TARGET MATHEMATICS by Dr. AGYAT GUPTA

The Excellence Key...

(M.Sc, B.Ed., M.Phill, P.hd)

CODE:TMC- AG-PB-1 **REG.NO:-TMC -D/79/89/36/63**

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.

Time : 3 Hours — Maximum Marks : 80

CLASS – XII — **MATHEMATICS**

PRE-BOARD EXAMINATION 2019 -20

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

SECTION I: Single correct answer type

This section contains 12 multiple choice question. Each question has four choices (A) , (B) , (C) &(D) out of which ONLY ONE is correct .

Q.1 If $A=\begin{pmatrix}1&2&3\\3&1&2\\2&3&1\end{pmatrix}$ and $B=\begin{pmatrix}-5&7&1\\1&-5&7\\7&1&-5\end{pmatrix}$ then AB is equal to

(a) I_3 (b) $2I_3$ (c) $4I_3$ (d) $18I_3$

Q.2 Inverse of the matrix $\begin{bmatrix}3&-2&-1\\-4&1&-1\\2&0&1\end{bmatrix}$ is

(a) $\begin{bmatrix}1&2&3\\3&3&7\\-2&-4&-5\end{bmatrix}$ (b) $\begin{bmatrix}1&-3&5\\7&4&6\\4&2&7\end{bmatrix}$ (c) $\begin{bmatrix}1&2&3\\2&5&7\\-2&-4&-5\end{bmatrix}$ (d) $\begin{bmatrix}1&2&-4\\8&-4&-5\\3&5&2\end{bmatrix}$

Q.3 If the points whose position, vectors are $3\mathbf{i}-2\mathbf{j}-\mathbf{k}$, $2\mathbf{i}+3\mathbf{j}-4\mathbf{k}$, $-\mathbf{i}+\mathbf{j}+2\mathbf{k}$ and $4\mathbf{i}+5\mathbf{j}+\lambda\mathbf{k}$ lie on a plane, then $\lambda=$

(a) $-\frac{146}{17}$ (b) $\frac{146}{17}$ (c) $-\frac{17}{146}$ (d) $\frac{17}{146}$

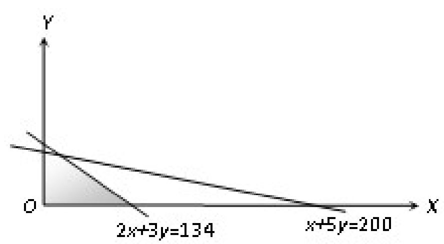
Q.4 If A and B are two events such that $P(A)=\frac{3}{8}$, $P(B)=\frac{5}{8}$ and $P(A\cup B)=\frac{3}{4}$, then $P\left(\frac{A}{B}\right)=$

(a) $\frac{2}{5}$ (b) $\frac{2}{3}$ (c) $\frac{3}{5}$ (d) None of these

Q.5 The co-ordinates of the foot of the perpendicular drawn from the origin to a plane is (2, 4, –3). The equation of the plane is

(a) $2x-4y-3z=29$ (b) $2x-4y+3z=29$

(c) $2x+4y-3z=29$ (d) None of these

Q.6	If $\cos^{-1} p + \cos^{-1} q + \cos^{-1} r = \pi$ then $p^2 + q^2 + r^2 + 2pqr =$ (a) 3 (b) 1 (c) 2 (d) -1
Q.7	The chances to fail in Physics are 20% and the chances to fail in Mathematics are 10%. What are the chances to fail in at least one subject (a) 28% (b) 38% (c) 72% (d) 82%
Q.8	$\int \frac{e^{2x}-1}{e^{2x}+1}dx =$ (a) $\frac{e^{2x}-1}{e^{2x}+1}+c$ (b) $\log(e^{2x}+1)-x+c$ (c) $\log(e^{2x}+1)+c$ (d)None of these
Q.9	A plane meets the co-ordinate axes in A,B,C and (α,β,γ) is the centered of the triangle ABC. Then the equation of the plane is (a) $\frac{x}{\alpha}+\frac{y}{\beta}+\frac{z}{\gamma}=3$ (b) $\frac{x}{\alpha}+\frac{y}{\beta}+\frac{z}{\gamma}=1$ (c) $\frac{3x}{\alpha}+\frac{3y}{\beta}+\frac{3z}{\gamma}=1$ (d) $\alpha x+\beta y+\gamma z=1$
Q.10	The minimum value of objective function $c = 2x + 2y$ in the given feasible region, is  (a) 134 (b) 40 (c) 38 (d) 80

