

Mid-West University
Examinations Management Office
Birendranagar, Surkhet
End - Semester Examination, 2081

Subject: DE 445 – Mathematical Methods in Economic I

FM: 60

Level/program: Bachelor (B.A) Semester: IV

Time: 3 Hours

PM: 30

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

Attempt ALL of the following Very Short Answer Questions.

10x1=10

1. How can you define Disjunction?
2. The sets $U = \{ a, b, c, d, e, f, g \}$, $A = \{ a, b, c \}$,
 $B = \{ c, d, e \}$. Find the value of $A \cup B$.
3. If $f(x) = x^2 - 2x + 2$, find the value of $f(3)$.
4. In which statement is true or false: 5 is prime or $3 < 8$.
5. If $x = 5$, $y = -7$, Prove that : $|x - y| \geq |x| - |y|$.
6. If the total cost is given by $C(x) = 3x^2 + 2x + 25$. Find the marginal cost function.
7. Define interval.
8. Evaluate: $\int_0^1 x \, dx + \int_0^1 x^{-1} \, dx$.
9. Find the cost function, if marginal cost function $MC = x^2 - 2x + 5$.
10. Determine the order and degree of differential equation:
 $\frac{d^3y}{dx^3} - 2\frac{dy}{dx} + 3 = 0$.

Attempt any THREE of the Following Short Questions.

3x8=24

- 11 a. Find the three rational number between 1 and 2.
b. Show that $\frac{4a+5b}{a+b}$ is rational number between 4 and 5 where a and b are positive number.
12. Define Tautology and contradiction. Write down the truth table for conditional.
Prove that: $p \rightarrow (q \vee r) = (p \rightarrow q) \wedge (p \rightarrow r)$.
13. a. Solve: $\frac{dy}{dx} = \frac{x^2}{1+y^2}$. [3]
b. Define homogeneous differential equation.
Solve: $x^2 \frac{dy}{dx} + y^2 = xy$. [5]
14. The demand function is $p = 20 - 3q$ and supply function $p = 2q$ where p is price and q is quantity. Find the consumers surplus and producer's surplus under the pure competition.

Attempt any TWO of the Following Long Questions.

2x13=26

15. a. The XYZ company finds that the production cost associated with each article is Rs.20 and fixed cost is Rs. 60,000. If each article is sold for Rs.32. Find the following:
 - i. total cost function
 - ii. profit function
 - iii. break-even point
 - iv. The number of articles that must be produced and sold each month so as to make a profit of Rs.18000.
- b. If the cost function of producing x quantities of a product is given by $C(x) = 250x^2 + 1250x + 12500$ and each unit of product are sold at Rs.5000, then what are the break-even points?
16. If the revenue function and the total cost function of a firm are $R(x) = 14x - x^2$ and $C(x) = x^3 - 2x$ respectively, find the level of output x in order to maximize the profit. Also, find the maximum profit.
17. a. The marginal revenue function $MR = 15 - 9x + 6x^2$ and the marginal cost function $MC = 10 - 24x - 3x^2$, if the total cost of producing one unit is Rs.25. Find the profit function. Also, find the total profit when $x = 2$.
b. The marginal cost function for a product is $1 + 2x + 6x^2$, where x is the output. Find the total cost function if the fixed cost is Rs.100 when the output is zero.