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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: 18B11MA111

MAX. MARKS: 15

COURSE NAME: ENGINEERING 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.*

1. Show that  $\lim_{(x,y) \rightarrow (0,0)} \frac{x^2 + \sin^2 y}{3x^2 + y^2}$  does not exist? [2], [CO1]
2. Express  $\frac{\partial z}{\partial r}$  and  $\frac{\partial z}{\partial \theta}$  as functions of  $r$  and  $\theta$ ; 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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