

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad-500043

CIVIL ENGINEERING

TUTORIAL QUESTION BANK

Course Title	LINEAR ALGEBRA AND CALCULUS				
Course Code	AHSB02				
Programme	B.Tech				
Semester	I AE CSE IT	ECE EEE M	E CE		
Course Type	Foundation				
Regulation	IARE - R18				
	r	Гheory		Pract	ical
Course Structure	Lectures	Tutorials	Credits	Laboratory	Credits
	3	1	4	-	-
Chief Coordinator	Ms. P Rajani, Assi	stant Professor			
Course Faculty	Dr. M Anita, Profe	ssor			
	Dr. S Jagadha, Pro	fessor			
	Dr. J Suresh Goud,	Assistant Profe	ssor		
	Ms. L Indira, Assistant Professor				
	Mr. Ch Somashekar, Assistant Professor				
	Ms. P Srilatha, Assistant Professor				
	Ms. C Rachana, Assistant Professor				
	Ms. V Subba Laxn	ni, Assistant Pro	fessor		
	Ms. B Praveena, A	ssistant Professo	or		

COURSE OBJECTIVES:

The cours	The course should enable the students to:					
Ι	Determine rank of a matrix and solve linear differential equations of second order.					
II	Determine the characteristic roots and apply double integrals to evaluate area.					
III	Apply mean value theorems and apply triple integrals to evaluate volume.					
IV	Determine the functional dependence and extremum value of a function					
V	Analyze gradient, divergence, curl and evaluate line, surface, volume integrals over a vector field.					

COURSE OUTCOMES (COs):

CO 1	Determine rank by reducing the matrix to Echelon and Normal forms. Determine inverse of the matrix by Gauss Jordon Method and Solving Second and higher order differential equations with constant coefficients.
CO 2	Determine a modal matrix, and reducing a matrix to diagonal form. Evaluate inverse and powers of matrices by using Cayley-Hamilton theorem. Evaluate double integral. Utilize the concept of change order of integration and change of variables to evaluate double integrals. Determine the area.
CO 3	Apply the Mean value theorems for the single variable functions. Apply triple integrals to evaluate volume.

CO 4	Determine the maxima and minima for a function of several variable with and without constraints.
CO 5	Analyze scalar and vector fields and compute the gradient, divergence and curl. Evaluate line, surface
	and volume integral of vectors. Use Vector integral theorems to facilitate vector integration.

COURSE LEARNING OUTCOMES (CLOs):

Students, who complete the course, will have demonstrated the ability to do the following:

AHSB02.01	Demonstrate knowledge of matrix calculation as an elegant and powerful mathematical language in connection with rank of a matrix.
AHSB02.02	Determine rank by reducing the matrix to Echelon and Normal forms.
AHSB02.03	Determine inverse of the matrix by Gauss Jordon Method.
AHSB02.04	Find the complete solution of a non-homogeneous differential equation as a linear combination of the complementary function and a particular solution.
AHSB02.05	Solving Second and higher order differential equations with constant coefficients.
AHSB02.06	Interpret the Eigen values and Eigen vectors of matrix for a linear transformation and use properties of Eigen values
AHSB02.07	Understand the concept of Eigen values in real-world problems of control field where they are pole of closed loop system.
AHSB02.08	Apply the concept of Eigen values in real-world problems of mechanical systems where Eigen values are natural frequency and mode shape.
AHSB02.09	Use the system of linear equations and matrix to determine the dependency and independency.
AHSB02.10	Determine a modal matrix, and reducing a matrix to diagonal form.
AHSB02.11	Evaluate inverse and powers of matrices by using Cayley-Hamilton theorem.
AHSB02.12	Apply double integrals to evaluate area of a given function.
AHSB02.13	Utilize the concept of change order of integration and change of variables to evaluate double integrals.
AHSB02.14	Apply the Mean value theorems for the single variable functions.
AHSB02.15	Apply triple integrals to evaluate volume of a given function.
AHSB02.16	Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies.
AHSB02.17	Understand the techniques of multidimensional change of variables to transform the coordinates by utilizing the Jacobian. Determine Jacobian for the coordinate transformation.
AHSB02.18	Apply maxima and minima for functions of several variable's and Lagrange's method of multipliers.
AHSB02.19	Analyze scalar and vector fields and compute the gradient, divergence and curl.
AHSB02.20	Understand integration of vector function with given initial conditions.
AHSB02.21	Evaluate line, surface and volume integral of vectors.
AHSB02.22	Use Vector integral theorems to facilitate vector integration.

MODULE - I						
	THEORY OF MATRICES AND LINEAR TRANSFORMATIONS					
S No	Part - A (Short Answer Questions	Blooms Blooms Taxonomy Level	Course Outcomes	Course Learning Outcomes (CLOs)		
1	Define Orthogonal matrix.	Remember	CO 1	AHSB02.01		
2	Find the value of k such that the rank of $\begin{bmatrix} 1 & 1 & -1 & 1 \\ 1 & -1 & k & -1 \\ 3 & 1 & 0 & 1 \end{bmatrix}$ is 2.	Remember	CO 1	AHSB02.01		
3	Prove that $\frac{1}{2} \begin{bmatrix} 1+i & -1+i \\ 1+i & 1-i \end{bmatrix}$ is a unitary matrix.	Understand	CO 1	AHSB02.01		
4	Find the value of k such that rank of $\begin{bmatrix} 1 & 2 & 3 \\ 2 & k & 7 \\ 3 & 6 & 10 \end{bmatrix}$ is 2	Understand	CO 1	AHSB02.01		
5	Find the Skew-symmetric part of the matrix $\begin{bmatrix} 1 & 1 & 2 \\ -1 & 1 & 1 \\ 3 & -1 & 2 \end{bmatrix}$.	Understand	CO 1	AHSB02.01		
6	Define Rank of a matrix and Skew-Hermitian matrix., Unitary matrix.	Remember	CO 1	AHSB02.01		
7	If $A = \begin{bmatrix} 3 & a & b \\ -2 & 2 & 4 \\ 7 & 4 & 5 \end{bmatrix}$ is symmetric, then find the values of a and b.	Understand	CO 1	AHSB02.01		
8	Define orthogonal matrix .Prove that $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ is orthogonal.	Understand	CO 1	AHSB02.01		
9	Determine the values of a, b, c when the matrix $\begin{bmatrix} 0 & 2b & c \\ a & b & -c \\ a & -b & c \end{bmatrix}$ is orthogonal.	Remember	CO 1	AHSB02.01		
10	Express the matrix A as sum of symmetric and Skew-symmetric matrices. where A = $\begin{bmatrix} 3 & -2 & 6 \\ 2 & 7 & -1 \\ 5 & 4 & 0 \end{bmatrix}$	Understand	CO 1	AHSB02.01		
11	Write the solution of the $\frac{d^3y}{dx^3} - 3\frac{dy}{dx} + 2y = 0$	Understand	CO 1	AHSB02.04		
12	Write the solution of the $(4D^2-4D+1)y=100$	Understand	CO 1	AHSB02.04		

