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-2-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 If $\cos[\tan^{-1}\{\sin(\cot^{-1}\sqrt{3})\}] = y$, then

(A) $y = \frac{4}{5}$ (B) $y = \frac{2}{\sqrt{5}}$ (C) $y = -\frac{2}{\sqrt{5}}$ (D) $y^2 = \frac{10}{11}$

Q.2 Determine the values of a & b for which the function $f(x) = \begin{cases} \frac{\sin(a+1)x + 2\sin x}{x}, & for\ x < 0 \\ 2, & for\ x = 0 \\ \frac{\sqrt{1+bx} - 1}{x}, & for\ x > 0 \end{cases}$ is continuous at x = 0

(a) $a = 1; b = 4$ (b) $a = -1; b = 4$ (c) $a = -1; b = -4$ (d) none

Q.3 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.4 If $A = \begin{bmatrix} 0 & 1 & -2 \\ -1 & 0 & 5 \\ 2 & 5 & 0 \end{bmatrix}$, then

(a) $A' = A$ (b) $A' = -A$ (c) $A' = 2A$ (d) None of these

Q.5 The function $x^4 - 4x$ is decreasing in the interval

(a) $[-1, 1]$ (b) $(-\infty, 1)$ (c) $[1, +\infty)$ (d) None of these

Q.6 If A is a square matrix, then A will be non-singular if

(a) $|A| = 0$ (b) $|A| > 0$ (c) $|A| < 0$ (d) $|A| \neq 0$

Q.7 Let $P = \{(x,y) | x^2 + y^2 = 1, x, y \in R\}$. Then P is

(a) Reflexive (b) Symmetric
(c) Transitive (d) Anti-symmetric

Q.8 If matrix A is of order $m \times n$ and B is of order $n \times p$, then order of $(AB)^T$ is equal to

(a) Order of AB (b) Order of BA (c) Order of $A^T B^T$ (d) Order of $B^T A^T$

Q.9 The slope of normal to curve $x = a\cos^3\theta, y = a\sin^3\theta$ at $\theta = \frac{\pi}{4}$ is

