(c) Apply Runge- kutla method of fourth order to find an approximate value of y   **8**

at x = 1.2 if $\frac{dy}{dx} = x^2 + y^2$, given that y = 1.5 when x = 1 choosing h = 0.1

5. (a) Solve $[xy^2 - e^{1/x^3}] dx - yx^2 dy = 0$ **6**

(b) If y satisfies the equation $\frac{dy}{dx} = x^2 y - 1$ and with y = 1 when x = 0, using   **6**

Taylor's series method for y about x = 0, find y when x = 0.1 and x = 0.2

(c) Compute the value of the definite integral $\int_{-1}^{1} \frac{dx}{1+x^2}$ by using   **8**

     (i) Trapezoidal rule

     (ii) Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule

     (iii) Simpson's $\left(\frac{3}{8}\right)^{th}$ rule. Compare result with exact values.

6. (a) A radial displacement 'u' in rotating a disc at a distance 'r' from the axis in   **6**

given by $\frac{d^2u}{dr^2} + \frac{1}{r}\frac{du}{dr} - \frac{u}{r^2} + kr = 0$. Find the displacement given

u = 0 when r = 0 and r = a

(b) Evaluate $\iint x^2 \, dxdy$ over the region bounded by $xy = a^2$, x = 2a, y = 0 and y = x   **6**

in the first quadrant.

(c) Find the volume of the tetrahedron bounded by the co-ordinate planes and   **8**

the plane $\frac{x}{2} + \frac{y}{3} + \frac{z}{4} = 1$