TUTORIAL QUESTION BANK

13	Find the particular integral of $\frac{1}{\sqrt{1-x}} x$	Understand	CO 1	AHSB02.04
14	Find the particular integral of $\frac{1}{(D^2 - 1)}x$	Remember	CO 1	AHSB02.04
	Solve the differential equation $\frac{d^3 y}{dx^3} + y = 0$ Solve the differential equation $(D^2 + a^2)y = 0$			
15	Solve the differential equation $(D^2 + a^2)y = 0$	Understand	CO 1	AHSB02.04
16	Find the particular value of $\frac{1}{(D-3)}x$ Find the particular integral of $(D^3 - D^2 + 4D - 4)y = e^x$	Understand	CO 1	AHSB02.04
17	Find the particular integral of $(D^3 - D^2 + 4D - 4)y = e^x$	Understand	CO 1	AHSB02.04
18	Solve the differential equation $\frac{1}{(D+1)(D-1)}e^{-x}$	Understand	CO 1	AHSB02.04
19	Solve the differential equation $(D^3 + D)y = 0$	Understand	CO 1	AHSB02.04
20	Solve the differential equation $(D^6 - 64)y = 0$	Remember	CO 1	AHSB02.04
1	Part - B (Long Answer Questi		CO 1	
1	By reducing the matrix $\begin{bmatrix} -1 & 2 & 0 \\ 3 & 7 & 1 \\ 5 & 9 & 3 \end{bmatrix}$ into normal form, find its rank.	Understand	CO 1	AHSB02.02
2	Find the values of a and b such that rank of the matrix	Understand	CO 1	AHSB02.02
	$\begin{bmatrix} 1 & -2 & 3 & 1 \\ 2 & 1 & -1 & 2 \\ 6 & -2 & a & b \end{bmatrix}$ is 3.			
	$\begin{vmatrix} 6 & -2 & a & b \end{vmatrix}$			
3	Find the rank of the matrix A= $\begin{bmatrix} 2 & 1 & 3 & 5 \\ 4 & 2 & 1 & 3 \\ 8 & 4 & 7 & 13 \\ 8 & 4 & -3 & -1 \end{bmatrix}$ by reducing to	Understand	CO 1	AHSB02.02
	echelon form.			
4	Reduce the matrix to its normal form where $A = \begin{bmatrix} -1 & -3 & 3 & 1 \\ 1 & 1 & -1 & 0 \\ 2 & -5 & 2 & -3 \\ -1 & 1 & 0 & 1 \end{bmatrix}$	Understand	CO 1	AHSB02.03
5	Find the Inverse of a matrix by using Gauss-Jordan method $A = \begin{bmatrix} 1 & -2 & 0 & 1 \\ 2 & -1 & 1 & 0 \\ 3 & -3 & 1 & 1 \\ -1 & -1 & -1 & 1 \end{bmatrix}.$	Understand	CO 1	AHSB02.02

