CODE:REV- AG-PB-4 पजियन क्रमांक **REG.NO:-TMC -D/79/89/36**

General Instructions :-

(i) **All** Question are compulsory :

(ii) This question paper contains **36** questions.

(iii) Question **1-20** in **PART- A are** Objective type question carrying **1** mark each.

(iv) Question **21-26** in **PART -B** are sort-answer type question carrying **2** mark each.

(v) Question **27-32** in **PART -C** are long-answer-**I** type question carrying **4** mark each.

(vi) Question **33-36** in **PART -D** are long-answer-**II** type question carrying **6** mark each

(vii) You have to attempt only one if the alternatives in all such questions.

(viii) Use of calculator is not permitted.

(ix) Please check that this question paper contains 8 printed pages.

(x) Code number given on the right-hand side of the question paper should be written on the title page of the answer-book by the candidate.

PRE-BOARD EXAMINATION 2019 -20

Time : 3 Hours | Maximum Marks : 80

CLASS – XII | **MATHEMATICS**

PART – A **(Question 1 to 20 carry 1 mark each.)**

SECTION I : Single correct answer type

This section contain 10 multiple choice question . Each question has four choices (A) , (B) , (C) &(D) out of which ONLY ONE is correct .

Q.1 If $A=\begin{bmatrix}2 & 2\\ -3 & 2\end{bmatrix}$ and $B=\begin{bmatrix}0 & -1\\ 1 & 0\end{bmatrix}$, then $(B^{-1}A^{-1})^{-1}=$

(a) $\begin{bmatrix}2 & -2\\ 2 & 3\end{bmatrix}$ (b) $\begin{bmatrix}3 & -2\\ 2 & 2\end{bmatrix}$ (c) $\frac{1}{10}\begin{bmatrix}2 & 2\\ -2 & 3\end{bmatrix}$ (d) $\frac{1}{10}\begin{bmatrix}3 & 2\\ -2 & 2\end{bmatrix}$

Q.2 $A=\begin{bmatrix}0 & 3\\ 2 & 0\end{bmatrix}$ and $A^{-1}=\lambda(adj(A))$, then $\lambda=$

(a) $\frac{-1}{6}$ (b) $\frac{1}{3}$ (c) $\frac{-1}{3}$ (d) $\frac{1}{6}$

Q.3 The area of a triangle whose vertices are $A(1,-1,2)$, $B(2,1,-1)$ and $C(3,-1,2)$ is

(a) 13 (b) $\sqrt{13}$ (c) 6 (d) $\sqrt{6}$

Q.4 A man is known to speak the truth 3 out of 4 times. He throws a die and reports

	that it is a six. The probability that it is actually a six, is (a) $\frac{3}{8}$ (b) $\frac{1}{5}$ (c) $\frac{3}{4}$ (d) None of these
Q.5	The necessary condition for third quadrant region in xy-plane, is (a) $x>0, y<0$ (b) $x<0, y<0$ (c) $x<0, y>0$ (d) $x<0, y=0$
Q.6	If $(\tan^{-1}x)^2+(\cot^{-1}x)^2=\frac{5\pi^2}{8}$, then x equals (a) -1 (b) 1 (c) 0 (d) None of these
Q.7	If A and B are two events such that $P(A)=\frac{3}{8}$, $P(B)=\frac{5}{8}$ and $P(A\cup B)=\frac{3}{4}$, then $P\left(\frac{A}{B}\right)=$ (a) $\frac{2}{5}$ (b) $\frac{2}{3}$ (c) $\frac{3}{5}$ (d) None of these
Q.8	$\int \frac{x^2}{(x^2+2)(x^2+3)}dx=$ (a) $-\sqrt{2}\tan^{-1}x+\sqrt{3}\tan^{-1}x+c$ (b) $-\sqrt{2}\tan^{-1}\frac{x}{\sqrt{2}}+\sqrt{3}\tan^{-1}\frac{x}{\sqrt{3}}+c$ (c) $\sqrt{2}\tan^{-1}\frac{x}{\sqrt{2}}+\sqrt{3}\tan^{-1}\frac{x}{\sqrt{3}}+c$ (d) None of these
Q.9	The straight lines $\frac{x-1}{1}=\frac{y-2}{2}=\frac{z-3}{3}$ and $\frac{x-1}{2}=\frac{y-2}{2}=\frac{z-3}{-2}$ are (a) Parallel lines (b) Intersecting at 60° (c) Skew lines (d) Intersecting at right angle
Q.10	If $\begin{bmatrix}1&2&3\\3&1&2\\2&3&1\end{bmatrix}\begin{bmatrix}x\\y\\z\end{bmatrix}=\begin{bmatrix}4&-2\\0&-6\\-1&2\end{bmatrix}\begin{bmatrix}2\\1\end{bmatrix}$, then $(x,y,z)=$ (a) $(-4,2,2)$ (b) $(4,-2,-2)$ (c) $(4,2,2)$ (d) $(-4,-2,-2)$
(Q11 – Q15) Answer the following questions	
Q.11	A gunner who is hiding himself from the enemy is at the point G (2, 1, 3) and observes an enemy bomber flying along the plane $3x+6y+2z+10=0$. What is the least distance of G from the plane?
Q.12	$\int_0^1 \log\left(\frac{1}{x}-1\right)dx=$......................
Q.13	Evaluate: $\int \frac{\cos 2x-\cos 2\alpha}{\cos x-\cos\alpha}dx$
Q.14	Evaluate: $\int \frac{e^{5\log_e x}-e^{4\log_e x}}{e^{3\log_e x}-e^{2\log_e x}}\,dx$. **OR** $\int_0^{\pi/2}\frac{\sin x-\cos x}{1+\sin x\cos x}dx=$.........