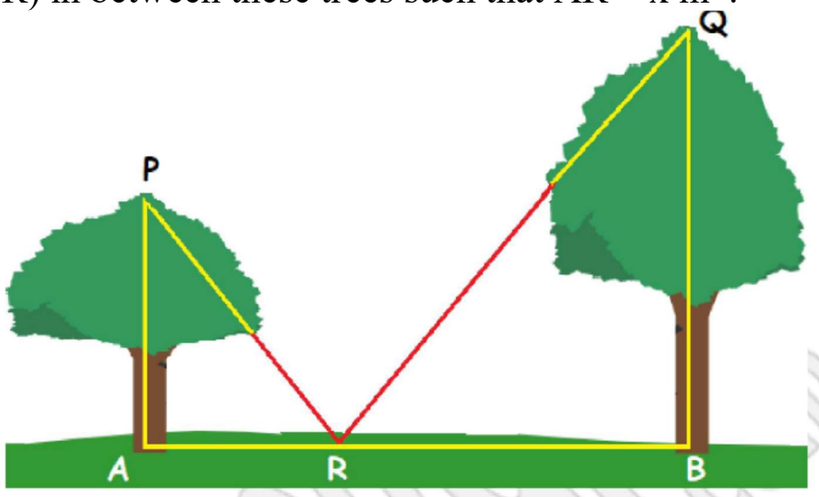
	(a) -1 (b) 1(c)0(d) none
Q.10	If $\cos^{-1} x - \cos^{-1}\frac{y}{2} = \alpha$, then $4x^2 - 4xy\cos\alpha + y^2$ is equal to (a) $4\sin^2\alpha$ (b) $-4\sin^2\alpha$ (c) $2\sin 2\alpha$ (d) 4
Q.11	A relation R in set A = {1,2,3} is defined as R = {(1, 1), (1, 2), (2, 2), (3, 3)}. Which of the following ordered pair in R shall be removed to make it an equivalence relation in A? a) (1, 1) b) (1, 2) c) (2, 2) d) (3, 3)
Q.12	If $y = \cos(\sin x^2)$, then at $x = \sqrt{\frac{\pi}{2}}, \frac{dy}{dx} =$ (a) – 2 (b) 2 (c) $-2\sqrt{\frac{\pi}{2}}$ (d) 0
Q.13	If A is square matrix of order 3 × 3 such that adj (4A) = k adj A, then k = (a)64 (b)4(c)16(d) NONE
Q.14	If $y = (x^x)^x$, then $\frac{dy}{dx} =$ (a) $(x^x)^x(1+2\log x)$ (b) $(x^x)^x(1+\log x)$ (c) $x(x^x)^x(1+2\log x)$ (d) $x(x^x)^x(1+\log x)$
Q.15	If A is a square matrix of order n x n such that $\|A\| = \lambda$ .Write the value of $\|-A\|$ **(a)** $(\lambda)^n$ **(b)** $-(\lambda)^n$ **(c)** $(-1)^n\lambda$ **(d) none**
Q.16	The line $x + y = 2$ is tangent to the curve $x^2 = 3 - 2y$ at its point **(a)(1, 1)(b)(–1, 1)(c) ($\sqrt{3}$, 0) (d) (3, –3)**
Q.17	If $A^2 - A + I = O$, then $A^{-1} =$ **(a)** A^{-2} **(b)** $A+I$ **(c)** $I-A$ **(d)** $A-I$
Q.18	If $y = \log\frac{1+\sqrt{x}}{1-\sqrt{x}}$, then $\frac{dy}{dx} =$ (a) $\frac{\sqrt{x}}{1-x}$ (b) $\frac{1}{\sqrt{x}(1-x)}$ (c) $\frac{\sqrt{x}}{1+x}$ (d) $\frac{1}{\sqrt{x}(1+x)}$
Q.19	The corner points of the feasible region determined by the following system of linear inequalities: 2x + y ≤ 10, x + 3y ≤ 15, xy ≥ 0 are (0, 0), (5, 0), (3, 4) and (0, 5). Let Z = px + qy, where p, q > 0. Condition on p and q so that the maximum of Z occurs at both (3, 4) and (0, 5) is (A) p = q (B) p = 2q (C) p = 3q (D) q = 3p
Q.20	The point $(0, 5)$ is closest to the curve $x^2 = 2y$ at (a) $(2\sqrt{2},0)$ (b) (0, 0)(c) $(2, 2)$ (d) None of these

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	The total number of bijective function from set A to A if A ={1, 2 ,3, 4} **(a) 256 (b) 16 (c) 24 (d) 0**

Q.22	The first derivative of the function $\left[\cos^{-1}\left(\sin\sqrt{\frac{1+x}{2}}\right)+x^x\right]$ with respect to x at $x = 1$ is (a) $\frac{3}{4}$ (b) 0 (c) $\frac{1}{2}$ (d) $-\frac{1}{2}$
Q.23	Inequations $3x - y \geq 3$ and $4x - y > 4$ (a) Have solution for positive x and negative y (b) Have no solution for positive x and y (c) Have solution for all x (d) Have solution for all y
Q.24	If $x = at^2, y = 2at$, then $\frac{d^2y}{dx^2} =$ (a) $-\frac{1}{t^2}$ (b) $\frac{1}{2at^3}$ (c) $-\frac{1}{t^3}$ (d) $-\frac{1}{2at^3}$
Q.25	If $\begin{bmatrix} x+y+z \\ x+y \\ y+z \end{bmatrix} = \begin{bmatrix} 9 \\ 5 \\ 7 \end{bmatrix}$, then $(x, y, z) =$ (a) $(4,3,2)$ (b) $(3,2,4)$ (c) $(2,3,4)$ (d) None of these
Q.26	The function $\sin^4x + \cos^4x$ increase if (a) $0 < x < \frac{\pi}{8}$ (b) $\frac{\pi}{4} < x < \frac{3\pi}{8}$ (c) $\frac{3\pi}{8} < x < \frac{5\pi}{8}$ (d) $\frac{5\pi}{8} < x < \frac{3\pi}{4}$
Q.27	$\sin^{-1}(\sin 4) = -----$ (a) $4-\pi$ (b) 4 (c) $\pi-4$ (d)None of these
Q.28	If $A = \begin{bmatrix} 0 & -1 & 2 \\ 2 & -2 & 0 \end{bmatrix}, B = \begin{bmatrix} 0 & 1 \\ 1 & 0 \\ 1 & 1 \end{bmatrix}$ and $M = AB$, then M^{-1} is equal to (a) $\begin{bmatrix} 2 & -2 \\ 2 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 1/3 & 1/3 \\ -1/3 & 1/6 \end{bmatrix}$ (c) $\begin{bmatrix} 1/3 & -1/3 \\ 1/3 & 1/6 \end{bmatrix}$ (d) $\begin{bmatrix} 1/3 & -1/3 \\ -1/3 & 1/6 \end{bmatrix}$
Q.29	If f(x) =sinx - $\frac{x}{2}$ is increasing function, then (a) $0 < x < \frac{\pi}{3}$ (b) $-\frac{\pi}{3} < x < 0$ (c) $-\frac{\pi}{3} < x < \frac{\pi}{3}$ (d) $x = \frac{\pi}{2}$
Q.30	Let $S = \{1,2,3,4,5\}$ and A =S x S. Define the relation R on A as follows: (a, b) R (c, d) if ad = cb. Then, R is (a) Reflexive only (b)Symmetric only(c) transitive only (d)equivalence relation
Q.31	If $f(x) = \begin{cases} \frac{1-\cos 10x}{x^2}, x < 0 \\ a, x = 0 \\ \frac{\sqrt{x}}{\sqrt{625+\sqrt{x}}-25}, x > 0 \end{cases}$, is continuous at $x = 0$, then the value of 'a' will be (a) 50 (b) – 50 (c) 25 (d) None of these
Q.32	For a matrix A, $AI = A$ and $AA^T = I$ is true for (a) If A is a square matrix (b) If A is a non singular matrix (c)If A is a symmetric matrix (d) If A is any matrix
Q.33	A firm produces two types of product A and B. The profit on both is Rs. 2 per

