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R-14

Code: 4GC14

B.Tech. I Year Supplementary Examinations March 2021

Mathematics-I

(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit (5 x 14 = 70 Marks)

UNIT-I

1. Find the orthogonal trajectories of the family of curves $r^n = a^n \cos n\theta$ 14M

OR

2. Solve $(D^3 + 1)y = e^{-x} + \cos(2x - 1)$ 14M

UNIT-II

3. Verify Rolle' theorem for $f(x) = e^{-x} \sin x$ in $[0, \pi]$. 14M

OR

4. Verify the Meclaurin's theorem for $f(x) = (1 - x)^{\frac{5}{2}}$ with Lagrange's form of remainder up to 3 terms with $x=1$. 14M

UNIT-III

5. Trace the curve $y^2(2a - x) = x^3$ 14M

OR

6. Change of order of integration and hence evaluate the double integral $\int_0^1 \int_{x^2}^{2-x} xy \, dx dy$ 14M

UNIT-IV

7. Find the Laplace transform of periodic function $f(t) = \begin{cases} 1, & 0 < t < a/2 \\ -1, & a/2 < t < a \end{cases}$ And $f(t+a) = f(t)$. 14M

OR

8. Solve $y^{11} + 2y^1 + 5y = e^{-t}$, $y(0) = 0$, $y^1(0) = 1$ using Laplace transform technique. 14M

UNIT-V

9. Find the directional derivative of $2xy + z^2$ at $(1, -1, 3)$ in the direction of $\bar{i} + 2\bar{j} + 3\bar{k}$. 14M

OR

10. Verify Gauss divergence theorem for $\bar{F} = (x^3 - yz)\bar{i} - 2x^2y\bar{j} + z\bar{k}$ taken over the surface of cube bounded by the planes $x=y=z=a$ & $x=y=z=0$. 14M