Fill in the blanks (Q11 – Q15)

Q.11	If $f: R_+ \to [4,\infty)$ &: $f(x)=x^2+4$ then $f^{-1}(x)=$-------
Q.12	he value of constant k = …….. so that the given function is continuous at the indicate point; $f(x)=\begin{cases}\frac{1-\cos 2kx}{x^2}, & if\ x\neq 0\\ 8 & if\ x=0\end{cases}$ at x = 0
Q.13	If $\begin{bmatrix}1 & 1 & x\end{bmatrix}\begin{bmatrix}1&0&2\\0&2&1\\2&1&0\end{bmatrix}\begin{bmatrix}1\\1\\1\end{bmatrix}=0$, then x = …… .
Q.14	Which of the following is not a decreasing function on the interval $\left(0,\frac{\pi}{2}\right)$ (a) $\cos x$ (b) $\cos 2x$ (c) $\cos 3x$ (d) $\cot x$ OR The function $f(x)=2x^3-15x^2+36x+4$ is maximum at (a) $x=2$ (b) $x=4$ (c) $x=0$ (d) $x=3$
Q.15	In a triangle ABC, the sides AB and BC are represented by vectors $2\hat{i}-\hat{j}+2\hat{k}$, $\hat{i}+3\hat{j}+5\hat{k}$ respectively. Find the vector representing CA . **OR** If $\lvert\vec{a}\times\vec{b}\rvert=4$, $\lvert\vec{a}.\vec{b}\rvert=2$, then $\lvert\vec{a}\rvert 2\lvert\vec{b}\rvert 2=$------- .

(Q16 - Q20) Answer the following questions

Q.16	Find the real values of λ for which the following system of linear equations has non-trivial solutions. $2\lambda x-2y+3z=0$; $x+\lambda y+2z=0$; $2x+\lambda z=0$

Q.17	Evaluate: $\int_0^2 x\sqrt{(2-x)}dx$.
Q.18	Evaluate: $\int \frac{x^3}{\sqrt{x^2+2}}dx =$ (a) $\frac{1}{3}(x^2+2)^{3/2}+2(x^2+2)^{1/2}+c$ (b) $\frac{1}{3}(x^2+2)^{3/2}-2(x^2+2)^{1/2}+c$ (c) $\frac{1}{3}(x^2+2)^{3/2}+(x^2+2)^{1/2}+c$ (d) $\frac{1}{3}(x^2+2)^{3/2}-(x^2+2)^{1/2}+c$
Q.19	Evaluate: $\int \frac{dx}{x\log x\log(\log x)}$ **OR** Evaluate: $\int \tan^4 x\, dx$
Q.20	The differential equation obtained by eliminating the arbitrary constant C in the equation representing the family of curves xy = C cos x is ……………
	PART – B (Question 21 to 26 carry 2 mark each.)
Q.21	Prove that : $2\tan^{-1}\frac{1}{5}+\sec^{-1}\frac{5\sqrt{2}}{7}+2\tan^{-1}\frac{1}{8}=\frac{\pi}{4}$. **OR** Relation R in the set A = {1, 2, 3, 4, 5,6,7} given by R = {(a, b): $\|a-b\|$ is even} Then find the number of set of all elements to related to 3 .
Q.22	If $y=\sin\left(2\tan^{-1}\sqrt{\frac{1-x}{1+x}}\right)$, find $\frac{dy}{dx}$.
Q.23	The volume of metal of hollow sphere is constant. If the inner radius at the rate of 1 cm/s, find the rate of the outer radius, when the radii are 3

