Mid-West University

Examinations Management Office

Birendranagar, Surkhet

End Semester - Examination, 2081

Subject: DE 472- Mathematical Methods in Economics II FM: 60

Level/program: Bachelor (B.A) Semester: VII 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. Find the first order Differential Equation of $y = 3x^2$.
2. If P = (1 , 2,-3) and Q = (2 , -2,1) Compute P.Q ?
3. If X = (2 , 3,-2) , Find $||X||$
4. Find the value of $\cos\theta$? If P = (1, 0, 0) and Q = (0, 1 , 0).
5. How can you define equally of two points in vector spaces?
6. Let $T: R^2 \to R^2$ be linear Transformation defined by $T(x, y) = (x, -2y)$. Find $T(2,4)$.
7. Find the determinant of the matrix $A = \begin{vmatrix} -8 & 8 \\ 5 & -5 \end{vmatrix}$.
8. What is the critical point?
9. What is convex function?
10. What is Optimum condition?

Attempt any THREE of the Following Short Questions. **3x8 =24**

11. Define order and degree of differential equation.

Find the general solution of the equations:

i. $\frac{dy}{dx} = \frac{x^2}{1+y^2}$

ii. $x^2 \frac{dy}{dx} = 2.$

12. Define Eigen value. Find the Eigen value of the given matrix: $\begin{pmatrix} 1 & 2 \\ 2 & 1 \end{pmatrix}$.
13. Define the scalar and vector projection Q onto P. Find the scalar and vector projection Q onto P, if Q = (1, 3, 2) and P = (1, 0, 1).
14. Determine where the graph of the function given below is concave upwards where it is concave downwards.

$f(x) = 2x^3 - 92 + 12x - 4.$

Attempt any TWO of the Following Long Questions. **2x13 =26**

15. How can you define the integral curve? Find the consumer surplus and producer surplus if the demand and the supply functions under pure competition are $D(x) = 16 - x^2$ and $S(x) = 4 + x$ respectively.
16. **i.** Find a vector which is orthogonal to P = (1, 2, 3) with respect to vector Q = (0,-1, 2) and normalized it.

ii. Let $T: R^2 \to R$ be a linear transformation for which T(1,1)= 3, T(0,1) = -2 then, find the value of $T(1, \frac{1}{2})$.

17. Examine the function for maximum or minimum

$u(x, y) = x^3 + y^3 - 3x - 27y + 24.$

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