CLASS – XII (PRE - BOARD) TERM -I

(CODE–041) TMC-TS-AG-TS-3-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	$\tan^{-1}\left[\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right]=$ (a) $\frac{\pi}{4}+\frac{1}{2}\cos^{-1}x^2$ (b) $\frac{\pi}{4}+\cos^{-1}x^2$ (c) $\frac{\pi}{4}+\frac{1}{2}\cos^{-1}x$ (d) $\frac{\pi}{4}-\frac{1}{2}\cos^{-1}x^2$
Q.2	Find the value of 'a' for which the function f defined as f(x) = $\begin{cases} a\sin\frac{\pi}{2}(x+1) , & x\le 0 \\ \frac{\tan x-\sin x}{x^3} , & x>0 \end{cases}$ is continuous at x = 0 (a) $-\frac{1}{2}$ (b) $\frac{1}{2}$ (c) 2 (d) none
Q.3	$A=\begin{bmatrix}0 & 3\\ 2 & 0\end{bmatrix}$ 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.4	If $A=\begin{bmatrix}-1 & 2\\ 2 & -1\end{bmatrix}$ and $B=\begin{bmatrix}3\\ 1\end{bmatrix}$, $AX=B$, then $X=$ (a) [5 7] (b) $\frac{1}{3}\begin{bmatrix}5\\ 7\end{bmatrix}$ (c) $\frac{1}{3}[5\ 7]$ (d) $\begin{bmatrix}5\\ 7\end{bmatrix}$
Q.5	The function $f(x)=\tan^{-1}(\sin x+\cos x)$, $x>0$ is always an increasing function on the interval (a) $(0,\pi)$ (b) $(0,\pi/2)$ (c) $(0,\pi/4)$ (d) $(0,3\pi/4)$
Q.6	If $A=\begin{bmatrix}1 & 2 & 1\\ 0 & 1 & -1\\ 3 & -1 & 1\end{bmatrix}$, then (a) $A^3+3A^2+A-9I_3=0$ (b) $A^3-3A^2+A+9I_3=0$ (c) $A^3+3A^2-A+9I_3=0$ (d) $A^3-3A^2-A+9I_3=0$
Q.7	The relation R defined on the set A = {1, 2, 3, 4, 5} by $R=\{(x,y):\lvert x^2-y^2\rvert<16\}$ is given by

