Only for 2021 to 2024 AD admitted Students

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TRIBHUVAN UNIVERSITY FACULTY OF MANAGEMENT Office of the Dean **April – May 2025**

Full Marks: 100 Pass Marks: 50 Time: 3 hrs

[10×2=20]

[6×5=30]

BIM / First Semester / MTH 204: Basic Mathematics

Candidates are required to answer the questions in their own words as far as practicable.

Group "A"

Brief Answer Questions:

- 1. If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, $A = \{1, 2, 3, 4, 5\}$ and $B = \{3, 4, 5, 6, 7\}$, find $A \cup B$.
- 2. Express $Z = (2 + 3i)^2$ in the form of a + ib.
- 3. Rewrite $-7 \le x \le 2$ by using the modulus sign.
- 4. Evaluate: $\lim_{x \to \infty} \frac{4x^2 5x + 7}{3x^2 6x 1}$
- 5. If $\vec{a} = 3\vec{i} + 2\vec{j}$ and $\vec{b} = -4\vec{i} + 3\vec{j}$ are two vectors. Find the value of $2\vec{a} + 3\vec{b}$.
- 6. Find the derivative of $y = x^3 \cdot e^x$
- 7. If $A = \begin{bmatrix} 2 & -4 \\ 3 & 1 \end{bmatrix}$, find $3A^{T}$.
- 8. Find the area bounded by the line y = 4x+7, the x-axis and ordinates at x=1 and x=3.
- 9. Solve the differential equation: $\frac{dy}{dx} = e^{-y}$
- 10. Find the value of determinant $A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 4 \\ 3 & 4 & 2 \end{bmatrix}$
 - Group "B"

Short Answer Questions: (Attempt any SIX Questions)

- 11. (a) If $x iy = \frac{5-6i}{5+6i}$ then prove that $x^2 + y^2 = 1$. (b) Find the square roots of $-4+4\sqrt{3}i$
- 12. A function f(x) is defined as follows:

$$f(x) = \begin{cases} 3x + 2 & for - 2 \le x < 0\\ 2 - 5x & for & 0 \le x < 2\\ 5 - 2x & for x \ge 2 \end{cases}$$

Examine the continuity and discontinuity of the function at x=0 and x=2.

13. If
$$f(x) = \frac{x+6}{cx-d}$$
, $\lim_{x \to 0} f(x) = -6$ and $\lim_{x \to \infty} f(x) = \frac{1}{3}$, find the value of $f(13)$.

14. Find the derivatives of:

(a)
$$y = t^3 + 1$$
 and $x = t^2 + 2$ (b) $x^2 + y^2 = 36$

- 15. Evaluate the integrals:
 - (a) $\int x(\sqrt{x+4}) dx$ (b) $\int \left(1 \frac{1}{x^2}\right) e^{x + \frac{1}{x}} dx$.

- 16. Prove or disprove that the vectors $\vec{a} + 2\vec{b} \vec{c}$, $2\vec{a} \vec{b} + \vec{c}$, and $3\vec{a} + \vec{b} + \vec{c}$ are Coplanar.
- 17. Solve the differential equation.

$$\frac{dy}{dx} + 3y = e^{2x} + 12$$

Group "C"

Long Answer Questions: (Attempt any THREE Questions)

[3×10=30]

[20]

- 18. A survey of 600 television viewers produced the following information:
 - 285 watch channel A, 195 watch channel B, 115 watch channel C, 70 watch channel A and B, 50 watch channel B and C, 45 watch channel A and C. If 150 of the viewers watch none of the channels, find how many of them watch
 - a. at least one of the channels
 - b. all three channels
 - c. two channels only
 - d. one channel only

Represent all the sets in venn diagram.

19. The flowing table shows the annual production of wheat (in thousand tons) of a certain village.

Year	2015	2016	2017	2018	2019	2020	2021
Production	77	88	94	85	91	98	93

a. Determine the equation of the trend line by least square method.

b. Estimate the production in the year 2023 and 2025.

20. Solve the following system of linear equations by using determinant or matrix method:

2x + 5y + 3z = 9; 3x + y + 2z = 3; x + 2y - z = 6

21. The demand and supply functions for a good are

 $P_d = 100 - 0.5Q_d$ and $P_s = 10 + 0.5Q_s$

respectively, where P and Q denote price and quantity.

- a. Find the equilibrium price and quantity.
- b. Find the consumer's surplus and producer's surplus.
- c. Also, find total surplus.

Group "D"

Comprehensive Answer / Case / Situation Analysis Questions:

22. The demand function for a commodity is P = 15 - Q, where P is the price in rupees and Q is the

number of outputs produced and sold. The cost function is given by $C(Q) = -20 - 3Q + Q^2$

- a. Find the value of Q at which the revenue is maximum. Also find the maximum revenue.
- b. Find the value of Q at which profit is maximum. Also find the maximum profit.
- c. Find the price(*P*) at which profit is maximum.
- d. Find the break-even point.

