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

CLASS – XII (PRE - BOARD) TERM -I

(CODE-041) TMC-TS-AG-TS-1-OBJ-(MCQ)

Time : 90 MINUTES **Maximum Marks : 40**

General Instructions:

1. This question paper contains three sections – A, B and C. Each part is compulsory.
2. Section - A has 20 MCQs, attempt any 16 out of 20.
3. Section - B has 20 MCQs, attempt any 16 out of 20
4. Section - C has 10 MCQs, attempt any 8 out of 10.
5. There is no negative marking.
6. All questions carry equal marks.

SECTION – A

In this section, attempt any 16 questions out of Questions 1 – 20. Each Question is of 1 mark weightage. In case more than desirable number of questions are attempted, ONLY first 16 will be considered for evaluation.

Q.1 $\cos^{-1}\left(\frac{a}{x}\right) - \cos^{-1}\left(\frac{b}{x}\right) = \cos^{-1}\left(\frac{1}{b}\right) - \cos^{-1}\left(\frac{1}{a}\right), |a| \geq 1, |b| \geq 1.$ then x =

(a) $\pm ab$ (b) $-ab$ (c) ab (d) none

Q.2 If the function $f(x) = \begin{cases} 1 + \sin\frac{\pi x}{2}, \text{for} -\infty < x \leq 1 \\ ax + b, \text{for} 1 < x < 3 \\ 6\tan\frac{x\pi}{12}, \text{for} 3 \leq x < 6 \end{cases}$ is continuous in the interval $(-\infty, 6)$, then the values of a and b are respectively

(a) 0, 2 (b) 1, 1 (c) 2, 0 (d) 2, 1

Q.3 Sum of all element of the inverse of the matrix $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ is

(a)1 (b) 3 (c) o (d) none

Q.4 If $A = \begin{bmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{bmatrix}$, then $A^n =$

(a) $\begin{bmatrix} na & 0 & 0 \\ 0 & nb & 0 \\ 0 & 0 & nc \end{bmatrix}$ (b) $\begin{bmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & n \end{bmatrix}$ (c) $\begin{bmatrix} a^n & 0 & 0 \\ 0 & b^n & 0 \\ 0 & 0 & c^n \end{bmatrix}$ (d) None of these

Q.5 $y=x(x-3)^2$ decreases for the values of x given by:

(a) $1<x<3$ (b) $x<0$ (c) $x>0$ (d) $0<x<\frac{3}{2}$

Q.6 If $A = \begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 0 \\ 2 & 3 \end{bmatrix}$, then

(a) $A^2 = A$ (b) $B^2 = B$ (c) $AB \neq BA$ (d) $AB = BA$

Q.7 Let R be a relation on N defined by $R = \{(1+x, 1+x^2) : x \leq 5, x \in N\}$.
Which of the following is false?

a. R = {(2,2),(3,5), (4,10),(5,17), (6,25)}
b. Domain of R = {2,3,4,5,6}
c. Range of R = {2,5,10,17,26}
d. None of the above