	item. Every product need processing on machines M_1 and M_2. For A, machines M_1 and M_2 takes 1 minute and 2 minute respectively and that of for B, machines M_1 and M_2 takes the time 1 minute and 1 minute. The machines M_1, M_2 are not available more than 8 hours and 10 hours any of day respectively. If the products made x of A and y of B, then the linear constraints for the L.P.P. except $x \geq 0, y \geq 0$, are (a) $x + y \leq 480, 2x + y \leq 600$ (b) $x + y \leq 8, 2x + y \leq 10$ (c) $x + y \geq 480, 2x + y \geq 600$ (d) $x + y \leq 8, 2x + y \geq 10$
Q.34	Reeta goes for walk in a Community Park daily. She notices two specific trees in a line (as seen in the figure below), whose heights are AP = 16 m and BQ =22 m respectively, are 20 m apart from each other. She stands at a point (say, at R) in between these trees such that AR = x m .  If $RP^2 + RQ^2$ is minimum, then x equals (a) 10 units (b) 10 m (c) 10 m^2 (d) 10 cm
Q.35	Value of x, the matrix $A=\begin{bmatrix} 3-x & 5x+1 \\ 2 & 4 \end{bmatrix}$ is singular (A) $x \neq \frac{5}{7}$ (B) $x = \frac{5}{7}$ (C) Any real value (D) No real value
Q.36	The least value of $\left(\sin^{-1} x\right)^2 + \left(\cos^{-1} x\right)^2 = ------$. (a) $\frac{\pi^2}{2}$ (b) $\frac{\pi^2}{8}$ (c) $\frac{\pi^2}{4}$ (d)None of these
Q.37	If $A=\begin{bmatrix}1 & 2 & 3\end{bmatrix}$ and $B=\begin{bmatrix}-5 & 4 & 0 \\ 0 & 2 & -1 \\ 1 & -3 & 2\end{bmatrix}$, then $AB =$ (a) $\begin{bmatrix}-5 & 4 & 0 \\ 0 & 4 & -2 \\ 3 & -9 & 6\end{bmatrix}$ (b) $\begin{bmatrix}3 \\ 1 \\ 1\end{bmatrix}$ (c) $\begin{bmatrix}-2 & -1 & 4\end{bmatrix}$ (d) $\begin{bmatrix}-5 & 8 & 0 \\ 0 & 4 & -3 \\ 1 & -6 & 6\end{bmatrix}$
Q.38	If $f(x)=\frac{x-3}{x+1}$, then $f[f\{f(x)\}]$ equals (a) x (b) $-x$ (c) $\frac{x}{2}$ (d) $-\frac{1}{x}$
Q.39	The equations of the normal to the curve $x^{2/3} + y^{2/3} = 2$ at (1, 1)is (a) x + y = 2(b) x + y = 0(c) y = x (d) none
Q.40	If $A=\begin{bmatrix}4 & 1 \\ 3 & 2\end{bmatrix}$ and $I=\begin{bmatrix}1 & 0 \\ 0 & 1\end{bmatrix}$, then $A^2 - 6A =$