Q.15	Write the IF of differential equation : $ye^{y}dx = (y^{3} + 2xe^{y})dy$.
	Fill in the blanks (Q16 – Q20)
Q.16	The relation $R = \left\{(a,b) : a = \frac{1}{b}; a, b \in Q_0\right\}$ (a)Reflexive but not symmetric(b) symmetric but not Reflexive and transitive (c) Symmetric and Transitive (d)Neither symmetric nor transitive
Q.17	If $f(x) = \begin{cases} \frac{1-\cos 4x}{x^2}, & \text{when } x < 0 \\ a, & \text{when } x = 0 \\ \frac{\sqrt{x}}{\sqrt{(16+\sqrt{x})}-4}, & \text{when } x > 0 \end{cases}$, is continuous at $x = 0$, then the value of 'a' will be (a) 8 (b) – 8 (c) 4 (d) None of these
Q.18	If $\begin{vmatrix} x+1 & 3 & 5 \\ 2 & x+2 & 5 \\ 2 & 3 & x+4 \end{vmatrix} = 0$, then $x =$ ....
Q.19	If the line ax + by + c = 0 is a tangent to the curve xy = 4 ,then show that either a > 0 , b > 0 or a < 0 , b < 0 . OR The value of c in Mean value theorem for the function f(x) = x(x - 2), x $\in$ [1, 2] is ....
Q.20	Find the angle between two vectors $\vec{a} \& \vec{b}$ having the same length $\sqrt{2}$ and their scalar product is -1. **OR** Find the angles at which the vector $\hat{i} + 2\hat{j} - 2\hat{k}$ is inclined to each of the coordinate axes.
	PART – B (Question 21 to 26 carry 2 mark each.)
Q.21	If $\cos^{-1}\frac{x}{a} + \cos^{-1}\frac{y}{b} = \alpha$ prove that $\frac{x^2}{a^2} - \frac{2xy}{ab}(\cos\alpha) + \frac{y^2}{b^2} = \sin^2\alpha$. **OR** Let f : R - $\left\{-\frac{3}{5}\right\} \rightarrow$ R be a function defined f(x) = $\frac{2x}{5x+3}$, find f^{-1} : Range of f $\rightarrow$ R - $\left\{-\frac{3}{5}\right\}$. Let f : R - $\left\{-\frac{3}{5}\right\} \rightarrow$ R be a function defined f(x) = $\frac{2x}{5x+3}$, find f^{-1} : Range of f $\rightarrow$ R - $\left\{-\frac{3}{5}\right\}$.