$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	6	Reduce the matrix A to its normal form where	Understand	CO 1	AHSB02.02
$A = \begin{bmatrix} 4 & 0 & 2 & 6 \\ 2 & 1 & 3 & 1 \end{bmatrix}$ and hence find the rank $\begin{bmatrix} 1 & 1 & -1 & 0 \\ k & 2 & 2 & 2 \\ 9 & 9 & k & 3 \end{bmatrix}$ Understand $CO = 1$ AHSB02.02 $B = \begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$ by reducing to normal $\begin{bmatrix} 2 & -4 & 3 & -1 & 0 \\ 1 & -2 & -1 & -4 & 2 \\ 0 & 1 & -1 & 3 & 1 \\ 4 & -7 & 4 & -4 & 5 \end{bmatrix}$ Understand $CO = 1$ AHSB02.02 $\begin{bmatrix} 2 & -4 & 3 & -1 & 0 \\ 1 & -2 & -1 & -4 & 2 \\ 0 & 1 & -1 & 3 & 1 \\ 4 & -7 & 4 & -4 & 5 \end{bmatrix}$ by reducing to the chelon form $\begin{bmatrix} 4 & 0 & 2 & 1 \\ 2 & 1 & 3 & 4 \\ 2 & 3 & 4 & 7 \\ 2 & 3 & 1 & 4 \end{bmatrix}$ by Echelon $B = CO = 1$ AHSB02.02 B = CO = 1 AHSB02.02 B = CO = 1 AHSB02.02 CO = 1 AHSB02.04 AHSB02.04 $D^{2}(D^{2} + 4)y = 96x^{2} + \sin 2x - k$ $D = CO = 1$ AHSB02.04 $D^{2}(D^{2} + 4)y = 96x^{2} + \sin 2x - k$ $D = CO = 1$ AHSB02.04 $D^{2}(D^{2} + 4)y = 96x^{2} + \sin 2x - k$ $D = CO = 1$ AHSB02.04 $D^{2}(D^{2} + 4)y = 96x^{2} + \sin 2x - k$ $D = CO = 1$ AHSB02.04 $D^{2}(D^{2} + 4)y = 96x^{2} + \sin 2x - k$ $D = CO = 1$ AHSB02.04 $D^{2}(D^{2} + 4)y = 96x^{2} + \sin 2x - k$ $D = CO = 1$ AHSB02.04 $D^{2}(D^{2} + 4)y = 96x^{2} + \sin 2x - k$ $D = CO = 1$ AHSB02.04 $D^{2}(D^{2} + 4)y = 96x^{2} + \sin 2x - k$ $D = CO = 1$ AHSB02.04 $D^{2}(D^{2} + 4)y = 96x^{2} + \sin 2x - k$ $D = CO = 1$ AHSB02.04 $D^{2}(D^{2} + 4)y = 96x^{2} + \sin 2x - k$ $D = CO = 1$ AHSB02.04 $D^{2}(D^{2} + 4)y = 96x^{2} + \sin 2x - k$ $D = CO = 1$ AHSB02.04 $D^{2}(D^{2} + 4)y = 96x^{2} + \sin 2x - k$ $D = CO = 1$ AHSB02.04 $D^{2}(D^{2} + 4)y = 96x^{2} + \sin 2x - k$ $D = CO = 1$ AHSB02.04 $D^{2}(D^{2} + 4)y = 96x^{2} + \sin 2x - k$ $D = CO = 1$ AHSB02.04 $D^{2}(D^{2} + 4)y = 96x^{2} + e^{3x}$ $D = CO = 1$ AHSB02.04 $D^{2}(D^{2} + 4)y = 26x^{2} + e^{3x}$ $D = CO = 1$ AHSB02.04 $D^{2}(D^{2} + 4)y = 26x^{2} + e^{3x}$ $D = CO = 1$ AHSB02.04 $D^{2}(D^{2} + 4)y = 26x^{2} + e^{3x}$ $D = CO = 1$ AHSB02.04 $D^{2}(D^{2} + 4)y = 26x^{2} + e^$					
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99k38Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$ UnderstandCO 1AHSB02.029Find the rank of the matrix, by reducing it to the echelon formUnderstandCO 1AHSB02.029Find the rank of the matrix, by reducing it to the echelon formUnderstandCO 1AHSB02.0210 $\begin{bmatrix} 2 & -4 & 3 & -1 & 0 \\ 1 & -2 & -1 & -4 & 2 \\ 0 & 1 & -1 & 3 & 1 \\ 4 & -7 & 4 & -4 & 5 \end{bmatrix}$ UnderstandCO 1AHSB02.0210Find the rank of the A^T matrix if $A = \begin{bmatrix} 4 & 0 & 2 & 1 \\ 2 & 1 & 3 & 4 \\ 2 & 3 & 4 & 7 \\ 2 & 3 & 1 & 4 \end{bmatrix}$ by EchelonUnderstandCO 1AHSB02.0211Solve the differential equation $(D^2 + 1)y = cosecx$ using variationUnderstandCO 1AHSB02.0412Solve the differential equation $(D^2 + 2D + 1)y = sin3x$ UnderstandCO 1AHSB02.0413Solve the differential equation $(D^2 + 2D + 1)y = x^2$ UnderstandCO 1AHSB02.0414Solve the differential equation $(D^2 + 2D + 1)y = x^2$ UnderstandCO 1AHSB02.0415Solve the differential equation $(D^2 + 1)y = sin xsin 2x + e^s x^2$ UnderstandCO 1AHSB02.0416Solve the differential equation $(D^2 + 1)y = sin xsin 2x + e^s x^2$ UnderstandCO 1AHSB02.0416Solve the differential equation $(D^2 + 1)y = sin xsin 2x + e^s x^2$ UnderstandCO 1AHSB02.0417Solve the differential equation $(D^2 + 1)y = sin xsin 2x + e^s x^2$ UnderstandCO 1AHSB02.041					
8Image: Constraint of the matrix is the matrix					
I $2 - 3 - 0$ $2 - 4 - 3 - 2$ $3 - 2 - 1 - 3$ $6 - 8 - 7 - 5$ by reducing to normal $6 - 8 - 7 - 5$ 9Find the rank of the matrix, by reducing it to the echelon form $1 - 2 - 1 - 4 - 2$ $0 - 1 - 1 - 3 - 1$ $4 - 7 - 4 - 4 - 5$ UnderstandCO 1AHSB02.0210Find the rank of the A^T matrix if $A = \begin{bmatrix} 4 & 0 & 2 & 1 \\ 2 & 1 & 3 & 4 \\ 2 & 3 & 4 & 7 \\ 2 & 3 & 1 & 4 \end{bmatrix}$ by EchelonUnderstandCO 1AHSB02.0211Solve the differential equation $(D^2 + 1)y = cosecx$ using variation of parameter.UnderstandCO 1AHSB02.0412Solve the differential equation $(D^2 + 2D + 1)y = x^2$ UnderstandCO 1AHSB02.0413Solve the differential equation $(D^2 + 2D + 1)y = x^2$ UnderstandCO 1AHSB02.0414Solve the differential equation $(D^2 + 2D + 1)y = x^2$ UnderstandCO 1AHSB02.0415Solve the differential equation $(D^2 + 1)y = sin x sin 2x + e^x x^2$ UnderstandCO 1AHSB02.0416Solve the differential equation $(D^2 + 2D + 1)y = x^2$ UnderstandCO 1AHSB02.0416Solve the differential equation $(D^2 + 1)y = sin x sin 2x + e^x x^2$ UnderstandCO 1AHSB02.0417Solve the differential equation $(D^2 + 1)y = sin x sin 2x + e^x x^2$ UnderstandCO 1AHSB02.0418Solve the differential equation $(D^2 - 3D + 2)y = cos hx$ UnderstandCO 1AHSB02.0419Solve the differential equation $(D^2 + 4)y = x cos x$ UnderstandCO 1AHSB02.04					
