TARGET MATHEMATICS by Dr. AGYAT GUPTA
The Excellence Key...
(M.Sc, B.Ed., M.Phill, P.hd)

CODE:AG-11-TMC-TS-XII-1403   **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 14 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 2020-21

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 .

Suppose you visit to a hotel with your family and you observe that floor of a hotel is made up of mirror polished Kota stone. Also, there is a large crystal chandelier attached at the ceiling of the hotel. Consider the floor of the hotel as a

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plane having equation $3x - y + 4z = 2$ and crystal chandelier as the point $(3, -2, 1)$.
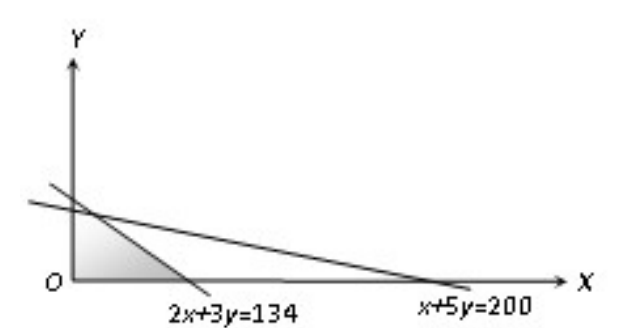

Based on the above information, answer the following questions:

Q.1	The d.r.'s of the perpendicular from the point $(3, -2, 1)$ to the plane $3x - y + 4z = 2$, is (a) $< 3,1,4 >$ (b) $< 3, -1,4 >$ (c) $< 4,1,3 >$ (d) $< 4,-1,3 >$
Q.2	The length of the perpendicular from the point $(3, -2, 1)$ to the plane $3x - y + 4z = 2$, is

(a) $\sqrt{13}$ units (b) $\frac{1}{2}\sqrt{13}$ units (c) $\sqrt{\frac{13}{2}}$ units (d) $\frac{13}{\sqrt{2}}$ units

Q.3	The equation of the perpendicular from the point $(3, -2, 1)$ to the plane $3x - y + 4z = 2$, is (a) $\dfrac{x-3}{3} = \dfrac{y-2}{-1} = \dfrac{z-1}{4}$ (b) $\dfrac{x-3}{3} = \dfrac{y+2}{-1} = \dfrac{z-1}{4}$ (c) $\dfrac{x+3}{3} = \dfrac{y+2}{-1} = \dfrac{z-1}{4}$ (d) None of these
Q.4	The foot of the perpendicular drawn from the point $(3, -2, 1)$ to the plane $3x - y + 4 z = 2$, is (a) $\left(\dfrac{3}{2}, \dfrac{-3}{2}, -1\right)$ (b) $\left(\dfrac{-3}{2}, \dfrac{3}{2}, -1\right)$ (c) $\left(\dfrac{3}{2}, \dfrac{3}{2}, -1\right)$ (d) $\left(\dfrac{1}{2}, \dfrac{3}{2}, -1\right)$
Q.5	The image of the point $(3, -2, 1)$ in the given plane is (a) $(0, 1, 3)$ (b) $(0, -1, 3)$ (c) $(0, 1, -3)$ (d) $(0, -1, -3)$
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	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) $-\dfrac{146}{17}$ (b) $\dfrac{146}{17}$ (c) $-\dfrac{17}{146}$ (d) $\dfrac{17}{146}$

Q.8 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.9 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.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;

$f(x)=\begin{cases}\dfrac{1-\cos 2kx}{x^2},&if\ x\neq 0\\8,&if\ x=0\end{cases}$ at x = 0

Q.13 If $[1\ \ 1\ \ x]\begin{bmatrix}1&0&2\\0&2&1\\2&1&0\end{bmatrix}\begin{bmatrix}1\\1\\1\end{bmatrix}=0$, then x = …… .

Q.14 Which of the following is not a decreasing function on the interval $\left(0,\dfrac{\pi}{2}\right)$

(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 $|\vec{a} \times \vec{b}| = 4$, $|\vec{a} \cdot \vec{b}| = 2$, then $|\vec{a}|2|\vec{b}|^2 = ---$.

