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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST 1 EXAMINATIONS - SEPTEMBER 2019

B.Tech I Semester (ECE/CSE/IT/CE)

COURSE CODE: 10B11MA111   MAX. MARKS: 15

COURSE NAME: MATHEMATICS-I

COURSE CREDITS: 04   MAX. TIME: 1HR

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Marks are indicated against each question.

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1. Show that $\lim_{(x,y)\to(0,0)} \frac{x^2+\sin^2 y}{3x^2+y^2}$ does not exist?   [2], [CO1]

2. Express $\frac{\partial z}{\partial r}$ and $\frac{\partial z}{\partial \theta}$ as functions of r and θ; for $z = \tan^{-1}\left(\frac{x}{y}\right), x = r\cos\theta, \ y = r\sin\theta$.

   [3], [CO1]

3. Using Taylor's series expansion for $f(x,y)$ at the origin, find the quadratic approximation of $f(x,y) = \ln(2x + y + 1)$.   [3], [CO1]

4. Obtain maximum value of the function $f(x,y,z) = x^2 + 2y - z^2$ subject to the constraints $2x - y = 0$ and $y + z = 0$.   [3], [CO2]

5. (a) Evaluate the improper integral $\int_0^1 \frac{1}{\sqrt{1-x}} dx$.   [2], [CO2]

   (b) Using Gamma functions evaluate $\int_0^{\pi/2} \sin^3\theta \cos^4\theta \ d\theta$.   [2], [CO2]

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