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$\begin{bmatrix} 6 & 8 & 7 & 5 \end{bmatrix}$ form $\begin{bmatrix} 2 & -4 & 3 & -1 & 0 \\ 1 & -2 & -1 & -4 & 2 \\ 0 & 1 & -1 & 3 & 1 \\ 4 & -7 & 4 & -4 & 5 \end{bmatrix}$ $\begin{bmatrix} 4 & 0 & 2 & 1 \\ 2 & 3 & 4 & 7 \\ 2 & 3 & 1 & 4 \end{bmatrix}$ $\begin{bmatrix} 4 & 0 & 2 & 1 \\ 2 & 1 & 3 & 4 \\ 2 & 3 & 4 & 7 \\ 2 & 3 & 1 & 4 \end{bmatrix}$ by Echelon $\begin{bmatrix} 11 \\ Solve the differential equation (D^2 + 1)y = cosecx using variation of parameter.$ $\begin{bmatrix} 11 \\ Solve the differential equation (D^2 + 1)y = cosecx using variation of parameter.$ $\begin{bmatrix} 12 \\ 2 & 4 & 3 & -1 & -4 & -4 & 5 \end{bmatrix}$ $\begin{bmatrix} 11 \\ 2 \\ 3 \\ 4 \\ 7 \\ 2 \\ 3 \\ 1 \\ 4 \end{bmatrix}$ by Echelon $\begin{bmatrix} 11 \\ Solve the differential equation (D^2 + 1)y = cosecx using variation of parameter.$ $\begin{bmatrix} 11 \\ Solve the differential equation (D^2 + 1)y = cosecx using variation of parameter.$ $\begin{bmatrix} 11 \\ Solve the differential equation (D^2 + 6D + 9)y = sin3x \\ Solve the differential equation (D^2 + 6D + 9)y = sin3x \\ 13 \\ Solve the differential equation (D^2 + 2D + 1)y = x^2 \\ Understand \\ (D^3 - 6D^2 + 11D - 6)y = e^{-2x} + e^{-3x} \\ 16 \\ Solve the differential equation (D^2 + 1)y = sin xsin 2x + e^x x^2 \\ Understand \\ CO 1 \\ AHSB02.04 \\ CO $		Find the rank of the matrix $\begin{bmatrix} 2 & 4 & 3 & 2 \\ 0 & 0 & 0 \end{bmatrix}$ by reducing to normal			
formImage: Constraint of the matrix, by reducing it to the chelon formUnderstandCO 1AHSB02.029 $\begin{bmatrix} 2 & -4 & 3 & -1 & 0 \\ 1 & -2 & -1 & -4 & 2 \\ 0 & 1 & -1 & 3 & 1 \\ 4 & -7 & 4 & -4 & 5 \end{bmatrix}$ Image: Constraint of the arrow					
9Find the rank of the matrix, by reducing it to the echelon formUnderstandCO 1AHSB02.02 $\begin{bmatrix} 2 & -4 & 3 & -1 & 0 \\ 1 & -2 & -1 & -4 & 2 \\ 0 & 1 & -1 & 3 & 1 \\ 4 & -7 & 4 & -4 & 5 \end{bmatrix}$ UnderstandCO 1AHSB02.0210Find the rank of the A^T matrix if $A = \begin{bmatrix} 4 & 0 & 2 & 1 \\ 2 & 1 & 3 & 4 \\ 2 & 3 & 4 & 7 \\ 2 & 3 & 1 & 4 \end{bmatrix}$ by EchelonUnderstandCO 1AHSB02.0211Solve the differential equation $(D^2 + 1)y = cosecx$ using variation of parameter.UnderstandCO 1AHSB02.0412Solve the differential equation $D^2 + 2D + 1)y = sin 3x$ UnderstandCO 1AHSB02.0413Solve the differential equation $(D^2 + 2D + 1)y = x^2$ UnderstandCO 1AHSB02.0414Solve the differential equation $(D^2 + 2D + 1)y = x^2$ UnderstandCO 1AHSB02.0415Solve the differential equation $(D^2 + 1)y = sin x sin 2x + e^x x^2$ UnderstandCO 1AHSB02.0416Solve the differential equation $(D^2 + 1)y = sin x sin 2x + e^x x^2$ UnderstandCO 1AHSB02.0417Solve the differential equation $(D^2 + 1)y = sin x sin 2x + e^x x^2$ UnderstandCO 1AHSB02.0417Solve the differential equation $(D^2 + 1)y = sin x sin 2x + e^x x^2$ UnderstandCO 1AHSB02.0418Solve the differential equation $(D^2 - 3D + 2)y = cos hx$ UnderstandCO 1AHSB02.0419Solve the differential equation $(D^2 + 4)y = x cosx$ UnderstandCO 1AHSB02.04		$\begin{bmatrix} 6 & 8 & 7 & 5 \end{bmatrix}$			
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19Solve the differential equation $(D^2 + 4)y = x \cos x$ UnderstandCO 1AHSB02.04	17	Solve the differential equation $(D^3 + 1)y = 3 + 5e^x$	Understand	CO 1	AHSB02.04
	18	Solve the differential equation $(D^2 - 3D + 2)y = \cos hx$	Understand	CO 1	AHSB02.04
Solve the differential equation $(D^2 + 9)y = \cos 3x + \sin 2x$ Understand CO 1 AHSB02.04		Solve the differential equation $(D^2 + 4)y = x \cos x$			
	20	Solve the differential equation $(D^2 + 9)y = \cos 3x + \sin 2x$	Understand	CO 1	AHSB02.04

