R15

Code No: 121AB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year Examinations, September/October - 2021
MATHEMATICS-I
(Common to CE, EEE, ME, ECE, CSE, EIE, IT, MMT, AME, MIE, PTM)

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

Answer any five questions
All questions carry equal marks

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1. Find the non-trivial solution of the system of equations 2x – y + 3z = 0, 3x + 2y + z = 0, x – 4y + 5z = 0. [15]

2. Reduce the following quadratic form $2x^2+2y^2+2z^2-2xy-2zx-2yz$ to canonical form by orthogonal reduction. [15]

3.a) Verity Cauchy's mean value theorem for $f(x)=e^x, g(x)=e^{-x}$ in (3,7) and find the value of C.

b) Find the maximum and minimum values of $x+y+z$ subject to $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}=1$ [8+7]

4. Find the maximum and minimum values of $x^3+3xy^2-15x^2-15y^2+72x$ [15]

5.a) Evaluate $\int_0^1 \frac{x^4 dx}{\sqrt{1-x^2}}$, using $\beta-\Gamma$ functions.

b) Evaluate $\int_0^a \int_0^{\sqrt{a^2-y^2}} (x^2+y^2)\, dy\, dx$ [7+8]

6.a) If $\int_0^1 \frac{x^2 dx}{\sqrt{1-x^5}} = \beta(m,n)$. Find $\Gamma(m+n)$.

b) Evaluate $\int_0^1 \int_0^{1-z} \int_0^{1-y-z} xyz\, dx\, dy\, dz$ [7+8]

7.a) Solve the differential equation $(D^2-4)y = 2\cos^2 x$.

b) Solve by the method of variation of parameters $\frac{d^2y}{dx^2}+4y=\tan 2x$ [7+8]

8.a) Evaluate $\int_0^\infty te^{-2t}\sin t\, dt$.

b) Find Inverse Laplace transform of $\frac{3s+7}{(s^2-2s-3)}$. [7+8]

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