JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2024

B.Tech-I Semester (CSE/IT/ECE/CE/M&C)

COURSE CODE (CREDITS): 24B11MA111 (4)   MAX. MARKS: 25

COURSE NAME: ENGINEERING MATHEMATICS-I

COURSE INSTRUCTORS: MDS, PKP*, NKT, RKB

MAX. TIME: 1 Hour 30 Minutes

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q. No.	Question	CO	Marks
Q1	Convert the following matrix in row echelon form: $$\begin{bmatrix} 1 & 2 & 3 & 0 \\ 3 & 2 & 1 & 3 \\ 2 & 4 & 3 & 2 \\ 6 & 8 & 7 & 5 \end{bmatrix}$$	CO-1	3
Q2	Determine whether the following set of vectors is a basis for $\mathbb{R}^4$: $\{(1,1,0,2),\ (-1,1,1,-2),(2,1,3,-1),(2,-1,1,2)\}$	CO-1	3
Q3	Show that $\lim_{(x,y)\to(0,0)} \frac{x^3 y}{x^6+y^2}$ does not exists.	CO-2	3
Q4	If $z = \frac{x^2+y^2}{x+y}$, show that $\left(\frac{\partial z}{\partial x} - \frac{\partial z}{\partial y}\right)^2 = 4\left(1 - \frac{\partial z}{\partial x} - \frac{\partial z}{\partial y}\right)$	CO-2	3
Q5	Use Chain rule to find $\frac{\partial w}{\partial \alpha}$ where $w = xe^{zy}$ with $x = \alpha^2\beta$, $y = \beta^2\gamma\ and\ z = \gamma^2\alpha$.	CO-2	3
Q6	Find all the critical points of $f(x,y) = 2x^3 + y^2 - 6xy + 4y$ and classify them as local minimum, local maximum or saddle points (if they exist).	CO-2	3.5
Q7	Sketch the region of integration and evaluate the integral $$\int_0^1 \int_y^{y^{1/3}} e^{x^2}\,dx\,dy$$	CO-2	3.5
Q8	Find parametric equation for the line through (2,3,0) and perpendicular to the vectors $\vec{u} = \hat{\imath} + 2\hat{\jmath} + 3\hat{k}$ and $\vec{v} = 3\hat{\imath} + 4\hat{\jmath} + 5\hat{k}$.	CO-3	3

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