Q.8	If $\begin{bmatrix}1 & 1 & 1\\ 1 & -2 & -2\\ 1 & 3 & 1\end{bmatrix}\begin{bmatrix}x\\ y\\ z\end{bmatrix}=\begin{bmatrix}0\\ 3\\ 4\end{bmatrix}$, then $\begin{bmatrix}x\\ y\\ z\end{bmatrix}$ is equal to (a) $\begin{bmatrix}1\\ 1\\ 1\end{bmatrix}$ (b) $\begin{bmatrix}1\\ -2\\ 3\end{bmatrix}$ (c) $\begin{bmatrix}1\\ -2\\ 1\end{bmatrix}$ (d) $\begin{bmatrix}1\\ 2\\ -3\end{bmatrix}$
Q.9	The equation of the normal to the curve $x^2=4y$ which passes through the point (1,2) (a) x - y = 1 (b) x + y = 3 (c) 2x + y = 4 (d) None of these
Q.10	If $a>b>c>0$, then $\cot^{-1}\left(\frac{1+ab}{a-b}\right)+\cot^{-1}\left(\frac{1+bc}{b-c}\right)+\cot^{-1}\left(\frac{1+ca}{c-a}\right)=$ ---- (a) π (b) 2π (c) 0 (d) None of these
Q.11	If R is an equivalence relation on a set A, then R^{-1} is (a) Reflexive only (b) Symmetric but not transitive (c) Equivalence (d) None of these
Q.12	If $f(x)=mx+c, f(0)=f'(0)=1$ then $f(2)=$ (a) 1 (b) 2 (c) 3 (d) – 3
Q.13	If $A=\begin{bmatrix}a & 0 & 0\\ 0 & a & 0\\ 0 & 0 & a\end{bmatrix}$, then the value of $\lvert$ adj A $\rvert$ (a) a^6 (b) a^3 (c) a^9 (d) none
Q.14	If $y=\cot^{-1}(x^2)$, then $\frac{dy}{dx}$ is equal to (a) $\frac{2x}{1+x^4}$ (b) $\frac{2x}{\sqrt{1+4x}}$ (c) $\frac{-2x}{1+x^4}$ (d) $\frac{-2x}{\sqrt{1+x^2}}$
Q.15	$\begin{bmatrix}a & b\\ -b & a\end{bmatrix}\begin{bmatrix}a & -b\\ b & a\end{bmatrix}=$ (a) $(a^2+b^2)I$ (b) $(a^2-b^2)I$ (c) $(a+b)I$ (d) NONE
Q.16	If $y=4x-5$ is tangent to the curve $y^2=px^3+q$ at (2, 3), then (a) $p=2,q=-7$ (b) $p=-2,q=7$ (c) $p=-2,q=-7$ (d) $p=2,q=7$
Q.17	If A is a square matrix of order 3 x 3 such that $\lvert A\rvert=2$. Write the value of $\lvert A^TA\rvert$ (a) 4 (b) 2 (c) 16 (d) none
Q.18	Differential coefficient of $\cos^{-1}(\sqrt{x})$ with respect to $\sqrt{(1-x)}$ is (a) $\sqrt{x}$ (b) $-\sqrt{x}$ (c) $\frac{1}{\sqrt{x}}$ (d) $-\frac{1}{\sqrt{x}}$
Q.19	The maximum value of μ = 3x + 4y subjected to the conditions x + y ≤ 40, x + 2y ≤ 60; x, y ≥ 0 is (a) 130 (b) 120 (c) 40 (d) 140
Q.20	The height of the largest cone that can be inscribed in a sphere of radius 12 is **(a)** 16 **(b)** 8 **(c)** 18 **(d) NONE**

SECTION – B

In this section, attempt any 16 questions out of the Questions 21 - 40. Each Question is of 1 mark weightage. **In case more than desirable number of questions are attempted, ONLY first 16 will be considered for evaluation.**

Q.21	Set A has 3 elements and set B has 4 elements. The number of invertible function that can be defined from A to B is

