Assessment Task   : Problem Question / Multiple Choice Questions (MCQs)

Sample Question:

Question Difficulty

1. (a) Find the equation of the tangent plane to the surface $xy + yz + zx = 5$ at the point (1,2,1).   *Grade / level D*

[6 marks]

(b) Consider the function $f(x,y,z) = 4x - y^2 e^{3xz}$
   (i) In which direction does f have its maximum rate of change at the point (3,-1,0)? What is   *Grade / level D*
     the maximum rate of change in this direction?
   (ii) Find the direction derivative of f at the point (3,-1,0) in the direction $\vec{v} = (-1,4,2)$.   *Grade / level C*

[6 marks]

(c) (i) The equation $x^3 + 2^x 2yz + sin\ z - 1 = 0$ defines z implicitly as a function of x and y, i.e.,   *Grade / level C or B*
   $z = z(x,y)$. Find $\frac{\delta z}{\delta x}$ and $\frac{\delta z}{\delta y}$.
   (ii) Consider now the function $z = z(x,y)$ in part (i) above, and assume in addition that the   *Grade / level A*
     variables x and y are functions of two other variables u and v:

$$x = \frac{u^2 - v^2}{2}, \quad y = uv$$

Find $\frac{\delta z}{\delta u}$.

[8 marks]

*The same concept is adopted for MCQs where questions of different levels of difficulties (Level A to D) are set.

Marking Rubric

Grade	Descriptor	Problem Part	Marks allocated	Marks obtained
A	Able to interpret and identify the underlying logic of the problem, solve the various elements of the problem, bring the various elements together to form a coherent solution to the problem, and to express that solution logically and comprehensively	1(c)	8	
B	Able to identify all appropriate expression for the solution of the problem and be able to apply all to solve each element of a problem	1(b)	6	
C	Able to identify all or most appropriate expressions for the solution of the problem, but unable to apply all to solve each element	1(b)		
D	Able to solve a simple problem involving one aspect of a problem only	1(a)	6	
F	Unable to solve simple problems			
		Total	20	

Grade equivalents

Total marks assigned	Grade Equivalent
0-9	F (Fail)
10-12	D (Pass)
13-15	C (Satisfactory)
16-18	B (Good)
19-20	A (Excellent)