Code No: 152AA **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year II Semester Examinations, September/October - 2021
MATHEMATICS-II
(Common to CE, ME, ECE, EIE, MCT, MMT, ECM, AE, MIE, CSBS, CSE(AI&ML), CSE(IOT))

Time: 3 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) Solve the differential equation
$$\frac{dy}{dx} = \frac{x - y\cos x}{1 + \sin x}$$

b) If the air is maintained at 15°C and the temperature of the body drops from 70°C to 40^0 in 10 minutes. What will be its temperature after 30 minutes? [7+8]

2.a) Solve the differential equation $(e^y + 1)\cos x dx + e^y \sin x dy = 0$

b) The temperature of cup of coffee is 90°C. When freshly poured the room temperature being 24^0C. In one minute it was cooled to 80 ^{0}C. How long a period must elapse, before the temperature of the cup becomes 65^0C? [7+8]

3.a) Solve the differential equation $(D^3 - 3D^2 + 3D - 1)y = Sinx + x^3$.

b) Solve by method of variation of parameters $\frac{d^2y}{dx^2} + y = \cos ecx$. [7+8]

4.a) Evaluate $\int\int (x^2 + y^2)dxdy$ in the positive quadrant for which $x + y \le 1$.

b) Evaluate $\int_0^1 \int_0^{1-z} \int_0^{1-y-z} xyzdxdydz$. [8+7]

5.a) By changing the order of integration, evaluate $\int_0^1 \int_1^{2-x} xydxdy$

b) Evaluate $\int\int\int (xy + yz + zx)dxdydz$, where V is the region of space founded by $x = 0$, $x = 1$, $y = 0$, $y = 2$ and $z = 0$, $z = 3$. [7+8]

6.a) Find the angle between the surface x log z = y^2-1 and $2 - z = x^2 y$ at (1, 1, 1).

b) Find network done in moving a particle in the force field $F = 3x^2 i + (2xz - y)j + zk$ along with the curve x= $2at^2$, y = t, z = $4t^2$ -1 from t= 0 to 1. [7+8]

7.a) Find the directional derivative of f(x,y,z)=$zy^3 + xz^3$ at the point (1,-3,4) in the direction of the vector 2i+j - 3k.

b) Show that the vector $\bar{F} = (3x^2 + 2y^2 + 1)i + (4xy - 3y^2 z - 3)j + (2 - y^3)k$ is irrotational and find scalar potential. [7+8]

8. Verify stokes theorem for $F = (x^2 + y^2)i - 2xy\, i$ taken around the rectangle bounded by the lines $x = \pm a, y = 0, y = b$. [15]

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