	(a) {(1, 1), (2, 1), (3, 1), (4, 1), (2, 3)}(b) {(2, 2), (3, 2), (4, 2), (2, 4)} (c){(3, 3), (3, 4), (5, 4), (4, 3), (3, 1)}(d) None of these
Q.8	$AB = 0$, if and only if (a) $A \neq 0, B \neq 0$ (b) $A = 0, B \neq 0$ (c) $A = 0$ or $B = 0$ (d) None of these
Q.9	The slope of tangent to the curve $x = t^2 + 3t - 8$, $y = 2t^2 - 2t - 5$ at the point (2, –1) is (a) $\frac{22}{7}$ (b) $\frac{6}{7}$ (c)– 6(d) None of these
Q.10	Find x if $\cos^{-1} x + \sin^{-1}\left(\frac{x}{2}\right) = \frac{\pi}{6}$ (a)-1 (b) 1 (c) ±1 (d) none
Q.11	Relation R in the set A = {1, 2, 3, 4, 5,6,7} given by R = {(a, b): $\lvert a-b \rvert$ is even} Then the number of set of all elements to related to 3 (A) 3 (B) 2 (C) 4 (D) none of these
Q.12	If $y = \sqrt{\frac{1+e^x}{1-e^x}}$, then $\frac{dy}{dx} =$ (a) $\frac{e^x}{(1-e^x)\sqrt{1-e^{2x}}}$ (b) $\frac{e^x}{(1-e^x)\sqrt{1-e^x}}$ (c) $\frac{e^x}{(1-e^x)\sqrt{1+e^{2x}}}$ (d) $\frac{e^x}{(1-e^x)\sqrt{1+e^x}}$
Q.13	The matrix $\begin{vmatrix} \lambda & -1 & 4 \\ -3 & 0 & 1 \\ -1 & 1 & 2 \end{vmatrix}$ is invertible, if (a) $\lambda \neq -15$ (b) $\lambda \neq -17$ (c) $\lambda \neq -16$ (d) $\lambda \neq -18$
Q.14	$\frac{d}{dx}\left[\frac{2}{\pi}\sin x^0\right] =$ (a) $\frac{\pi}{180}\cos x^0$ (b) $\frac{1}{90}\cos x^0$ (c) $\frac{\pi}{90}\cos x^0$ (d) $\frac{2}{90}\cos x^0$
Q.15	An Orthogonal matrix is (a) $\begin{bmatrix} \cos\alpha & 2\sin\alpha \\ -2\sin\alpha & \cos\alpha \end{bmatrix}$ (b) $\begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$ (c) $\begin{bmatrix} \cos\alpha & \sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$ (d) $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$
Q.16	The slope of tangent to curve $y = \frac{x-1}{x-2} at x = 10$ is (a) $\frac{1}{64}$ (b) –64 (c) $-\frac{1}{64}$ (d) none
Q.17	If $A = \begin{vmatrix} 2x & 0 \\ x & x \end{vmatrix}$ and $A^{-1} = \begin{vmatrix} 1 & 0 \\ -1 & 2 \end{vmatrix}$, find the value of x= **(a) -1/2 (b)1(c)2(d) 1 /2**
Q.18	If $x^m y^n = (x+y)^{m+n}$ then $\left.\frac{dy}{dx}\right\rvert_{x=1,y=2}$ is equal to (a) 1/2(b)2(c)$2m/n$ (d) $m/2n$
Q.19	The point at which the maximum value of x + y, subject to the constraints x + 2y ≤ 70,2x + y ≤ 95, x, y ≥ 0 is obtained, is (a) (30, 25) (b) (20, 35) (c) (35, 20) (d) (40, 15)
Q.20	The absolute minimum values of $f(x) = \sin x + \frac{1}{2}\cos 2x$ in $\left[0, \frac{\pi}{2}\right]$

(a) $\frac{\pi}{2}$ (b) $\frac{3}{4}$ (c) $\frac{1}{2}$ (d) $\frac{\pi}{6}$

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 function $f(x) = \sin\left(\log(x + \sqrt{x^2 + 1})\right)$ is

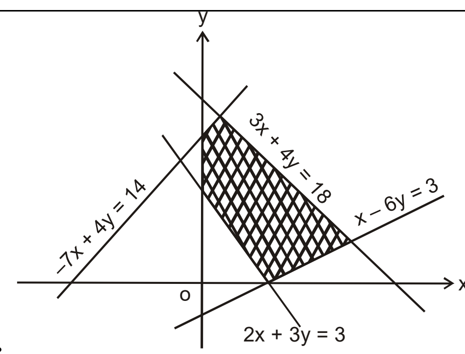
(a) Even function (b) Odd function

(c) Neither even nor odd (d) Periodic function

Q.22 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.23



Find the linear constraints for which the shaded fig. area in following figure is the feasible region

(i) $x, y \geq 0$ (ii) 2x + 3y ≥ 3, 3x + 4y ≤ 18(iii) x – 6y ≥ 3 , – 7x + 4y ≤ 14

(iv) – 7x + 4y ≤ 14 , x – 6y ≤ 3(v) 3x + 4y ≤ 18, x – 6y ≥ 3(vi) 2x + 3y ≤ 3, – 7x + 4y ≤ 14

(a) (i) , (ii) & (iv) (b) (i) , (ii) & (v)

(c) (i) , (iii) & (vi) (d) (i) , (ii) & (iii)