	cm and 6 cm respectively.
Q.24	If $\hat{i}+\hat{j}+\hat{k}$, $2\hat{i}+5\hat{j}, 3\hat{i}+2\hat{j}-3\hat{k}$ and $\hat{i}-6\hat{j}-\hat{k}$ are the position vectors of the pints A,B,C and D respectively, find the angle between $\vec{AB}$ and $\vec{CD}$. Deduce that $\vec{AB}$ and $\vec{CD}$ are parallel . **OR** Find the values of 'a' for which the vector $\vec{r}=(a^2-4)i+2j-(a^2-9)k$ makes acute angles with the coordinate axes.
Q.25	Show that the line $\vec{r}=(\hat{i}+\hat{j})+\lambda(2\hat{i}+\hat{j}+4\hat{k})$ is parallel to the plane $\vec{r}.(-2\hat{i}+\hat{k})=5$ .Also find the distance between the line and the plane.
Q.26	Two cards are drawn without replacement from a well shuffled pack of 52 cards. Find the probability that one is a king and other is a queen of opposite color.
	PART – C (Question 27 to 32 carry 4 mark each.)
Q.27	If $f:R-\left\{\frac{7}{5}\right\}\to R-\left\{\frac{3}{5}\right\}$ be defined as $f(x)=\frac{3x+4}{5x-7}$ & $g:R-\left\{\frac{3}{5}\right\}\to R-\left\{\frac{7}{5}\right\}$ be defined as $g(x)=\frac{7x+4}{5x-3}$.Prove that $gof=I_A$ & $(fog)=I_B$ where $B=R-\left\{\frac{3}{5}\right\}$ & $A=R-\left\{\frac{7}{5}\right\}$.Find also g^{-1}, f^{-1} & $(gof)^{-1}$.
Q.28	If $y=\sin(\sin x)$, prove that $\frac{d^2y}{dx^2}+\tan x\frac{dy}{dx}+y\cos^2 x=0$. **OR** Find the derivative of the $\cos^{-1}\left(\sin\sqrt{\frac{1+x}{2}}\right)+x^x$ f(x) w.r.t. x at x = 1.

Q.29 Find the particular solution of the differential equation $\frac{dy}{dx} + y\tan x = 3x^2 + x^3 \tan x, x \neq \frac{\pi}{2}$, given that $y = 0$ when $x = \frac{\pi}{3}$.

Q.30 Evaluate: $\int_0^1 x(\tan^{-1} x)^2 dx$.

OR

Evaluate: $\int \cos 2\theta \log\left(\frac{\cos\theta + \sin\theta}{\cos\theta - \sin\theta}\right) d\theta$.

Q.31 There are 4 card numbered 1 to 4, one number on one card. Two cards are drawn at random without replacement Let X denotes the sum of the numbers on the two drawn cards. Find the mean and variance of X.

OR

Bag I contains 4 red and 5 black balls and bag II contains 3 red and 4 black balls. One ball is transferred from bag I to bag II and then two balls are drawn at random (without replacement) from bag II. The balls so drawn are both found to be black. Find the probability that the transferred ball is black.

Q.32 A manufacturer produces nuts and bolts. It takes 1 hour of work on machine A and 3 hours on machine B to produce a package of nuts. It takes 3 hours on machine A and 1 hour on machine B to produce a package of bolts. He earns a profit, of Rs 17.50 per package on nuts and Rs. 7.00 per package on bolts. How many packages of each should e produced each day so as to maximize his profit, if he operates his machines for at the most 12 hours a day?

PART – D **(Question 33 to 36 carry 6 mark each.)**

Q.33 Using integration, find the area of the region bounded by the line

$x - y + 2 = 0$ the curve $x = \sqrt{y}$ and y-axis.

Q.34 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. hence solve the following system of equations by Cramer's rule : $9x + 7y + 3z = 6$; $5x - y + 4z = 1$; $6x + 8y + 2z = 4$.

Q.35 Find the equation of tangents to the curve $y = \cos(x + y)$, $-2\pi \langle x \langle 2\pi$ that are parallel to the line $x + 2y = 0$.

OR

A large window is in the form of a rectangle surmounted by a Equilateral triangle . The total perimeter of the window is 12 m, find the dimensions of the window to admit maximum light through the whole opening .

Q.36 Find the distance of the point (3 , -2, 1) from the plane $3x + y - z + 2 = 0$ measured parallel to the line $\frac{x-1}{2} = \frac{y+2}{-3} = \frac{z-1}{1}$. Also find the foot of the perpendicular from the given point upon the given line .

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जिन्हें अपना भविष्य बेहतर करना है, वे आज मेहनत करते हैं, कल के भरोसे नहीं बैठते।