



P.V.G.'s
Mukhtangan English School & Jr. College,
44, Vidyanagari, Parvati, Pune - 411009.
Terminal Examination (2025-26)
Standard - XII

Subject : Mathematics

Marks - 50

Date : 08.10.2025

Time : 8.30 am to 11.00 am

General Instructions -

The question paper is divided into four sections.

1. Section A: Q1 contains five multiple choice questions carrying 2 marks each. Q2 contains four very short answer type questions 1 mark each.
2. Section B: Q3 to Q13 are eleven very short answer type questions carrying 2 marks each. (Attempt any Eight)
3. Section C: Q14 to Q19 are six short answer type questions carrying 3 marks each. (Attempt any Four).
4. Section D: Q20 to Q23 are four long answer type questions carrying 4 marks each. (Attempt any Two)
5. Figures to the right indicate full marks.
6. For each multiple choice of questions, only the first attempt will be considered for evaluation.

Section A

Q1. Select the correct option from the given alternatives. (2 Marks each) (10)

- i) The maximum value of $z = 10x + 6y$ subjected to the constraints $3x + y \leq 12$, $2x + 5y \leq 34$, $x \geq 0, y \geq 0$ _____.

A) 56 B) 65 C) 55 D) 66

- ii) If $A^{-1} = \frac{-1}{2} \begin{bmatrix} 1 & -4 \\ -1 & 2 \end{bmatrix}$ then $A =$

A) $\begin{bmatrix} 2 & 4 \\ -1 & 1 \end{bmatrix}$ B) $\begin{bmatrix} -2 & -1 \\ -4 & -1 \end{bmatrix}$ C) $\begin{bmatrix} 2 & 4 \\ 1 & 1 \end{bmatrix}$ D) $\frac{-1}{2} \begin{bmatrix} 2 & 4 \\ 1 & 1 \end{bmatrix}$

- iii) If $x\sqrt{y+1} + y\sqrt{x+1} = 0$ and $x \neq y$ then $\frac{dy}{dx} =$ _____

A) $\frac{1}{(1+x)^2}$ B) $\frac{-1}{(1+x)^2}$ C) $(1+x)^2$ D) $\frac{-x}{x+1}$

- iv) The approximate value of $\sqrt[3]{28}$ is _____

A) 3.03604 B) 3.03704 C) 3.03124 D) 3.3604

v) $\int_1^2 \frac{1}{x^2} e^{\frac{1}{x}} dx = \underline{\hspace{2cm}}.$

A) $\sqrt{e} + 1$

B) $\sqrt{e} - 1$

C) $\sqrt{e} (\sqrt{e} - 1)$ D) $\frac{\sqrt{e} - 1}{e}$

Q2. Answer the following. (1 Mark each)

(4)

i) Verify whether the following equation has solution:

$$2 \sin \theta = 3$$

ii) Write the negation of following statement:

'All natural numbers are whole numbers.'

iii) Evaluate $\int \frac{\sin 2x}{\cos x} dx$

iv) If $y = \log [\tan x^2]$ find $\frac{dy}{dx}$

Section B

Attempt any eight of the following questions. (2 Marks each)

(16)

Q3. A) Write the contrapositive of the following statement:

If voltage increases then current decreases.

B) Rewrite the following statement without using if -----then.

If a man is judge then he is honest.

Q4. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and X is a 2x2 matrix such that $AX = I$ then find X.

Q5. Find the principle solution of $\sin \theta = \frac{-1}{2}$

Q6. Find the cartesian coordinates of $\left(\frac{3}{4}, \frac{3\pi}{4} \right)$

Q7. If $y = \sqrt{\cos x + \sqrt{\cos x + \sqrt{\cos x + \dots \infty}}}$ then show that $\frac{dy}{dx} = \frac{\sin x}{1 - 2y}$

Q8. If $y = \frac{(x+1)^2}{(x+2)^3(x+3)^4}$ then find $\frac{dy}{dx}$

Q9. Find the equation of tangent to the curve $y = x^2 + 2e^x + 2$ at (0,4)

Q10. Integrate w.r.t.x : $\frac{(\log x)^n}{x}$

Q11. Evaluate $\int \frac{1}{\sqrt{3x^2 - 6}} dx$

Q12. Prove that $\int_0^a f(x) dx = \int_0^a f(a-x) dx$

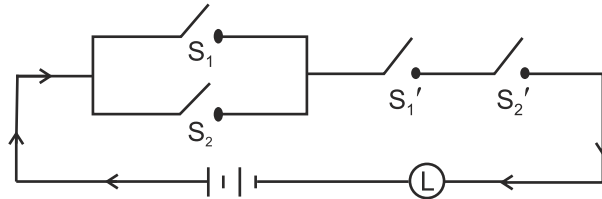
Q13. Evaluate $\int_{-3}^3 \frac{x^3}{9-x^2} dx$

Section C

Attempt any four of the following questions. (3 marks each)

(12)

Q14. Express the following switching circuit in the symbolic form of logic. Construct the switching table and interpret it.



Q15. Find the inverse of $A = \begin{bmatrix} \cos \theta & -\sin \theta & 0 \\ \sin \theta & \cos \theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$ by row transformation.

Q16. Prove that ; $\tan^{-1} \sqrt{\frac{1 - \cos \theta}{1 + \cos \theta}} = \frac{\theta}{2}$, if $\theta \in (0, \pi)$

Q17. Find the maximum value of the function $f(x) = x^3 - 9x^2 + 24x$

Q18. Evaluate $\int_{-1}^1 \frac{1}{a^2 e^x + b^2 e^{-x}} dx$

Q19. Prove that;

If $x = f(t)$ and $y = g(t)$ are differentiable functions of t so that y is a differentiable function of x

and if $\frac{dx}{dt} \neq 0$ then,

$$\frac{dy}{dx} = \frac{dy / dt}{dx / dt}$$

Section D

Attempt any two of the following questions. (4 marks each)

(8)

Q20. Maximize : $z = 3x + 5y$ subject to $x + 4y \leq 24$, $3x + y \leq 21$, $x + y \leq 9$

$x \geq 0$, $y \geq 0$ also find maximum value of z .

Q21. Solve the following equations by method of inversion:

$$5x - y + 4z = 5, 2x + 3y + 5z = 2 \text{ and } 5x - 2y + 6z = -1$$

Q22. Verify Rolle's theorem for

$$f(x) = x^2 - 4x + 10 \text{ on } [0, 4]$$

Q23. Show that,

If u and v are two differentiable function of x then,

$$\int uv \, dx = u \int v \, dx - \int \frac{du}{dx} (\int v \, dx) \, dx.$$