Q.22	If $x=e^{\frac{x}{y}}$, prove that $\frac{dy}{dx}=\frac{x-y}{x\log x}$.
Q.23	Find the points on the curve y = x^3 at which the slope of the tangent is equal to the y - coordinate of the point .
Q.24	Points L, M,N divide the sides BC,CA and AB of triangle ABC in the ratio 1:4, 3:2 and 3:7 respectively. Prove that $\vec{AL}+\vec{BM}+\vec{CN}$ is a vector parallel to $\vec{CK}$, where K divides AB in the ratio 1:3. **OR** If $\vec{a}$ and $\vec{b}$ are non-collinear vectors and $\vec{A}=(2x+3y-1)\vec{a}+(3x+2y+5)\vec{b}$ & $\vec{B}=(-x-4y)\vec{a}+(3x-4y+7)\vec{b}$, Find x and y such $7\vec{A}=3\vec{B}$.
Q.25	Find the length of the foot of perpendicular from the point $\left(1,\frac{3}{2},2\right)$ to the plane $2x-2y+4z+5=0$.
Q.26	The mean and variance of a binomial distribution are 4 & $\frac{4}{3}$ respectively.Find P(x ≥ 1).

PART – C (Question 27 to 32 carry 4 mark each.)

Q.27	Show that the relation R in the set A = {1, 2, 3, 4, 5} given by R = {(a, b): $\lvert a-b\rvert$ is even} is an equivalence relation. Show that all the elements of {1, 3, 5} are related to each other and the elements of {2, 4} are related to each other. But no elements of {1, 3, 5} is related to any elements of {2, 4} .
Q.28	Let $f(x)=x-\lvert x-x^2\rvert, x\in[-1,1]$. Find the point of discontinuity, (if any), of this function on $[-1,1]$. **OR** Find $\frac{dy}{dx}$, When $y=(\log x)^x+x^{x\cos x}$.
Q.29	From the differential equation of the family circles having radii 3.
Q.30	Evaluate: $\int_{-a}^{a}\sqrt{\frac{a-x}{a+x}}\,dx.$. **OR** Evaluate: $\int\frac{1-\cos x}{\cos x(1+\cos x)}dx$.
Q.31	A coin is tossed until a head appears or the tail appears 4 times in succession .Find the probability distribution of the number of tosses . Find the mean and variance also . **OR** A bag contains (2n+1) coins. It is known that 'n' of these coins have a head on both its sides whereas the rest of the coins are fair. A coin is picked up at random from the bag

	and is tossed. If the probability that the toss results in a head is $\frac{31}{42}$, find the value of 'n,.
Q.32	A manufacturer makes two products , A and B . Product A sells at Rs. 200 per unit and takes 30 minutes to make product B sells at Rs. 300 per unit and takes 1 hour to make .There is a permanent order of 14 units of product A and 16 units of product B. A working week consist of 40 hr of production and the weekly turnover must not be less than Rs. 10000. If the profit on each of the product A is Rs. 20 and on product B is Rs. 30 , then how many of each should be produced so that the profit is maximum ? Also find the maximum profit. Solve the problem graphically.
	PART – D (Question 33 to 36 carry 6 mark each.)
Q.33	If $\begin{vmatrix} a & b-y & c-z \\ a-x & b & c-z \\ a-x & b-y & c \end{vmatrix} = 0$, then using properties of determinants, find the value of $\frac{a}{x}+\frac{b}{y}+\frac{c}{z}$, where $x, y, z \neq 0$ **OR** State the condition under which the following system of equations have a unique solutions. If $A = \begin{bmatrix} 3 & 2 & 1 \\ 4 & -1 & 2 \\ 7 & 3 & -3 \end{bmatrix}$ find A^{-1} and hence solve the system of linear equations : $3x+4y+7z=14, x+2y-3z=0, 2x-y+3z=4.$
Q.34	Find Smaller area enclosed by the circle $x^2 + y^2 = 4$ and the lines x + y = 2.
Q.35	Show that the right circular cone of least curved surface and given volume has an altitude equal to $\sqrt{2}$ times the radius of the base. **OR** For the curve $y = 4x^3 - 2x^5$, find all point at which the tangent passes through origin.
Q.36	Find the direction ratios of the normal to the plane, which passes through the points (1, 0, 0) and (0, 1, 0) and makes angle $\frac{\pi}{4}$ which the plane x + y = 3. Also find the equation of the plane.
	" THE TWO MOST POWERFUL WARRIORS ARE PATIENCE AND TIME "