Dort	C (Problem Solving and Critical Thinking Questions)			
rart -	Find the Inverse of a matrix by using Gauss-Jordan method	Understand	CO 1	AHSB02.03
1	$\begin{bmatrix} 1 & 1 & 2 \end{bmatrix}$	Chaerstand	001	11151502.05
	$A = \begin{vmatrix} 1 & 3 & -3 \end{vmatrix}.$			
	$A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}.$			
2	Find the Inverse of a matrix by using Gauss-Jordan method	Understand	CO 1	AHSB02.03
	$\begin{pmatrix} 2 & 3 & 4 \\ 1 & 2 & 1 \end{pmatrix}$			
	$\begin{pmatrix} -& & -\\ 4 & 3 & 1\\ 1 & 2 & 4 \end{pmatrix}$			
3		Understand	CO 1	AHSB02.02
_				
	Find the rank of the matrix $\begin{vmatrix} 2 & 1 & 3 & 4 \\ 2 & 1 & -1 & -1 \end{vmatrix}$ by Normal form.			
	Find the rank of the matrix $\begin{vmatrix} 2 & 1 & 3 & 4 \\ 2 & 3 & 4 & 7 \end{vmatrix}$ by Normal form.			
		TT 1 . 1	CO 1	
4	$\begin{bmatrix} 2 & 3 & 1 & 4 \end{bmatrix}$ Find the rank of the matrix A= $\begin{bmatrix} 2 & 1 & -3 & -6 \\ 3 & -3 & 1 & 2 \\ 3 & -3 & 1 & 2 \end{bmatrix}$. by canonical	Understand	CO 1	AHSB02.03
	form			
5	$\begin{bmatrix} 0 & 1 & 2 \end{bmatrix}$	Understand	CO 1	AHSB02.03
	Find the inverse of A if $A = \begin{bmatrix} 1 & 2 & 3 \end{bmatrix}$ by elementary row			
	operation.			
6	By using method of variation of parameters solve	Understand	CO 1	AHSB02.05
Ŭ	$y'' + y = x \cos x$.	Chaerstand	001	7115002.05
7	Solve the differential equation	Understand	CO 1	AHSB02.04
,	· · · · · · · · · · · · · · · · · · ·	Onderstand	001	7115002.04
	$(D^{3} - 4D^{2} - D + 4)y = e^{3x}cos2x$			
8	Solve the differential equation $(D^2 + 3D + 2)y = e^{e^x}$, By using	Understand	CO 1	AHSB02.05
	method of variation of parameters			
9	Solve the differential equation	Understand	CO 1	AHSB02.04
-	$(D^3 - 5D^2 + 8D - 4)Y = e^x + 3e^{-x} + xe^x$			
10	$(D^3 - 5D^2 + 8D - 4)Y = e^x + 3e^{-x} + xe^x$ Apply the method of variation parameters to solve	Understand	CO 1	AHSB02.05
	$(D^2 + a^2)y = \tan ax$			
	MODULE-II		I	
	LINEAR TRANSFORMATIONS AND I	DOUBLE INTEG	RALS	
	Part – A (Short Answer Questi	ons)		
1	State Cayley- Hamilton theorem.	Understand	CO 2	AHSB02.06
2	$\begin{bmatrix} 2 & 2 & 1 \end{bmatrix}$	Understand	CO 2	AHSB02.06
	Find the sum of Eigen values of the matrix 1 3 1			
3	Show that the vectors $X_1=(1,1,2)$, $X_2=(1,2,5)$ and $X_3=(5,3,4)$ are	Understand	CO 2	AHSB02.09
-	linearly dependent.	D	00.2	
4	6 -2 2	Remember	CO 2	AHSB02.06
	Find the characteristic equation of the matrix $A = \begin{vmatrix} -2 & 3 & -1 \end{vmatrix}$			