(a) $3I$ (b) $5I$ (c) $-5I$ (d) None of these

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 The equation of the tangent to the curve x = sin 3t, y = cos 2t, at t = π/4 is

(a) $2\sqrt{2}x-3y+2=0$ (b) $2\sqrt{2}x+3y=2$ (c) $2\sqrt{2}y-3x=2$ (d) none

Q.42 For maximum value of Z = 5x + 2y , subject to the constraints 2x + 3y ≥ 6 , x − 2y ≤ 2 , 6x + 4y ≤ 24 , −3x + 2y ≤ 3 and x ≥ 0, y ≥ 0 the values of x and y are

(a) 18/7, 2/7 (b) 7/2, 3/4 (c) 3/2, 15/4 (d) None of these

Q.43 The minimum value of $2x+3y$, when $xy=6$, is

(a) 12 (b) 9 (c) 8 (d) 6

Q.44 A function f from the set of natural numbers to integers defined by $f(n)=\begin{cases}\frac{n-1}{2}, \text{ when } n \text{ is odd}\\ -\frac{n}{2}, \text{ when } n \text{ is even}\end{cases}$, is

(a) One-one but not onto (b) Onto but not one-one

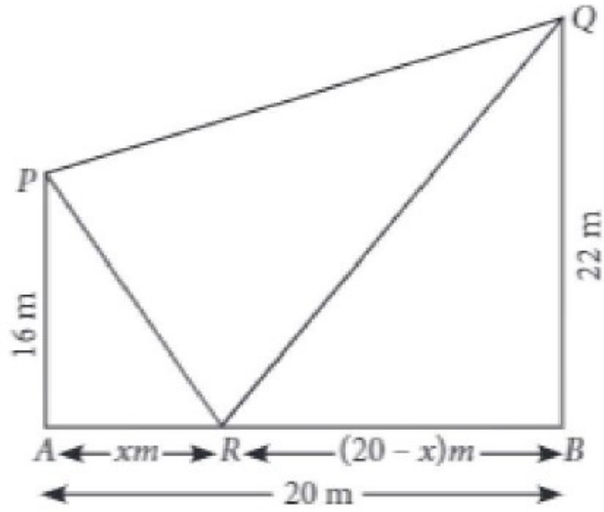
(c) One-one and onto both (d) Neither one-one nor onto

Q.45 For what value of λ, the system of equations $x+y+z=6, x+2y+3z=10$, $x+2y+\lambda z=12$ is inconsistent

(a) $\lambda=1$ (b) $\lambda=2$ (c) $\lambda=-2$ (d) $\lambda=3$

CASE STUDY

Two multi-storey buildings (represented by *AP* and *BQ*) are on opposite side of a 20 m wide road at point *A* and *B* respectively. There is a point *R* on read as shown in figure.



Based on the above information, answer the following questions.

Q.46 Area of trapezium *ABQP* is

(a) 380 sq.m (b) 280 sq.m (c) 320 sq.m (d) 430 sq.m

Q.47 The length *PQ* is

(a) 20.5 m (b) 19.80 m (c) 20.88 m (d) 21 m

Q.48 Let there be a quantity *S* such that $S=RP^2+RQ^2$, then *AS* is given by

(a) $2x^2-40x-1140$ (b) $2x^2+40x+1140$ (c) $2x^2-40x+1140$ (d) $2x^2+40x-1140$

Q.49 Find the value of x for value of S is minimum.

(a) 10 (b) 0 (c) 4 (d) −10

Q.50	For minimum value S, find the value of PR and RQ. (a) 18.50 m,19.36 m (b) 18.86 m,24.17 m (c) 17.56 m,23.29 m (d) None of these
	**********