

Code No: 152AA

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year II Semester Examinations, November/December - 2020

MATHEMATICS-II

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

Time: 2 hours

Max. Marks: 75

Answer any five questions

All questions carry equal marks

- 1.a) Solve $\frac{dy}{dx} + \frac{y}{x} = y^2 x \sin x$.
b) If the air is maintained at 30°C and the temperature of the body cools from 80°C to 60°C in 12 minutes, find the temperature of the body after 24 minutes. [7+8]
- 2.a) Solve $\frac{dy}{dx} = e^{x-y}(e^x - e^y)$.
b) Radium decomposes at a rate proportional to the amount present. If p% of the original amount disappears in 1 year, how much will remain at the end of 21 years. [7+8]
- 3.a) Solve $\frac{d^2y}{dx^2} - (a+b)\frac{dy}{dx} + aby = e^{ax} + e^{bx}$.
b) Solve $(D^2 - 1)y = e^x \cos x$. [8+7]
- 4.a) Solve $(D^2 - 4D + 3)y = \sin 3x \cos 2x$.
b) Solve $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = 2 \log x$. [7+8]
- 5.a) Check the equality of the two double integrals
 $\int_0^1 \left(\int_0^1 \frac{x-y}{(x+y)^3} dy \right) dx$ and $\int_0^1 \left(\int_0^1 \frac{x-y}{(x+y)^3} dx \right) dy$.
b) Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} dx dy dz$. [8+7]
- 6.a) Change the order of integration in the integral and evaluate $\int_0^{4a} \int_{x^2/4a}^{2\sqrt{ax}} dy dx$.
b) Calculate the volume of the solid bounded by the planes $x = 0$, $y = 0$, $x+y+z = a$ and $z = 0$. [7+8]
7. Find the directional derivative of the function $\phi = xy^2 + yz^3$ at the point $(2, -1, 1)$ in the direction of the normal to the surface $x \log z - y^2 + 4 = 0$ at $(-1, 2, 1)$. [15]
8. Verify Green's theorem in the plane for $\int_C (x^2 - xy^3)dx + (y^2 - 2xy)dy$ where C is a square with vertices $(0, 0)$ $(2, 0)$ $(2, 2)$ $(0, 2)$. [15]

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