PART B

(Answer any 2 questions each question carries 7 marks)

11 Find the radius of curvature and interval of curvature of $\sum_{n=1}^{\alpha} \frac{x^n}{2n+3}$

12 Test the convergence of $\frac{x}{1.2} + \frac{x^2}{2.3} + \frac{x^3}{3.4} + - - - - -$

13 Determine the Taylor's series expansion of f(x) = sinx at x = π/4.

(Answer any 2 questions each question carries 7 marks)

14 Find the nature of domain of the following function

1. $f(x,y) = \sqrt{x^2 - y^2}$
2. $f(x,y) = \ln(x^2 - y)$

15 Show that the function $f(x,y) = \frac{x^3 y}{2x^6 + y^2}$ approaches zero as $(x,y) \to (0,0)$ along the line y = mx.

16 Find the trace of the surface $x^2 + y^2 - z^2 = 0$ in the plane x = 2 and y = 1.

$$x^2 + y^2 - z^2 = 0$$

(Answer any 2 questions each question carries 7 marks)

17 Find the local linear approximation of $f(x,y) = \sqrt{(x^2 + y^2)}$ at (3,4) and compare the error in approximation by L(3.04,3.98) with the distance between the points.

18 Find the relative extrema of $f(x,y) = 3x^2 - 2xy + y^2 - 8y$

19 If $z = e^{xy}, x = 2u + v, \ y = \frac{u}{v}$ Find $\frac{\partial z}{\partial u}$ and $\frac{\partial z}{\partial v}$

(Answer any 2 questions each question carries 7 marks)

20 If $r(t) = e^t i + e^{-2t} j + tk$

1) Find the scalar tangential and normal component of acceleration at t = 0

2) Find the vector tangential and normal component of acceleration at t = 0.

21 Find the equation of the tangent plane and parametric equations of the normal

line to the surface $z = 4x^3y^2 + 2y - 2$ at the point P (1, -2, 10).

22 Find the directional derivative of $f = x^2y - yz^3 + z$ at (1,-2,0) in the direction of $\vec{a} = 2\vec{i} + \vec{j} + 2\vec{k}$

(Answer any 2 questions each question carries 7 marks)

23 Evaluate $\iint_R y\,dA$ where R is the region in the first quadrant enclosed between the circle $x^2 + y^2 = 25$ and the line x+y=5

24 Change the order of integration and evaluate $\int_1^2 \int_y^{y^2} y^2\,dxdy$

25 Find the volume bounded by the cylinder $x^2 + y^2 = 4$ the planes y + z = 3 and z = 0.