l + m + n) is a factor of the determinant $\begin{matrix} l+m & m+n & n+l \\ n & l & m \\ 2 & 2 & 2 \end{matrix}$ or not. Give reason.	1
17	Evaluate $\int\ (\ \ + 1)$.	1
18	Find $\int$ ——— .	1

	OR	
	Find $\int (\quad 2 \; - \quad 2 \;)$	
19	Find $\int xe^{(\quad)}$dx.	1
20	Write the general solution of differential equation $— = e$	1
	SECTION – B	
21	Express $\sin \quad \frac{}{\sqrt{\;}}$;where $- < \quad < -$, in the simplest form.	2
	OR	
	Let R be the relation in the set Z of integers given by R = {(a, b) : 2 divides a – b}.Show that the relation R transitive? Write the equivalence class [0].	
22	If $= ae \quad + be$, then show that $— - — - 2y = 0$.	2
23	A particle moves along the curve $x \; = 2y$. At what point, ordinate increases at the same rate as abscissa increases?	2
24	For three non-zero vectors $\vec{a}, \vec{b}$ and $\vec{c}$, prove that $[\; - \quad - \quad - \;] = 0$.	2
	OR	
	If $\vec{} + \vec{} + \vec{} = 0$ $\quad |\vec{}| = 3, \quad \vec{} = 5, |\vec{}| = 7$, then find the value of $\vec{}.\vec{} + \vec{}.\vec{} + \vec{}.\vec{}$.	
25	Find the acute angle between the lines $— = — = —$ and $— = — = —$	2
26	A speaks truth in 80% cases and B speaks truth in 90% cases. In what percentage of cases are they likely to agree with each other in stating the same fact?	2
	SECTION – C	
27	Let $: A \to B$ be a function defined as $( ) \; = —$, where $A = R - \{3\}$ and $B = R - \{2\}$. Is the function f one –one and onto? Is f invertible? If yes, then find its inverse.	4
28	If $\sqrt{1 - x} + \sqrt{1 - y} = a(x - y)$, then prove that $— = \frac{}{\sqrt{\;}}$.	4
	OR	
	If $x = a(\cos 2\theta + 2\theta \sin 2\theta)$ and $y = a(\sin 2\theta - 2\theta \cos 2\theta)$, find $—$ at $\theta = -$.	
29	Solve the differential equation $x\,dy - y\,dx = \sqrt{x \; + y}\;dx$.	4

30	Evaluate $\int \mid \quad -2 \quad \mid$.	4
31	Two numbers are selected at random (without replacement) from first 7 natural numbers. If X denotes the smaller of the two numbers obtained, find the probability distribution of X. Also, find mean of the distribution. **OR** There are three coins, one is a two headed coin (having head on both the faces), another is a biased coin that comes up heads 75% of the time and the third is an unbiased coin. One of the three coins is chosen at random and tossed. If It shows head. What is probability that it was the two headed coin ?	4
32	Two tailors A and B earn ₹150 and ₹200 per day respectively. A can stitch 6 shirts and 4 pants per day, while B can stitch 10 shirts and 4 pants per day. Form a L.P.P to minimize the labour cost to produce (stitch) at least 60 shirts and 32 pants and solve it graphically.	4
	SECTION D	
33	Using the properties of determinants, prove that $(\quad + \quad)$ $(\quad + \quad) \qquad = 2 \quad (\quad + \quad + \quad)$. $(\quad + \quad)$ **OR** If A = $\begin{matrix} 2 & 3 & 4 \\ 1 & -1 & 0 \\ 0 & 1 & 2 \end{matrix}$, find A . Hence, solve the system of equations $- \quad = 3$; $2 \quad + 3 \quad + 4 \quad = 17$; $+ 2 \quad = 7$	6
34	Using integration, find the area of the region $\{(x, y) : x \quad + y \quad \le \; 1 , \quad x + y \ge 1, \quad x \ge 0, \quad y \ge 0 \; \}$	6
35	A given quantity of metal is to be cast into a solid half circular cylinder with a rectangular base and semi-circular ends. Show that in order that total surface area is minimum, the ratio of length of cylinder to the diameter of semi-circular ends is $\pi : \pi + 2$. **OR** Show that the triangle of maximum area that can be inscribed in a given circle is an equilateral triangle.	6
36	Find the equation of a plane passing through the points $(2,1,2)$ and $(4,-2,1)$ and perpendicular to plane $\vec{r}. \; \hat{i} - 2k \quad = 5$. Also, find the coordinates of the point, where the line passing through the points $(3,4,1)$ and $(5,1,6)$ crosses the plane thus obtained.	6