(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: $\int \dfrac{x^3}{\sqrt{x^2 + 2}}dx =$

(a) $\dfrac{1}{3}(x^2 + 2)^{3/2} + 2(x^2 + 2)^{1/2} + c$

(b) $\dfrac{1}{3}(x^2 + 2)^{3/2} - 2(x^2 + 2)^{1/2} + c$

(c) $\dfrac{1}{3}(x^2 + 2)^{3/2} + (x^2 + 2)^{1/2} + c$

(d) $\dfrac{1}{3}(x^2 + 2)^{3/2} - (x^2 + 2)^{1/2} + c$

Q.19 Evaluate: $\int \dfrac{dx}{x \log x \log(\log x)}$

OR

Evaluate: $\int \tan^4 x \, dx$

Q.20 For what value of a the vectors $2\hat{i} - 3\hat{j} + 4\hat{k}$ and $a\hat{i} + 6\hat{j} - 8\hat{k}$ are collinear .

PART – B   (Question 21 to 26 carry 2 mark each.)

Q.21 Prove that : $2 \tan^{-1}\dfrac{1}{5} + \sec^{-1}\dfrac{5\sqrt{2}}{7} + 2\tan^{-1}\dfrac{1}{8} = \dfrac{\pi}{4}$.

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 $y = \sin\left(2\tan^{-1}\sqrt{\dfrac{1-x}{1+x}}\right)$, find $\dfrac{dy}{dx}$.

Q.23 Find the equation of a tangent to the curve given by

	$x = a\sin^3 t,\ y = b\cos^3 t$ at a point where $t = \dfrac{\pi}{2}$.
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 $f:R-\left\{\dfrac{7}{5}\right\}\to R-\left\{\dfrac{3}{5}\right\}$ be defined as $f(x)=\dfrac{3x+4}{5x-7}$ & $g:R-\left\{\dfrac{3}{5}\right\}\to R-\left\{\dfrac{7}{5}\right\}$ be defined as $g(x)=\dfrac{7x+4}{5x-3}$·Prove that

	$gof=I_A$ & $(fog)=I_B$ where $B=R-\left\{\dfrac{3}{5}\right\}$ & $A=R-\left\{\dfrac{7}{5}\right\}$. Find also g^{-1}, f^{-1} & $(gof)^{-1}$.
Q.28	If $y=\sin(\sin x),$ prove that $\dfrac{d^2 y}{dx^2}+\tan x\dfrac{dy}{dx}+y\cos^2 x=0$. **OR** Find the derivative of the $\cos^{-1}\left(\sin\sqrt{\dfrac{1+x}{2}}\right)+x^x$ f(x) w.r.t. x at x = 1.
Q.29	Find the particular solution of the differential equation $\dfrac{dy}{dx}+y\tan x=3x^2+x^3\tan x, x\neq\dfrac{\pi}{2}$, given that y = 0 when $x=\dfrac{\pi}{3}$.
Q.30	Evaluate: $\int\dfrac{(3\sin\alpha-2)\cos\alpha}{5-\cos^2\alpha-4\sin\alpha}d\alpha$. **OR** Evaluate: $\int\cos 2\theta\log\left(\dfrac{\cos\theta+\sin\theta}{\cos\theta-\sin\theta}\right)d\theta$.
Q.31	The members of a consulting firm rent cars from three rental agencies:50% from agency X, 30% from agency Y and 20% from agency Z. From past experience it is

known that 9% of the cars from agency X need a service and tuning before renting, 12% of the cars from agency Y need a service and tuning before renting and 10% of the cars from agency Z need a service and tuning before renting. If the rental car delivered to the firm needs service and tuning, find the probability that agency Z is not to be blamed.

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 $\dfrac{a}{x} + \dfrac{b}{y} + \dfrac{c}{z}$, where $x, y, z \neq 0$

OR

Given two matrix , $A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix} \& B = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$,

Verify that $BA = 6I$, use the result to solve the system $x - y = 3$, $2x + 3y + 4z = 17$, $y + 2z = 7$.

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 $\dfrac{x-1}{2} = \dfrac{y+2}{-3} = \dfrac{z-1}{1}$ ·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।