Code: RR100102

RR

B. Tech I Year (RR) Supplementary Examinations, May 2012

MATHEMATICS - I

(Common to all Branches)

Time: 3 hours Max Marks: 80

Answer any FIVE questions

All questions carry equal marks

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1 (a) Test the convergence of the series $\sum_{n=1}^{\alpha} \frac{1}{2^n + 3^n}$.

(b) Verify Rolls theorem for f(x) = $2x^3 + x^2 - 4x - 2$ in $[-\sqrt{2}, \sqrt{2}]$.

2 (a) If $\mu = \log(x^2 + y^2) + \tan^{-1}(y/x)$ prove that $\mu_{xx} + \mu_{yy} = 0$.

(b) Define curvature, center of curvature, radius of curvature and circle of curvature.

3 (a) Trace the Folium of Decartes: $x^3 + y^3 = 3axy$.

(b) Determine the volume of the solid generated by revolving the limacon. r = a + b cosθ (a>b) about the initial line.

4 (a) Form the differential equation by eliminating the arbitrary constant $\sin\sqrt{x} + e^{1/y} = c$.

(b) Solve the differential equation: $\frac{dy}{dx} = \frac{x+y\cos x}{1+\sin x}$.

5 (a) Solve the differential equation: $(D^3 - 4D^2 - D - 4)\,y = e^{3x}\cos 2x$.

(b) Solve the differential equation: $(D^2 + 1)\,y = \text{cosec } x$ by variation of parameters method.

6 (a) Show that L $\{t^n f(t)\} = (-1)^n \frac{d^n}{ds^n}[\bar{f}(s)]$ where n = 1, 2, 3,….

(b) Find $L^{-1}\{s / (s^2 - a^2)\}$.

7 (a) Evaluate $\nabla.[r\,\nabla(1/r^3)]$ where $r = \sqrt{x^2 + y^2 + z^2}$.

(b) Evaluate $\iint_s$ A.n ds where A = 18zi – 12j + 3yk and s is that part of the plane 2x+3y+6z = 12 which is located in the first octant.

8 Verify divergence theorem for F = x^2i+zj+yzk taken over the cube bounded by x = 0, x= 1, y = 0, y =1, z = 0, z = 1.

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