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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
MID TERM TEST – (SUMMER SEMESTER) EXAMINATION- JUNE 2018
B.Tech II Semester (BT/BI)

MAX. MARKS: 50

COURSE CODE: 10B11MA212
COURSE NAME: BASIC MATHEMATICS II

MAX. TIME: 2 Hrs

COURSE CREDITS: 4

Note: *All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

[8]

1. Test the convergence of the following series

(i) $\sum_{n=1}^{\infty} \frac{n}{n+1}$

(ii) $\sum_{n=1}^{\infty} \frac{n^2}{3^n}$

2. Find the normal, unit normal and tangent plane to the surface $2x^2 + y^2 + 2z = 3$ at the point $(2, 1, -3)$. [6]

3. Using Taylor's series expansion expand $f(x, y) = e^x \sin y$ in powers of x and y (up to third degree terms). [6]

4. State the Euler's theorem for homogeneous functions. If $\sin u = \frac{x^2 y^2}{x+y}$, then show that [6]

$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 3 \tan u$$

5. Draw a rough sketch of the region of the integration and evaluate the double integral $\iint_D 120\, xy\, dA$, where D is the region bounded by the line $y = x$ and parabola $y = x^2$. [6]

6. Using the integrating factor solve the differential equation $\frac{dy}{dx} - \frac{y}{x} = \frac{1}{x} \log x$. [6]

7. Compute the first partial derivatives of the function $f(x, y) = x^2 \sin (x^2 - y^2)$. [6]

8. (a) Compute the $div(grade\ (f))$ for the function $f = x^2 + y^2 + z^2$. [4]

(b) Write the order and degree of the differential equation $2x\left(\frac{dy}{dx}\right)^{2/3} - \left(\frac{d^4y}{dx^4}\right) = 0$. [2]

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