Find the Eigen values of the matrix $\begin{bmatrix} 2 & -1 & -1 \\ -1 & 2 & -1 \\ -1 & -1 & 2 \end{bmatrix}$ 6Show that the vectors $X_1=(1,1,1)$ $X_2=(3,1,2)$ and $X_3=(2,1,4)$ are linearly independent.UnderstandCO 2Al7Define diaganalisation of a matrix.UnderstandCO 2Al9Find the Eigen values of the matrix A^{-1} , $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \end{bmatrix}$ UnderstandCO 2Al9Find the Eigen values of the matrix A^{-1} , $A = \begin{bmatrix} 1 & 2 & -1 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ UnderstandCO 2Al10Find the eigen values A^3 of the matrix $A = \begin{bmatrix} 1 & 2 & -1 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ UnderstandCO 2Al11Evaluate the double integral $\int_0^{-1} \int_0^{1/2} y dy dx$.RememberCO 2Al12Evaluate the double integral $\int_0^{1/2} \int_0^{1/2} y dy dx$.UnderstandCO 2Al13Evaluate the double integral $\int_0^{1/2} \int_0^{1/2} xy dx dy$.UnderstandCO 2Al14Find the value of double integral $\int_0^{1/2} \int_0^{1/2} xy dx dy$.UnderstandCO 2Al15Evaluate the double integral $\int_0^{1/2} \int_0^{1/2} xy dx dy$ UnderstandCO 2Al16Evaluate the double integral $\int_0^{1/2} \int_0^{1/2} xy dx dy$ UnderstandCO 2Al16Evaluate the double integral $\int_0^{1/2} \int_0^{1/2} xy dx dy$ UnderstandCO 2Al16Evaluate the double integral $\int_0^{1/2} \int_0^{1/2} xy dx dy$ UnderstandCO 2Al16Evaluate the double integral $\int_0^{1/2} \int_0^{1/2} x^2 dx dy$ UnderstandCO 2<	5		Understand	CO 2	AHSB02.06
6Show that the vectors $X_1=(1,1,1)$ $X_2=(3,1,2)$ and $X_3=(2,1,4)$ are linearly independent.UnderstandCO 2Al7Define Modal and Spectral matrices.UnderstandCO 2Al8Define diaganalisation of a matrix.UnderstandCO 2Al9Find the Eigen values of the matrix A^{-1} , $A = \begin{bmatrix} 8 & -3 & -2 \\ 4 & -3 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ UnderstandCO 2Al10Find the eigen values A^3 of the matrix $A = \begin{pmatrix} 1 & 2 & -1 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{pmatrix}$ UnderstandCO 2Al11Evaluate the double integral $\int_0^{\pi} \int_0^{\pi} dr' dr' dr dr.$ UnderstandCO 2Al12Evaluate the double integral $\int_0^{\pi} \int_0^{\pi} dr' dr' dr dr.$ UnderstandCO 2Al13Evaluate the double integral $\int_0^{\pi} \int_0^{\pi} dr' dr' dr dr.$ UnderstandCO 2Al14Find the value of double integral $\int_0^{\pi} \int_0^{\pi} dr' dr' dr dr.$ UnderstandCO 2Al15Evaluate the double integral $\int_0^{\pi} \int_0^{\pi} dr' dr' dr dr.$ UnderstandCO 2Al16Evaluate the double integral $\int_0^{\pi} \int_0^{\pi} dr' dr' dr dr.$ UnderstandCO 2Al17Evaluate the double integral $\int_0^{\pi} \int_0^{\pi} dr' dr' dr dr.$ UnderstandCO 2Al18Evaluate the double integral $\int_0^{\pi} \int_0^{\pi} dr' dr' dr dr.$ UnderstandCO 2Al19Evaluate the double integral $\int_0^{\pi} \int_0^{\pi} dr' dr' dr' dr dr.$ UnderstandCO 2Al20State the formula to find area of the region using double integratinRememberCO 2<	F	Find the Eigen values of the matrix $\begin{pmatrix} 2 & -1 & -1 \\ -1 & 2 & -1 \\ -1 & -1 & 2 \end{pmatrix}$	Understand	02	Ansb02.00
7Define Modal and Spectral matrices.UnderstandCO 2All8Define diaganalisation of a matrix.UnderstandCO 2All9Find the Eigen values of the matrix A^{-1} , $A = \begin{bmatrix} 8 & -8 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ UnderstandCO 2All10Find the eigen values A^3 of the matrix $A = \begin{bmatrix} 1 & 2 & -1 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ UnderstandCO 2All11Evaluate the double integral $\int_0^{\pi} \int_0^{\pi} y dy dx$.RememberCO 2All12Evaluate the double integral $\int_0^{\pi} \int_0^{\pi} x dy d\theta$.UnderstandCO 2All13Evaluate the double integral $\int_0^{\pi} \int_0^{1} xy(x + y) dx dy$.UnderstandCO 2All14Find the value of double integral $\int_0^{\pi} \int_1^{\pi^2} x dx dy$.UnderstandCO 2All15Evaluate the double integral $\int_0^{\pi} \int_1^{\pi^2} x^2 dx dy$.UnderstandCO 2All16Evaluate the double integral $\int_0^{\pi} \int_0^{\pi^2} x^2 dx dy$.UnderstandCO 2All17Evaluate the double integral $\int_0^{\pi} \int_0^{\pi^2} x^2 dx dy$.UnderstandCO 2All18Evaluate the double integral $\int_0^{\pi} \int_0^{\pi^2} x^2 dx dy$.UnderstandCO 2All19Evaluate the double integral $\int_0^{\pi} \int_0^{\pi} x^2 dx dy$.UnderstandCO 2All19Evaluate the double integral $\int_0^{\pi} \int_0^{\pi} x^2 e^{-r^2} r d\theta dr$.UnderstandCO 2All2Diagonalisation of matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ UnderstandCO 2All2Diagonalisation of matr	6 S	Show that the vectors $X_1 = (1,1,1) X_2 = (3,1,2)$ and $X_3 = (2,1,4)$ are	Understand	CO 2	AHSB02.09
9Find the Eigen values of the matrix A^{-1} , $A = \begin{bmatrix} 8 & -8 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ UnderstandCO 2Al10Find the eigen values A^3 of the matrix $A = \begin{bmatrix} 1 & 2 & -1 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ UnderstandCO 2Al11Evaluate the double integral $\int_0^2 \int_0^5 ydydx$.RememberCO 2Al12Evaluate the double integral $\int_0^{-1} \int_0^1 dr $			Understand	CO 2	AHSB02.10
