Jaypee Institute of Information Technology, Noida

Session: 2010 – 11

Test – I

Course Name: Mathematics – I **Max. Time: 1.00 Hr.**

Subject Code: 10B11MA111 / 07B11MA101 **Max. Marks: 15**

Note: Attempt all Questions. Calculators are not allowed.

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1. If $w = \ln(x^2 + y^2 + z^2)$, $x = ue^v \sin(u)$, $y = ue^v \cos(u)$, $z = ue^v$. Find $\frac{\partial w}{\partial u}, \frac{\partial w}{\partial v}$ at the point $(u, v) = (-2, 0)$. (3)

2. (a) Find the linear and quadratic approximation to $f(x, y) = \sin(xy)$ at the point $\left(1, \frac{\pi}{2}\right)$. (2)

(b) Determine Jacobian and find the relation between them if exists, where $u = \frac{x - y}{x + y}$ and $v = \frac{xy}{(x + y)^2}$. (2)

3. Find the absolute maxima and minima of the function $f(x, y) = 2x^2 - 4x + y^2 - 4y + 1$ on the closed triangular plate bounded by the lines $x = 0, y = 2, y = 2x$ in the first quadrant. (3)

4. (a) Change the Cartesian integral into an equivalent polar integral and evaluate

$$\int_0^2 \int_0^{\sqrt{1-(x-1)^2}} \frac{(x + y)}{(x^2 + y^2)} dy dx.$$ (3)

(b) Evaluate the following integral $\int_0^1 \int_{4y}^4 e^{x^2} dx dy$. (2)

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