Q.24 $\lim_{x \to 0} \frac{e^{1/x} - 1}{e^{1/x} + 1} =$

(a) 0 (b) 1 (c) –1 (d) Does not exist

Q.25 If $A = \begin{pmatrix} 2 & 1 & -1 \\ 1 & -1 & 1 \\ 3 & 1 & -2 \end{pmatrix}$, then find the value of $\left|A^n\right|$

(a) 3^n **(b)** 3^{n-1} **(c)** 3^{n-2} **(d)** **NONE**

Q.26 $2x^3+18x^2-96x+45 = 0$ is an increasing function when

(a) $x \leq -8, x \geq 2$ (b) $x < -2, x \geq 8$ (c) $x \leq -2, x \geq 8$ (d) $0 < x \leq -2$

Q.27 The domain of function $\cos^{-1}(2x - 1)$ is

(a) [0,1] (b) [–1, 1] (c) (–1,1) (d) [0, π]

Q.28 If $\begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix} A \begin{bmatrix} -3 & 2 \\ 5 & -3 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$, then the matrix $A =$

(a) $\begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ (c) $\begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$

Q.29 If $f(x) = x^5-20x^3+240x$, then f(x) satisfies which of the following

(a) It is monotonically decresing everywhere

(b) It is monotonically decresing only in $(0,\infty)$

(c) It is monotonically increasing everywhere

(d) It is monotonically increasing only in $(-\infty,0)$

Q.30 Total number of equivalence relations defined in the set S={a, b, c} is :

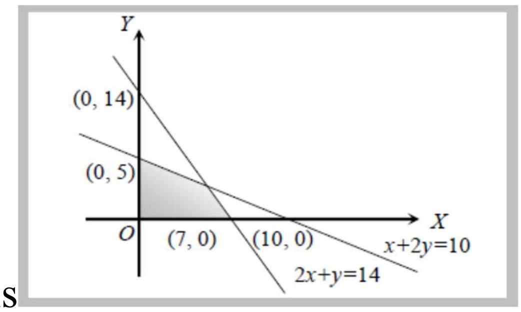
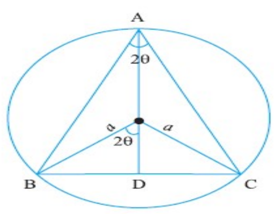
a. 5 b. 3! C. 23 d. 33

Q.31	Let A ={2, 3, 4, 5, 6, 7, 8, 9 } .Let R be the relation on A defined by $\{(x, y): x \in A \,\&\, x$ divides y)}. Then the number of order pair in R **(A) 6 (B) 14 (C) 13 (D) none of these**
Q.32	If $A=\begin{bmatrix}\alpha & 2\\ 2 & \alpha\end{bmatrix}$ and $\lvert A^3\rvert=125$, then α is (a) ±3 (b) ±2 (c) ±5 (d) 0
Q.33	On maximizing z = 4 x + 9y subject to x + 5y ≤ 200,2x + 3y ≤ 134 and x, y ≥ 0, z = (a) 380 (b) 382 (c) 384 (d) None of these
Q.34	A wire of length 36m is to be cut into two pieces. One of the pieces is to be made into a square and the other into a circle. What should be the lengths of the square pieces, so that the combined area of the square and the circle is minimum is (a) $\frac{36\pi}{\pi+4}$ (b) $\frac{144}{\pi+4}$ (c) $\frac{144\pi}{\pi+4}$ (d) none
Q.35	For 2×2 matrices A, B and I, if $A+B=I$ and $2A-2B=I$, then $A=$ (a) $\begin{bmatrix}\frac{1}{4} & 0\\ 0 & \frac{1}{4}\end{bmatrix}$ (b) $\begin{bmatrix}\frac{1}{2} & 0\\ 0 & \frac{1}{2}\end{bmatrix}$ (c) $\begin{bmatrix}\frac{3}{4} & 0\\ 0 & \frac{3}{4}\end{bmatrix}$ (d) $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$
Q.36	$2\sin^{-1}\frac{1}{2}+3\tan^{-1}(-1)+2\cos^{-1}\left(-\frac{1}{2}\right)+4\sec^{-1}(\sqrt{2})$ (a) $\frac{23\pi}{4}$ (b) $\frac{23\pi}{12}$ (c) $\frac{19\pi}{12}$ (d) None of these
Q.37	If A is a square matrix such that $A^2 = I$, then $(A-I)^3+(A+I)^3-7A$ is equal to : a. A b. I-A c. I+A d. 3A
Q.38	Function $f: R \to R, f(x)=x^2+x$ is (a) One-one onto (b) One-one into (c) Many-one onto (d) Many-one into
Q.39	The slope of normal to curve $x=a(\theta-\sin\theta), y=a(1+\cos\theta)$ at $\theta=-\frac{\pi}{2}$ (a) 1 (b) 0 (c) -1 (d) none
Q.40	$\begin{bmatrix}2 & 3\\ 5 & 7\end{bmatrix}\begin{bmatrix}1 & -3\\ -2 & 4\end{bmatrix}=\begin{bmatrix}-4 & 6\\ -9 & x\end{bmatrix} \Rightarrow x=$ (a) -4 (b) 6 (c) 13 (d) none