	(a) 9 (b) 24(c) 6 (d) 0
Q.22	If $x = a\sin\theta$ and $y = b\cos\theta$, then $\frac{d^2y}{dx^2}$ is (a) $\frac{a}{b^2}\sec^2\theta$ (b) $\frac{-b}{a}\sec^2\theta$ (c) $\frac{-b}{a^2}\sec^3\theta$ (d) $\frac{-b}{a^2}\sec^3\theta$
Q.23	The maximum value of Z = 4 x + 3y subjected to the constraints 3x + 2y ≥ 160, 5x + 2y ≥ 200, x + 2y ≥ 80, x, y ≥ 0 is (a) 320 (b) 300 (c) 230 (d) None of these
Q.24	If $y = x^{\sin x}$, then $\frac{dy}{dx}$ = (a) $\frac{x\cos x.\log x + \sin x}{x}.x^{\sin x}$ (b) $\frac{y[x\cos x.\log x + \cos x]}{x}$ (c) $y[x\sin x.\log x + \cos x]$ (d)None of these
Q.25	If $D = diag(d_1, d_2, d_3 ....., d_n)$ where $d_i \neq 0$ for all $i = 1, 2, 3, ..., n$, then D^{-1} is equal to (a) D (b) $diag(d_1^{-1}, d_2^{-1}, d_3^{-1} ....., d_n^{-1})$ (c) I (d) None of these
Q.26	The function f given by $f(x) = \log\sin x$ is strictly increasing (a) $\left(0, \frac{\pi}{2}\right)$ (b) $\left(\frac{\pi}{2}, \pi\right)$ (c) $(0, \pi)$ (d) None of these
Q.27	$\sec[\cot^{-1}\{\sin(\tan^{-1}(\cos ec(\cos^{-1}\frac{1}{2})))\}]$ (a) $\frac{\sqrt{11}}{2}$ (b) $\sqrt{\frac{11}{2}}$ (c) $\frac{11}{2}$ (d)NONE
Q.28	If $A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 9 \\ 1 & 8 & 27 \end{bmatrix}$, then the value of $\lvert Coff\ A\rvert$ is (a) 36(b)72(c) 144 (d) None of these
Q.29	If f(x) = cosx, then (a) f(x) is strictly decreasing in (0, π) (c) f(x) is neither increasing nor decreasing in (π,2π) (b) f(x) is strictly increasing in (0,2π) (d) All the above are correct
Q.30	Let A = {1, 2, 3…… 9} and R be the relation in $A \times A$ defined by (a, b) R(c, d) if a + d = b + c for (a, b), (c, d)$\in A \times A$. Then the number of equivalence class [(2, 5)] (A) 6 (B) 8 (C) 7 (D) none of these
Q.31	If $f(x) = \begin{cases} x + \lambda, & x < 3 \\ 4, & x = 3 \\ 3x - 5, & x > 3 \end{cases}$ is continuous at $x = 3$, then λ = (a) 4 (b) 3(c) 2 (d) 1
Q.32	If $B = \begin{bmatrix} 3 & -4 \\ -1 & 2 \end{bmatrix}$ find matrix A such that AB = I (A) $\begin{bmatrix} 1 & 2 \\ 1/2 & 3/2 \end{bmatrix}$ (B) $\begin{bmatrix} 2 & 4 \\ 1 & 3 \end{bmatrix}$ (C) $\begin{bmatrix} 1 & 2 \\ 1/2 & -3/2 \end{bmatrix}$ (D) NONE
Q.33	To maximize the objective function z = 2x + 3y under the constraints x + y ≤ 30, x – y ≥ 0, y ≤ 12, x ≤ 20, y ≥ 3 and x, y ≥ 0, is at (a) x = 12, y = 18 (b) x = 18, y = 12 (c) x = 12, y = 12 (d) x = 20, y = 10

Q.34	The absolute maximum values of the function f given by $f(x) = \sin^2 x - \cos x,\ x \in [0, \pi]$. (a) 1 (b) $\frac{5}{4}$ (c) -1 (d) NONE
Q.35	If $X_{m\times 4} Y_{p\times 4} = Z_{5\times b}$, for three matrices X,Y,Z, find the values of m, p and b. (A) $m=4, p=5, b=4$ (B) $m=4, p=4, b=5$ (C) $m=5, p=4, b=4$ (D) NONE
Q.36	If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = 3\pi$, then $xy + yz + zx =$ (a) 0 (b)1(c)3(d)–3
Q.37	Let $A = [a_{ij}]_{n\times n}$ be a square matrix and let c_{ij} be cofactor of a_{ij} in A, then (a) $\lvert C\rvert = \lvert A\rvert$ (b) $\lvert C\rvert = \lvert A\rvert^{n-1}$ (c) $\lvert C\rvert = \lvert A\rvert^{n-2}$ (d) None of these
Q.38	Let f and g be functions defined by $f(x) = \frac{x}{x+1}$, $g(x) = \frac{x}{1-x}$, then $(fog)(x)$ is (a) $\frac{1}{x}$ (b) $\frac{1}{x-1}$ (c) $x-1$ (d) x
Q.39	At what point on the curve $x^3 - 8a^2 y = 0$, the slope of the normal is $\frac{-2}{3}$ (a) (a, a) (b) $(2a, -a)$ (c) $(2a, a)$ (d) None of these
Q.40	If $A = \begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix}$ is such that $A^2 = I$, then (A) $1 + \alpha^2 + \beta\gamma = 0$ (B) $1 - \alpha^2 + \beta\gamma = 0$ (C) $1 - \alpha^2 - \beta\gamma = 0$ (D) $1 + \alpha^2 - \beta\gamma = 0$

