Code: 13A54101

R13

B.Tech I Year (R13) Supplementary Examinations June 2016

MATHEMATICS – I

(Common to all branches)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Write the differential equation obtained by eliminating 'c' from $y = cx + c^2 - c^3$.

(b) The general solution of $(D^3 - D)y = 0$.

(c) Expand e^x about x=1.

(d) Find the radius of curvature at $p = (\sqrt{2}, \sqrt{2})$ on the curve $x^2 + y^2 = 4$.

(e) Find asymptotes of the curve $x^3 + y^3 = 3axy$.

(f) Find the area bounded by the curve $\sqrt{x} + \sqrt{y} = 1$ and the coordinate axes.

(g) Find $L\{e^{-t} \sinh t\}$.

(h) Find the inverse Laplace transform of $\frac{e^{-3s}}{s+2}$

(i) Find the greatest value of the directional derivative of $\phi(x, y, z) = 2x^2 - y - z^4$ at $(2, 1, -1)$.

(j) Find the volume of a region bounded by a surface S.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

2 Solve : $x \log x \frac{dy}{dx} + y = 2 \log x$

OR

3 Solve by the method of variation of parameters $(D^2 + 1)y = x \sin x$.

UNIT - II

4 A rectangular box open at the top is to have a volume of 32cft. Find the dimensions of the box requiring least material for its construction.

OR

5 Find the envelope of $x \cos^3 \theta + y \sin^3 \theta = a$ for different values of θ.

UNIT - III

6 Find the area of the solid generated by the rotating the loop of the curve $r^2 = a^2 \cos 2\theta$ about the initial line.

OR

7 Find the volume of the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$

UNIT - IV

8 Find the inverse transform of $\frac{1}{s^2(s^2 + a^2)}$

OR

9 Solve $\frac{d^2x}{dt^2} + 2\frac{dx}{dt} + x = 3te^{-t}$ given that x(0) = 4 , $\frac{dx}{dt} = 0$ at t = 0.

Contd. in page 2

UNIT - V

10 Evaluate $\int_c [(2xy^3 - y^2 \cos x)dx + (1 - 2y \sin x + 3x^2 y^2)dy]$ where c is the ac of the parabola $2x = \pi y^2$ from (0,0) to $(\frac{\pi}{2}, 1)$

OR

11 Verify Gauss divergence theorem for $\overline{F} = (x^2 - yz)\bar{i} + (y^2 - zx)\bar{j} + (z^2 - xy)\bar{k}$ taken over the rectangular parallelepiped $0 \le x \le a$, $0 \le y \le b$, $0 \le z \le c$.

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