

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

(UGC – AUTONOMOUS)

B TECH II Semester Examinations, September 2021

(Common to CE, EEE, ECE, CSE & IT)

MATHEMATICS-II

Answer any Five questions

All questions carry equal marks

Time : 3 Hours

Max. Marks : 75

1. a) Solve $2xydy - (x^2 - y^2 + 1)dx = 0$. [7M]
 b) Solve $(x + 1)\frac{dy}{dx} - y = e^{3x}(x + 1)^2$. [8M]
2. a) If the Temperature of a body is changing from 100°C to 70°C in 15 minutes, find the temperature of the body after 25 minutes and when the temperature will be 40°C , if the temperature of the air is 30°C . [15M]
3. a) Solve $(D^3 - 6D^2 + 11D - 6)y = e^{-2x} + e^{-3x}$. [5M]
 b) Solve $(D^2 - 2D + 1)y = x^2e^{3x} - \sin 2x + 3$. [10M]
4. Apply the method of variation of parameters to solve $\frac{d^2y}{dx^2} + y = \operatorname{cosec} x$. [15M]
5. a) Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2 dx dy$ by changing of order of integration. [10M]
 b) Evaluate $\int_0^1 \int_0^1 \int_0^1 x^2 y^3 z^4 dx dy dz$ [5M]
6. a) Find the Directional derivative of $f(x, y, z) = xy^2 + yz^3$ at $(2, -1, 1)$ in the direction of the vector $i + 2j + 2k$. [8M]
 b) Show that the vector $(x^2 - yz)i + (y^2 - zx)j + (z^2 - xy)k$ is irrotational and find its scalar potential. [7M]
7. a) Evaluate $\int_c \vec{f} \cdot d\vec{r}$ where $\vec{F} = x^2\vec{i} + y^2\vec{j}$ and 'c' is the curve $y = x^2$ in the xy-plane from $(0,0)$ to $(1, 1)$. [8M]
 b) Evaluate $\int_s \vec{f} \cdot \vec{n} ds$ where $\vec{f} = zi + xj - 3y^2zk$ and S is the surface $x^2 + y^2 = 16$ included in the first octant between $z=0$ and $z=5$. [7M]
8. Verify Green's theorem for $\int_c [(xy + y^2)dx + x^2dy]$ where c is bounded by $y=x$ and $y=x^2$. [15M]