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	An equation of the tangent to the curve $y=x^4$ from the point (2, 0) not on the curve is (a) $y=0$ (b) $x=0$ (c) $x+y=0$ (d) None of these
Q.42	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.43	The local minimum values of the function $f(x)=2\cos x+x, 0<x<\pi$ (a) $-\sqrt{3}+\frac{5\pi}{6}$ (b) $\sqrt{3}+\frac{\pi}{6}$ (c) $\frac{5\pi}{6}$ (d) $\frac{\pi}{6}$

Q.44	The maximum value of objective function c = 2x + 3y in the given feasible region, is  (a) 29 (b) 18 (c) 14 (d) 15
Q.45	The system of linear equation $x+y+z=2, 2x+y-z=3, 3x+2y+Kz=4$ has unique solution if (a) $K \neq 0$ (b) $-1 < K < 1$ (c) $-2 < K < 2$ (d) $K = 0$
	CASE STUDY An isosceles triangle of vertical angle 2θ is inscribed in a circle of radius *a*. if the area of triangle is maximum when Let ABC be an isosceles triangle inscribed in the circle with radius *a* such that AB = AC therefore the area of triangle  .
Q.46	Length of altitude AD (a) $a + a\sin 2\theta$ (b) $a + a\cos 2\theta$ (c) $2a\cos 2\theta$ (d) $2a\sin 2\theta$
Q.47	Base of triangle BC (a) $a + a\sin 2\theta$ (b) $a + a\cos 2\theta$ (c) $2a\cos 2\theta$ (d) $2a\sin 2\theta$
Q.48	Let ABC be an isosceles triangle inscribed in the circle with radius *a* such that AB = AC therefore the area of triangle (a) $a^2\sin 2\theta(1+\cos 2\theta)$ (b) $a^2\sin 2\theta + a^2\sin 4\theta$ (c) $a\sin 2\theta(1+\cos 2\theta)$ (d) $\frac{a^2}{2}\sin 2\theta(1+\cos 2\theta)$
Q.49	Area of triangle is maximum when (a) $\theta = \frac{\pi}{6}$ (b) $\theta = \frac{\pi}{3}$ (c) $\theta = \frac{\pi}{4}$ (d) $\theta = \frac{\pi}{2}$
Q.50	Maximum Area of triangle is (a) $\frac{\sqrt{3}a^2}{4}$ (b) $\frac{3\sqrt{3}a^2}{4}$ (c) $\frac{3\sqrt{3}a^2}{2}$ (d) none
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