

I B. Tech II Semester Supplementary Examinations, July/August - 2021 MATHEMATICS-III

(Com. to CE, EEE, ECE, CSE, Chem. E, EIE, IT, Auto E, Min E, Pet E)

Time: 3 hours

Max. Marks: 75

Answer any five Questions one Question from Each Unit All Questions Carry Equal Marks

- 1. a) ϕ, ψ be two scalar functions then prove that $div(\phi \nabla \psi) = \phi \nabla^2 \psi + \nabla \phi \nabla \psi$ (8M)
 - b) Compute $\iint_{s} (a^{2} x^{2} + b^{2} y^{2} + c^{2} z^{2})^{1/2} ds$ over the ellipsoid $ax^{2} + by^{2} + cz^{2} = 1$. Using (7M) Gauss divergence theorem.

Or

- 2. a) Prove that $Curl(\overline{A} \times \overline{B}) = \overline{A}div\overline{B} \overline{B}div\overline{A} + (\overline{B}.\nabla)\overline{A} (\overline{A}.\nabla)\overline{B}$ (8M)
 - b) Evaluate $\int_C \overline{F} d\overline{r}$ where $\overline{F} = xy \,\overline{i} + (x^2 + y^2) \,\overline{j}$ and C is the axes from x = 2 to x = 4 (7M) and the line from y = 0 to y = 12.
- 3. a) Find $L\left\{e^{t}(t \ sinht)\right\}$ (7M)
 - b) Using Convolution theorem find the inverse Laplace transform of $\frac{1}{s^2(1+s)^2}$ (8M)
 - Or
- 4. a) Solve the differential equations by using Laplace transforms method (8M) $(D^2 + 4D + 3)y = e^{-t}ify(0) = 1, y'(0) = 1$
 - b) Find Laplace transform of f(t) where $f(t) = \begin{cases} e^t, \ 0 < t < 1 \\ 3, \ t > 1 \end{cases}$ (7M)
- 5. a) Find the Half range sine series of f(x) = x in $[0,\pi]$ (8M) Hence deduce that $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} \dots = \frac{\pi}{4}$
 - b) Find the Fourier Cosine transform of the function $f(x) = \begin{cases} \sin ax & \text{if } x < a \\ 0 & \text{if } x > a \end{cases}$ (7M) Or
- 6. a) Obtain the Fourier series of $f(x) = x^2 2$ $-2 \le x \le 2$ (8M)
 - b) Using Fourier integral show that (7M) $e^{-ax} - e^{-bx} = \frac{2(b^2 - a^2)}{\pi} \int_{0}^{\infty} \frac{\lambda \sin\lambda x d\lambda}{(\lambda^2 + a^2)(\lambda^2 + b^2)}, a, b > 0$

["]]"]"]"]] www.manaresults.co.in

Code No: R19BS1203

7. a) Form the partial differential equation by eliminating arbitrary constants from (8M) $z = \left(\sqrt{x+a}\right)\left(\sqrt{y+b}\right)$

b) Solve the PDE $y^2p - xyq = x(z - 2y)$ (7M)

Or

8. a) Solve the PDE $x^2p^2 = yq^2$

(8M)

- b) Form the partial differential equation by eliminating arbitrary function from (7M) $z = f(\sin x - \cos y)$
- 9. a) Solve the steady state equation of a rectangular plate of sides 'a' and 'b' (8M) insulated on the lateral surfaces subject to u(0, y) = 0 = u(a, y) = u(x, b) and u(x, 0) = x(a-x).
 - b) Solve the PDE $(D^2 7DD^1 + 12D^{1^2})z = e^{x-y}$ (7M)

Or

- 10. a) A tightly stretched string with fixed end points x = 0 and x = 1 is initially in a (8M) position given by $y = y_0 \sin^3 \frac{\pi}{1}$ if it is released from rest from this position, find displacement y(x, t).
 - b) Solve the PDE $(D^2 DD^1)z = \sin x \cos 2y$ (7M)

2 of 2