QUIZEN – Vectors and Calculus(11P03)

Learning Level 1	Learning Level 2	Learning Level 3
Q - Remembering (knowledge-based questions) U - Understanding (comprehension-based questions)	I - Applying (application-based questions) Z - Analyzing (analysis-based questions)	E - Evaluating (evaluation-based questions) N - Creating (creation-based questions)

Learning Level 1

1. Define the term "vector" and provide an example.

2. State the three operations that can be performed on vectors.

3. What is the magnitude of a vector? How is it calculated?

4. Explain the concept of a dot product between two vectors.

5. Differentiate between a scalar and a vector quantity.

Learning Level 2

6. Given two vectors A = 3i + 2j and B = 5i - 4j, calculate the magnitude of the vector sum A + B.

7. A particle moves along a curve described by the vector function r(t) = 2ti + (t^2 - 1)j. Find the velocity and acceleration vectors of the particle at time t = 2.

8. A force F = (2t + 1)i - (3t - 2)j acts on an object. Find the work done by this force as the object moves from the point (1, -2) to (3, 4).

9. Given the vector equation of a line as r = 2i + 3j + t(4i - 2j), determine the direction vector and a point on the line.

10. The position vector of a particle moving in space is given by r(t) = (2t^2)i + (3t - 1)j + (t^3 - 4t)k. Calculate the velocity and acceleration vectors of the particle at time t = 1.

Learning Level 3

11. A particle moves along a curve described by the vector function r(t) = (t^2)i + (2t)j. Find the unit tangent vector and the unit normal vector at time t = 3.

12. A vector field is given by F = (2x + 3y)i + (4y^2 - 2x)j. Find the curl and divergence of the vector field.

13. Consider the scalar function f(x, y) = 2x^2 + 3xy - 4y^2. Determine the critical points and classify them as local maximum, local minimum, or saddle points.

14. Find the directional derivative of the scalar function f(x, y, z) = 3x^2 + yz at the point (1, -2, 3) in the direction of the vector v = 2i - 3j + 6k.

15. A particle moves along a curve described by the vector function r(t) = (t^2)i + (2t)j + (3t^3 - 4t^2)k. Find the curvature of the curve at time t = 1.