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Question Paper Code: 92004

B.E./B.Tech. DEGREE EXAMINATION, AUGUST 2021

Second Semester

19UMA204- Calculus, Complex analysis and Numerical methods

Electronics and Communication Engineering

(Regulation 2019)

Duration: 1.45 hrs

Maximum: 50 Marks

PART A (Answer Any Ten)

10*2 = 20 Marks

1. Calculate Particular integral of $(D^2 + 4D + 8)y = e^{2x}$ CO1 – App
2. Solve $\frac{1}{D^2}(\cos x)$ CO1 – App
3. Solve Complementary function of $(x^2 D^2 - 3xD - 5)y = 0$ CO1 – App
4. Evaluate $\nabla\left(\frac{1}{r}\right)$ CO2 – App
5. Calculate unit normal vector to the surface $x^2 + xy + y^2 + xyz$ at $(1, -2, 1)$ CO2 – App
6. Prove that the vector $\vec{F} = z\vec{i} + x\vec{j} + y\vec{k}$ is solenoidal CO2 – App
7. Calculate the conjugate harmonic of $u = x^2 - y^2$ CO3 – App
8. Find the fixed point of the mapping $f(z) = \frac{z}{z-2}$ CO3 – App
9. Calculate the critical points of the transformation $w = z + \frac{1}{z}$ CO3 – App
10. Calculate the residue of $f(z) = \frac{e^{2z}}{z+1}$ as its pole CO4 – App
11. Find the pole of $f(z) = \frac{\cos 2z}{(z^2 + 1)^2 (z^2 + 16)^2}$ CO4 – App
12. Define Removable singularity CO6 – App
13. What do you mean by diagonally dominant? CO6 – App

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| 14 | State the principle used in Gauss Elimination Method | CO6 – App |
| 15 | State the principle used in Gauss Jordan Method | CO6 – App |

PART B (Answer Any Three)

3*10 = 30 Marks

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| 16. | A colony of bacteria is growing an exponentially. At time t=0 it has 10 bacteria in it and at time t=4 it has 2000. At what time it have 1,00,000 bacteria? | CO1App (10) |
| 17 | Verify Divergence theorem for $\vec{F} = (x^2 - yz)\vec{i} + (y^2 - xz)\vec{j} + (z^2 - xy)\vec{k}$ over the rectangular parallelepiped $x = 0, x = 1, y = 0, y = 2, z = 0, z = 3$. | CO2-App (10) |
| 18 | Find the image of $ z - 3i = 3$ under the transformation $w = \frac{1}{z}$ | CO3- App (10) |
| 19 | Evaluate $f(z) = \int_C \frac{\cos \pi z^2 + \sin \pi z^2}{(z+1)(z+2)} dz$ by using Cauchy's Integral formula

where C is $ z = 3$ | CO4- App (10) |
| 20 | Solve $27x + 6y - z = 85, 6x + 15y + 2z = 72, x + y + 54z = 110$ by Gauss Seidel method. | CO5- App (10) |