SECTION – C

In this section, attempt any 8 questions. Each question is of 1-mark weightage. Questions 41-50 are based on a Case-Study. In case more than desirable number of questions are attempted, ONLY first 8 will be considered for evaluation.

Q.41	For the curve $y = 4x^3 - 2x^5$, find all point at which the tangent passes through origin. (a) (0, 0)(b)(1,2) (c) (-1 , -2) (d) all of these
Q.42	A firm makes pants and shirt. A shirt takes 2 hour on machine and 3 hour of man labour while a pant takes 3 hour on machine and 2 hour of man labour. In a week there are 70 hour of machine and 75 hour of man labour available. If the firm determines to make x shirts and y pants per week, then for this the linear constraints are (a) x ≥ 0, y ≥ 0,2x + 3y ≥ 70,3x + 2y ≥ 75 (b) x ≥ 0, y ≥ 0,2x + 3y ≤ 70,3x + 2y ≥ 75 (c) x ≥ 0, y ≥ 0,2x + 3y ≥ 70,3x + 2y+ ≤ 75 (d) x ≥ 0, y ≥ 0,2x + 3y ≤ 70,3x + 2y ≤ 75
Q.43	A point on the hypotenuse of a right triangle is at a distance ‘8’ and ‘27’ from the sides of the triangle. The minimum length of the hypotenuse is **(a) $[13]^{3/2}$ (b) $[35]^{3/2}$ (c) $[13]^{2/3}$ (d) none**
Q.44	A whole sale merchant wants to start the business of cereal with Rs. 24,000. Wheat is Rs. 400 per quintal and rice is Rs. 600 per quintal. He has capacity to store 200 quintal cereal. He earns the profit Rs. 25 per quintal on wheat and Rs. 40 per quintal on rice. If he store x quintal rice and y quintal wheat, then for

	maximum profit the objective function is (a) 25x + 40y (b) 40x + 25y (c) 400x + 600y (d) $\frac{400x}{40}+\frac{600y}{25}$
Q.45	If $\begin{vmatrix} y+z & x & y \\ z+x & z & x \\ x+y & y & z \end{vmatrix} = k(x+y+z)(x-z)^2$, then $k=$ (a) 2 (b) 1(c) 3 (d) -1
	CASE STUDY A magazine company in a town has 5000 subscriber on its list and collects fix charges of Rs 3000 per year from each subscriber. The company proposes to increase the annual charges and it is believed that for every increase of Rs 1, one subscriber will discontinue service.  Based on the above information, answer the following questions.
Q.46	If x denote the amount of increase in annual charges, then revenue R, as a function of x can be represented as (a) $R(x)=3000\times5000\times x$ (b) $R(x)=(3000-2x)(5000+2x)$ (c) $R(x)=(5000+x)(3000-x)$ (d) $R(x)=(3000+x)(5000-x)$
Q.47	If magazine company increases Rs 500 as annual charges, then R is equal to (a) $Rs15750000$ (b) $Rs16750000$ (c) $Rs17500000$ (d) $Rs15000000$
Q.48	If revenue collected by the magazine company is Rs 15640000, then value of amount increased as annual charges for each subscriber, is (a) 400 (b) 16000 (c) Both (a) and (b) (d) None of these
Q.49	What amount of increase in annual charges will bring maximum revenue? (a) $Rs1000$ (b) $Rs2000$ (c) $Rs3000$ (d) $Rs4000$
Q.50	Maximum revenue is equal to (a) $Rs15000000$ (b) $Rs16000000$ (c) $Rs20500000$ (d) $Rs25000000$
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