GYANMANJARI INNOVATIVE UNIVERSITY

GYANMANJARI INSTITUTE OF TECHNOLOGY

B.Tech.-Mid Semester Examination (MSE)-W2025

Enrollment No.:_____

Subject Code: BETXX10201 **Date: 17/10/2025**

Subject Name: Mathematics I **Semester: 1st**

Time: 02:30 to 04:30 **Total Marks: 60**

Instructions:

1. **Question No. 1 is compulsory.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			Marks
Q.1	**(a)**	If $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \\ 1 & 3 & 4 \end{bmatrix}$ then find A^{-1} by matrix method (Row Elementary Operation).	**05**
	(b)	Find the eigen values of $A = \begin{bmatrix} -1 & 1 & 2 \\ 0 & -2 & 1 \\ 0 & 0 & -3 \end{bmatrix}$ 1) A^2 2) A^{-1} 3) $A + 2I$	**05**
	(c)	Find the value of λ so that the equations $2x + y + 2z = 0; x + y + 3z = 0;$ $4x + 3y + \lambda z = 0$ have a non-trivial solution.	**10**
Q.2	**(a)**	If $Z = xy^2 + 3xy^4, x = at^2, y = 2at, find\ \frac{dz}{dt}$	**05**
	(b)	Discuss the continuity of the function f defined as $f(x,y) = \begin{cases} \frac{x^3 - y^3}{x^2 + y^2}, & (x,y) \neq (0,0) \\ 0, & (x,y) = (0,0) \end{cases}$	**05**
		OR	
	(b)	Evaluate: $\lim_{x \to 0} \left\{ \frac{1}{sinx} - \frac{1}{x} \right\}$	**05**
	(c)	If $x = u\ cosv, y = u\ sinv$ then prove that $\frac{\partial(u,v)}{\partial(x,y)} \cdot \frac{\partial(x,y)}{\partial(u,v)} = 1$	**10**

OR

(c) 1. Expand log $(sinx)$ in power of $(x-2)$.
2. Using Maclaurian series, expand e^x **10**

Q.3 (a) Evaluate: $\int_0^1 \int_0^{2-x} \int_0^{2-x-y} dzdydx$ **05**

(b) Evaluate: $\iint_R (x+y)dydx$, where R is the region bounded by $x=0, x=2, y=x, y=x+2$ **05**

(c) *Evaluate*:

1. $\int_1^2 \int_2^3 \int_0^1 xyxdzdxdy$

2. $\int_0^{\frac{\pi}{2}} \int_{\frac{\pi}{2}}^{x} \cos(x+y)\, dydx$ **10**

OR

Q.3 (a) Evaluate the following:

1. $\int_0^1 \int_x^{x^2} (x^2+3y+2)dxdy$
2. $\int_0^1 \int_0^x e^{\frac{x}{y}}\, dxdy$ **05**

(b) Evaluate: $\iint_R (x^2+y^2)dA$, by changing the variables, where R is the region lying in the first quadrant and bounded by the hyperbola's $x^2-y^2=9, x^2-y^2=1, xy=2, xy=4$. **05**

(c) Change the order of Integration, evaluate $\int_0^3 \int_y^3 \frac{x}{x^2+y^2} dxdy$. **10**