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Roll No:

MLRS- R19



MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

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I B.TECH II Sem Supplementary Examination, November-2021

MATHEMATICS - II

(CE, CSE, ECE, EEE, IT, MECH)

Time: 3 Hours.

Max. Marks: 70

Note: 1. Question paper consists: Part-A and Part-B.

2. In Part - A, answer all questions which carries 20 marks.

3. In Part - B, answer any one question from each unit.

Each question carries 10 marks and may have a, b as sub questions.

PART- A

(10*2 Marks = 20 Marks)

1. a) State the necessary condition for the differential equation $Mdx + Ndy = 0$ to be exact. 2M C01 R
- b) Solve: $xdy + ydx = 0$. 2M C01 U
- c) Solve: $(D^2 - 5D + 6)y = 0$. 2M C02 R
- d) Find the particular solution of $(D^2 + D + 6)y = e^{2x}$. 2M C02 R
- e) Evaluate $\int_0^{11} \int_0^y y^2 dy dx$. 2M C03 R
- f) Define the centre of gravity. 2M C03 R
- g) If $\vec{r} = xi + yj + zk$ then find $\text{div } \vec{r}$. 2M C04 R
- h) Show that $\text{Curl grad } \phi = 0$ where ϕ is a scalar point function. 2M C04 Ap
- i) Evaluate $\oint_C xy^2 dx + x^2 y dy$ around a circle $x^2 + y^2 = a^2$. 2M C05 R
- j) State Stoke's theorem. 2M C05 R

PART- B

(10*5 Marks = 50 Marks)

- 2 a) Solve: $(x^2 - ay)dx = (ax - y^2)dy$. 5M C01 U
- b) Solve: $(y - px)(p - 1) = p + 1$. 5M C01 U

OR

- 3 Solve: $(x + 2y^3) \frac{dy}{dx} = y$. 10M C01 Ap

- 4 a) Solve: $(D^2 - 2D + 1)y = e^x$. 5M CO2 U
 b) Solve: $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + y = \cos(\log x)$. 5M CO2 U
- OR**
- 5 Solve: $(D^2 + 4)y = \tan 2x$ by the method of variation of parameters. 10M CO2 Ap
- 6 a) By changing the order of integration, evaluate $\int_0^1 \int_x^{\sqrt{1-x^2}} y^2 dy dx$. 5M CO3 Ap
 b) Evaluate $\int_0^5 \int_0^{x^2} x(x^2 + y^2) dx dy$ 5M CO3 Ap
- OR**
- 7 Using double integration, Find the area lying between the parabolas $y = 4x - x^2$ and the straight line $y = x$. 10M CO3 U
- 8 a) Find the directional derivative of $f = xy + yz + xz$ in the direction of vector $i + 2j + 2k$ at the point $(1, 2, 0)$. 5M CO4 U
 b) Evaluate $\text{div}(\text{grad}(r^n))$, where $r = |\vec{r}|$ and $\vec{r} = xi + yj + zk$. 5M CO4 U
- OR**
- 9 A fluid motion is given by $\vec{f} = (6xy + z^3)i + (3x^2 - z)j + (3xz^2 - y)k$. Is this motion irrotational? If so find the scalar potential. 10M CO4 Ap
- 10 a) Applying Green's theorem evaluate $\oint_c (y - \sin x)dx + \cos x dy$ where c is the plane triangle enclosed by the lines $y = 0, x = \pi/2, y = 2x/\pi$. 5M CO5 U
 b) Evaluate $\int_S \vec{F} \cdot \hat{n} ds$ where $\vec{F} = yzi + xzj + xyk$ and S is the portion of the sphere $x^2 + y^2 + z^2 = 1$ which is in the first octant. 5M CO5 U
- OR**
- 11 Verify Gauss Divergence theorem for $\vec{f} = (x^3 - yz)i - 2x^2 yj + zk$ taken over the surface of the cube bounded by the planes $x=y=z=a$ and coordinate planes. 10M CO5 Ap