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Find the eigen values A^3 of the matrix $A = \begin{bmatrix} 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ 11Evaluate the double integral $\int_0^3 \int_0^{a} ydydx$.RememberCO 2Al12Evaluate the double integral $\int_0^3 \int_0^{a} grdrd \theta$.UnderstandCO 2Al13Evaluate the double integral $\int_0^3 \int_0^1 xy(x + y) dxdy$.UnderstandCO 2Al14Find the value of double integral $\int_0^1 \int_0^1 f_x^{2^2} xydxdy$ UnderstandCO 2Al15Evaluate the double integral $\int_0^1 \int_0^1 f_x^{2^2} xydxdy$ UnderstandCO 2Al16Evaluate the double integral $\int_0^1 \int_0^1 f_x^{2^2} xydxdy$ UnderstandCO 2Al18Evaluate the double integral $\int_0^0 \int_0^{\pi} \int_0^{\pi/2} e^{-r^2} r d\theta dr$.UnderstandCO 2Al19Evaluate the double integral $\int_0^{\pi} \int_0^{\pi} \int_0^{\pi/2} e^{-r^2} r d\theta dr$.UnderstandCO 2Al20State the formula to find area of the region using double integrationRememberCO 2Al2Diagonalisation of matrix $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ UnderstandCO 2Al3Show that matrix $\begin{bmatrix} 0 & c & -h \\ -b & -a & 0 \\ 0 & -a & 0 \end{bmatrix}$ satisfying Cayley-HamiltonUnderstandCO 2Al4TTTUnderstandCO 2Al	9 F	Find the Eigen values of the matrix A^{-1} , $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$	Understand	CO 2	AHSB02.06
Image: Devaluate the double integral $\int_0^{\pi} \int_0^{2g/dt} d\theta$.UnderstandCO 2Al12Evaluate the double integral $\int_0^{\pi} \int_0^{2d/dt} d\theta$.UnderstandCO 2Al13Evaluate the double integral $\int_0^{\pi} \int_0^{1} xy(x + y) dxdy$.UnderstandCO 2Al14Find the value of double integral $\int_0^{\pi} \int_x^{1/x} xy dx dy$.UnderstandCO 2Al15Evaluate the double integral $\int_0^{\pi} \int_x^{\pi^2} xy dx dy$.UnderstandCO 2Al16Evaluate the double integral $\int_0^{\pi} \int_0^{\pi} d\theta dr$.RememberCO 2Al17Evaluate the double integral $\int_0^{\pi} \int_0^{\pi/2} e^{-r^2} r d\theta dr$.UnderstandCO 2Al18Evaluate the double integral $\int_0^{\pi} \int_0^{\pi/2} e^{-r^2} r d\theta dr$.UnderstandCO 2Al19Evaluate the double integral $\int_0^{\pi} \int_0^{\pi/2} e^{-r^2} r d\theta dr$.UnderstandCO 2Al20State the formula to find area of the region using double integration in Cartesian form.MinestandCO 2Al2Diagonalisation of matrix A= $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ UnderstandCO 2Al3Show that matrix $\begin{bmatrix} 0 & c & -b \\ -c & 0 & a \\ b & -a & 0 \end{bmatrix}$ satisfying Cayley-HamiltonUnderstandCO 2Al4Implementation and hence find its inverse, if its exists.ImplementationCO 2Al	10 F	Find the eigen values A^3 of the matrix $A = \begin{pmatrix} 1 & 2 & -1 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{pmatrix}$	Understand	CO 2	AHSB02.06
Image: Devaluate the double integral $\int_{0}^{\pi} \int_{0}^{2g/q} \int_{0}^{2g/q} dr d\theta$.UnderstandCO 2Al12Evaluate the double integral $\int_{0}^{\pi} \int_{0}^{2g/q} dr d\theta$.UnderstandCO 2Al13Evaluate the double integral $\int_{0}^{\pi} \int_{0}^{2} xy(x + y) dxdy$.UnderstandCO 2Al14Find the value of double integral $\int_{0}^{\pi} \int_{x}^{x^{2}} xydxdy$ UnderstandCO 2Al15Evaluate the double integral $\int_{0}^{\pi} \int_{x}^{\pi} xydxdy$ UnderstandCO 2Al16Evaluate the double integral $\int_{0}^{\pi} \int_{0}^{\pi} xydxdy$ UnderstandCO 2Al17Evaluate the double integral $\int_{0}^{\pi} \int_{0}^{\pi/2} e^{-r^{2}} r d\theta dr$.UnderstandCO 2Al18Evaluate the double integral $\int_{0}^{\pi} \int_{0}^{\pi/2} e^{-r^{2}} r d\theta dr$.UnderstandCO 2Al19Evaluate the double integral $\int_{0}^{\pi} \int_{0}^{\pi} e^{(1+\cos\theta)} r dr d\theta$.UnderstandCO 2Al20State the formula to find area of the region using double integration in Cartesian form.RememberCO 2Al1Find the characteristic vectors of the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ UnderstandCO 2Al2Diagonalisation of matrix $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ UnderstandCO 2Al3Show that matrix $\begin{bmatrix} 0 & c & -b \\ -c & 0 & a \\ b & -a & 0 \end{bmatrix}$ satisfying Cayley-HamiltonUnderstandCO 2Al4Interest and theore find its inverse, if its exists.Interest and theore co 2Al	11 -	$\int_{a}^{2} f^{x}$	Remember	CO 2	AHSB02.12
13Evaluate the double integral $\int_{0}^{3} \int_{0}^{1} xy(x + y) dx dy$.UnderstandCO 2Al14Find the value of double integral $\int_{1}^{3} xy^{2} dx dy$.UnderstandCO 2Al15Evaluate the double integral $\int_{0}^{1} \int_{x}^{x^{2}} xy dx dy$ UnderstandCO 2Al16Evaluate the double integral $\int_{0}^{1} \int_{0}^{1} x^{2} xy dx dy$ UnderstandCO 2Al17Evaluate the double integral $\int_{0}^{1} \int_{0}^{1} f_{1}^{2} xy dx dy$ UnderstandCO 2Al18Evaluate the double integral $\int_{0}^{\pi} \int_{0}^{\pi/2} e^{-r^{2}} r d\theta dr$.UnderstandCO 2Al19Evaluate the double integral $\int_{0}^{\pi} \int_{0}^{\pi/2} e^{-r^{2}} r d\theta dr$.UnderstandCO 2Al20State the formula to find area of the region using double integration in Cartesian form.RememberCO 2Al1Find the characteristic vectors of the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ UnderstandCO 2Al2Diagonalisation of matrix $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ UnderstandCO 2Al3Show that matrix $\begin{bmatrix} 0 & c & -b \\ -c & 0 & a \\ b & -a & 0 \end{bmatrix}$ satisfying Cayley-HamiltonUnderstandCO 2Al4T2IUnderstandCO 2Al	L				
