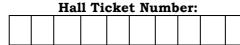
Subject Code:								
241AN								

Time: 3 Hours



VR24

VIGNAN'S INSTITUTE OF MANAGEMENT AND TECHNOLOGY FOR WOMEN

(An Autonomous Institution)

I-B.Tech.-I-Semester Regular Examinations, February-2025

MATRICES AND CALCULUS

(CSE)

Max. Marks: 60

(Answer All Questions) Note: Question paper consists of Part-A & Part-B.

- Part-A for 10M, ii) Part-B for 50marks •
- **Part A** is compulsory, consists of 10 sub questions from all units carrying equal marks. •
- Part-B consists of 10 questions (numbered from 2 to 11) carrying 10marks each. From • each unit there are 2 questions and the students should answer one of them. Hence the student should answer **5** questions from Part-B.

PART-A

	(1	lOMarks)
1.a)	Define Echelon form of a Matrix	1M
1.b)	What is the rank of a unitary matrix of order 'n'	1M
1.c)	If the Eigen values of A are 1,1,2 then find the Eigen values of A ³	1M
1.d)	State Cayley-Hamilton Theorem.	1M
1.e)	Discuss the applicability of Rolle's mean value theorem for the function $f(x) = x $	1M
	in [-1, 1]	
1.f)	Define Gamma function	1 M
1.g)	If $u = \frac{y}{x}$, $v = xy$ then find $J(\frac{u,v}{x,y})$	1M
1.h)	Write the necessary conditions for f (x, y) to have a maximum or minimum at (a,	1M
	b).	
1.i)	Evaluate $\int_{x=1}^{3} \int_{y=0}^{1} xy^2 dy dx$	1M
1.j)	Skecth the area bounded by the curves $y = x, y = x^2$	1 M

PART-B

(Answer any one full question from each unit. Each question carries 10 marks)

							(50Marks)	
2. a)						it to Normal form $\begin{bmatrix} 2 & 1 & 3 & 5 \\ 4 & 2 & 1 & 3 \\ 8 & 4 & 7 & 13 \\ 8 & 4 & -3 & -1 \end{bmatrix}$	5M	
b)		λz -	= μ	hav	e (i	do the system of equations $x + y + z = 6$, no solution (ii) a unique solution	5M	
						OR		
3. a)	Find the rank of a matrix	1 2 3 4	2 4 2 8	3 3 1 7	0 2 3 5	by reducing it to Echelon form.	5M	
b)								
4. a)	Prove that if λ is an Eigen value of a non- singular matrix A then $\frac{ A }{\lambda}$ is an eigen value of AdjA.							
b)	5			•		to canonical form by orthogonal	8M	

transformations and also find its rank, index and signature

OR Find Eigen values and Eigen vectors of $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ 5. a) 5M Verify Cayley-Hamilton theorem and hence find A-1 where b) $A = \begin{vmatrix} 5 & 1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{vmatrix}$ **5M** Verify Rolle's theorem for $f(x) = \log \left[\frac{x^2 + ab}{x(a+b)} \right]$ in [a, b] 6. a) **5**M b) Show that $\Gamma(1/2) = \sqrt{\pi}$ 5M OR 7. a) Show that $1 + x < e^x < 1 + xe^x$, for x > 05M b) 5M Show that $\int_{0}^{1} x^{m} (\log x)^{n} dx = \frac{(-1)^{n} n!}{(m+1)^{n+1}}$ where n is positive integer and m> -1 Prove that u = x + y + z, v = xy + yz + zx, $w = x^2 + y^2 + z^2$ are functional dependent and 8. a) **5M** find the relation between them A rectangular box open at the top is to have a volume 32 cubic feet. Find the **5M** b) dimensions of the box requiring least material for its construction OR If $u = \frac{x+y}{1-xy}$, $v = tan^{-1}x + tan^{-1}y$ then prove that u, v are functionally dependent 9. a) 5M and also write relation between them b) Find three positive numbers whose number is 100 and whose product is 5M maximum Change the order of integration $\int_0^{4a} \int_{x^2}^{2\sqrt{ax}} dy \, dx$ 10.a) 5M 5M b) Evaluate $\iint_{R} r^{3} dr d\theta$ Over the area included between the circles r=2sin Θ and r=4sin0 OR 11.a) Evaluate $\int_{0}^{1} \int_{x}^{\sqrt{x}} (x^2 + y^2) dx dy$ 5M 5M b) Evaluate $\iiint_{V} (xy + yz + zx) dx dy dz$. Where V is the region of space bounded by the planes x=0, x=1,y=0,y=2,z=0 and z=3

VMTW