

**DEPARTMENT OF CIVIL ENGINEERING**  
**NWFP UNIVERSITY OF ENGINEERING AND TECHNOLOGY PESHAWAR.**  
*All Campuses*  
**Final Term Examination 2<sup>nd</sup> Semester Spring 2006**

Course: Calculus (BSI-102)  
 Max Marks: 50

Time: 2:15 hours

Note: Attempt all questions

- Q1. a) Find the vector equation of the line tangent to the graph of  $r(t) = 4 \cos t \, i - 3t \, j$  at the point  $p(2, -\pi)$
- b) Evaluate  $\int_0^1 (e^{2t} i + e^{-t} j + tk) dt$
- Q2. a) Sketch the level curve,  $z = k$  for specified value of  $k$ ,  $f(x, y) = x^2 + 9y^2$  at  $k = 0, 1, 2, 3, 4$
- b) If  $w = x^2 y \cos z$ , Find  $\frac{\partial w}{\partial x}, \frac{\partial w}{\partial y}(2, 1, z)$
- Q3. a) Use total differential to approximate the change in  $f(x, y)$  as  $(x, y)$  varies from  $P$  to  $Q$   $f(x, y, z) = 2xy^2z^3$ ,  $P(1, -1, 2)$ ,  $Q(0.99, -1.02, 2.02)$ .
- b) At what rate is the volume of a box changing if its length is 8 ft and increasing at 3 ft/s, its width 6 ft and increasing at 2 ft/s and its height is 4 ft and increasing at 1 ft/s?
- Q4. a) Find directional derivative of  $f(x, y, z) = \frac{y}{x+z}$  at  $P(2, 1, -1)$  in the direction from  $P$  to  $Q(-1, 2, 0)$ .
- b) Find the gradient of  $f = \frac{z}{x^2 + y^2}$ .
- Q5. a) Locate all relative maxima, relative minima and saddle point, if any  $f(x, y) = xy + \frac{a^2}{x} + \frac{b^2}{y}$  ( $a \neq 0, b \neq 0$ ).
- b) At what point or points on the circle  $x^2 + y^2 = 1$  does  $f(x, y) = xy$  have an absolute maximum and what is that maximum? (Use Lagrange Multiplier)

$$v = w \cdot \nabla f$$

$$\frac{dl}{dt} = 3$$

# Past Papers N4 Civil Engineering

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*Engineering* ,1878      **Classed Subject Catalog** Engineering Societies Library,1965      Research in Education ,1970-05      **Library of Congress Catalogs** Library of Congress,1976      *Resources in education* ,1982-05      **Paper Trade Journal** ,1920      **Abstract Journal in Earthquake Engineering** ,1991      Building Industry Technology ,1985

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