Code: 15A54101 **R15**

B.Tech I Year I Semester (R15) Supplementary Examinations June/July 2019

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) Solve $(4xy + 3y^2 - x)dx + x(x + 2y)dy = 0$.

(b) Solve $y'' - 6y' + 9y = 5e^{-2x}$.

(c) Solve $x^2y'' + xy' + 9y = 0$.

(d) Solve $(1 + x)^2y'' + (1 + x)y' + y = 0$.

(e) Expand $e^x \cos y$ in a Taylor's series about the point (1,π/4).

(f) Find the radius of curvature for the curve $x^2y = a(x^2 + y^2)$ at the point (-2a, 2a).

(g) Evaluate $\int_0^1 \int_x^{\sqrt{x}} (x^2 + y^2) dydx$.

(h) Evaluate $\int_0^1 \int_x^{\sqrt{x}} xy\, dydx$ by changing the order of integration.

(i) Given $\vec{A} = x^2yz\, i + y^2zx\, j + z^2xy\, k$ find $div\vec{A}$ & $curl\, \vec{A}$.

(j) If $\vec{F} = x^2 i + xy\, j$ evaluate $\int_C \vec{F}.\vec{dr}$ from (0,0) to (1,1) along: (i) The line y=x. (ii) The parabola $y = \sqrt{x}$.

PART – B

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

UNIT – I

2 Solve $\frac{dy}{dx} + x \sin 2y = x^3 cos^2 y$.

OR

3 Solve $y'' + 4y' - 12y = e^{2x} - 3 \sin 2x$.

UNIT – II

4 Solve by the method of variation of parameters $y'' + a^2y = \sec ax$.

OR

5 Solve $(3x + 2)^2y'' + 3(3x + 2)y^1 - 36y = 8x^2 + 4x + 1$

UNIT – III

6 If $x = a \cosh u \cos v$ and $y = a \sinh u \sin v$ prove that $\frac{\partial(x,y)}{\partial(u,v)} = \frac{a^2}{2}(\cos h\, 2u - \cos 2v)$.

OR

7 Find the extreme values of the function $f(x, y) = x^3 + 3xy^2 - 3x^2 - 3y^2 + 4$.

UNIT – IV

8 Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} \frac{dz\, dy\, dx}{\sqrt{1-x^2-y^2-z^2}}$.

OR

9 Change the integral $\int_{-a}^{a} \int_0^{\sqrt{a^2-x^2}} \sqrt{x^2 + y^2} dy\, dx$ into polars and hence evaluate the same.

UNIT – V

10 Find $div\, \vec{F}$ and $curl\, \vec{F}$ where $\vec{F} = \nabla(x^3 + y^3 + z^3 - 3xyz)$.

OR

11 Verity Stoke's theorem for the vector $\vec{F} = (x^2 + y^2)i - 2xy\, j$ taken round the rectangle bounded by x=0, x=a, y=0, y=b.

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