

Code No: 152AA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year II Semester Examinations, July/August - 2021

MATHEMATICS-II

(Common to CE, EEE, ME, ECE, CSE, EIE, IT, MCT, MMT, AE, MIE, PTM, ITE)

Time: 3 Hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) Solve $x \frac{dy}{dx} + y = x^3 y^6$.
- b) Solve $y - px \quad p - 1 = p$; where $p = \frac{dy}{dx}$. [7+8]
2. Water at Temperature 100°C cools in 10 minutes to 80°C in a room temperature 25°C . Find the temperature of water after 20 minutes. [15]
3. Solve $D^2 - 4D + 4 y = x^2 \sin x + e^{2x} + 3$. [15]
- 4.a) Evaluate $\int_0^1 \int_1^{2-x} xy dx dy$.
- b) Find by double integration, the area enclosed by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. [7+8]
- 5.a) Evaluate $\int_R y dx dy$, where R is the region bounded by the parabolas $y^2 = 4x$ and $x^2 = 4y$.
- b) Evaluate $\int_0^\pi \int_0^{a \sin \theta} r dr d\theta$. [7+8]
- 6.a) Find the work done by the force $F = 3x^2 i + 2xz j - y k$ along the straight line joining the points $(0,0,1)$ and $(2,1,3)$.
- b) Find $\text{curl } f$ where $f = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$. [8+7]
- 7.a) Find the directional derivative of the function $f = x^2 - y^2 + 2z^2$ at the point $P(1,2,3)$ in the direction of the line PQ where Q is the point $(5,0,4)$.
- b) Prove that $\text{div} \frac{r}{r^3} = 0$, where $r = xi + yj + zk$. [8+7]
8. State and verify Gauss divergence theorem for $f = x^3 - yz i - 2x^2 y j + zk$ taken over the surface of the cube bounded by the planes $x = y = z = a$ and coordinate planes. [15]

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