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14Find the value of double integral $\int_{1}^{1} \int_{x}^{2} xy^{2} dx dy$.UnderstandCO 2Al15Evaluate the double integral $\int_{0}^{1} \int_{x}^{x^{2}} xy dx dy$ UnderstandCO 2Al16Evaluate the double integral $\int_{0}^{1} \int_{1}^{2} x^{2} xy dx dy$ RememberCO 2Al17Evaluate the double integral $\int_{0}^{1} \int_{0}^{2} x^{2} e^{-r^{2}} r d\theta dr$.UnderstandCO 2Al18Evaluate the double integral $\int_{0}^{\pi} \int_{0}^{2} e^{-r^{2}} r d\theta dr$.UnderstandCO 2Al19Evaluate the double integral $\int_{0}^{\pi} \int_{0}^{d(1+\cos\theta)} r dr d\theta$.UnderstandCO 2Al20State the formula to find area of the region using double integration in Cartesian form.RememberCO 2Al1Find the characteristic vectors of the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ UnderstandCO 2Al2Diagonalisation of matrix $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ UnderstandCO 2Al3Show that matrix $\begin{bmatrix} 0 & c & -b \\ -c & 0 & a \\ b & -a & 0 \end{bmatrix}$ satisfying Cayley-HamiltonUnderstandCO 2Al4 $\begin{bmatrix} 2 & 4 \end{bmatrix}$ UnderstandCO 2Al	13	Evaluate the double integral $\int_0^3 \int_0^1 xy(x + y) dx dy$.	Understand	CO 2	AHSB02.12
16Evaluate the double integral $\int_0^{\frac{\pi}{2}} \int_0^{\frac{\pi}{2}} \sin(x + y) dx dy$ RememberCO 2Al17Evaluate the double integral $\int_0^{1} \int_1^{2} xy dx dy$ UnderstandCO 2Al18Evaluate the double integral $\int_0^{\infty} \int_0^{\pi/2} e^{-r^2} r d\theta dr$.UnderstandCO 2Al19Evaluate the double integral $\int_0^{\pi} \int_0^{a(1+\cos\theta)} r dr d\theta$.UnderstandCO 2Al20State the formula to find area of the region using double integration in Cartesian form.RememberCO 2Al1Find the characteristic vectors of the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ UnderstandCO 2Al2Diagonalisation of matrix $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ UnderstandCO 2Al3Show that matrix $\begin{bmatrix} 0 & c & -b \\ -c & 0 & a \\ b & -a & 0 \end{bmatrix}$ satisfying Cayley-Hamilton theorem and hence find its inverse, if its exists.UnderstandCO 2Al	14 F	Find the value of double integral $\int_{0}^{2} \int_{0}^{3} xy^{2} dx dy$.	Understand	CO 2	AHSB02.12
16Evaluate the double integral $\int_0^{\frac{\pi}{2}} \int_0^{\frac{\pi}{2}} \sin(x + y) dx dy$ RememberCO 2All17Evaluate the double integral $\int_0^{\pi} \int_1^{\pi} 2xy dx dy$ UnderstandCO 2All18Evaluate the double integral $\int_0^{\infty} \int_0^{\pi/2} e^{-r^2} r d\theta dr$.UnderstandCO 2All19Evaluate the double integral $\int_0^{\pi} \int_0^{\pi/2} e^{-r^2} r d\theta dr$.UnderstandCO 2All20State the formula to find area of the region using double integration in Cartesian form.RememberCO 2All1Find the characteristic vectors of the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ UnderstandCO 2All2Diagonalisation of matrix $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ UnderstandCO 2All3Show that matrix $\begin{bmatrix} 0 & c & -b \\ -c & 0 & a \\ b & -a & 0 \end{bmatrix}$ satisfying Cayley-Hamilton theorem and hence find its inverse, if its exists.UnderstandCO 2All	15 E	Evaluate the double integral $\int_{a}^{1} \int_{a}^{x^{2}} xy dx dy$	Understand	CO 2	AHSB02.12
18Evaluate the double integral $\int_{0}^{\infty} \int_{0}^{\frac{\pi}{2}} e^{-r^{2}} r d\theta dr$.UnderstandCO 2Al19Evaluate the double integral $\int_{0}^{\pi} \int_{0}^{a(1+\cos\theta)} r dr d\theta$.UnderstandCO 2Al20State the formula to find area of the region using double integration in Cartesian form.RememberCO 2AlPart - B (Long Answer Questions)1Find the characteristic vectors of the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ UnderstandCO 2Al2Diagonalisation of matrix $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ UnderstandCO 2Al3Show that matrix $\begin{bmatrix} 0 & c & -b \\ -c & 0 & a \\ b & -a & 0 \end{bmatrix}$ satisfying Cayley-HamiltonUnderstandCO 2Al4 $\begin{bmatrix} 2 & 4 \end{bmatrix}$ UnderstandCO 2Al		π π	Remember	CO 2	AHSB02.12
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2Find the characteristic vectors of the matrix $A = \begin{bmatrix} 0 & 2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ UnderstandCO 2Al2Diagonalisation of matrix $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ UnderstandCO 2Al3Show that matrix $\begin{bmatrix} 0 & c & -b \\ -c & 0 & a \\ b & -a & 0 \end{bmatrix}$ satisfying Cayley-HamiltonUnderstandCO 2Al4[2 4]UnderstandCO 2Al				~	
Diagonalisation of matrix A= $4 -3 -2$ $3 -4 1$ UnderstandCO 2Al3Show that matrix $\begin{bmatrix} 0 & c & -b \\ -c & 0 & a \\ b & -a & 0 \end{bmatrix}$ satisfying Cayley-HamiltonUnderstandCO 2Al4 $\begin{bmatrix} 2 & 4 \end{bmatrix}$ UnderstandCO 2Al	_	Find the characteristic vectors of the matrix $A = \begin{vmatrix} -2 & 3 & -1 \end{vmatrix}$	Understand	CO 2	AHSB02.06
Show that matrix $-c$ 0 a <th< td=""><td></td><td>Diagonalisation of matrixA=$\begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$</td><td>Understand</td><td>CO 2</td><td>AHSB02.11</td></th<>		Diagonalisation of matrixA= $\begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$	Understand	CO 2	AHSB02.11
$\begin{bmatrix} 4 \\ \end{bmatrix}$ $\begin{bmatrix} 2 \\ 4 \end{bmatrix}$ Understand $\begin{bmatrix} CO \\ 2 \end{bmatrix}$ A	S	Show that matrix $\begin{bmatrix} -c & 0 & a \\ b & -a & 0 \end{bmatrix}$ satisfying Cayley-Hamilton	Understand	CO 2	AHSB02.11
Use Cayley-Hamilton theorem to find A^3 , if $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$	4	Use Cayley-Hamilton theorem to find A^3 , if $A = \begin{bmatrix} 2 & 4 \\ 1 & 1 \end{bmatrix}$	Understand	CO 2	AHSB02.11

5	Find the Eigen values and Eigen vectors of the matrix A and its	Understand	CO 2	AHSB02.06
5		Chaerstand	002	1115002.00
	inverse, where $A = \begin{bmatrix} 1 & 3 & 4 \\ 0 & 2 & 5 \\ 0 & 0 & 3 \end{bmatrix}$			
6	Find a matrix P such that $P^{-1}AP$ is a diagonal matrix, where A=	Understand	CO 2	AHSB02.10
	$\begin{bmatrix} -2 & 2 & -3 \end{bmatrix}$			
	2 1 - 6			
	$\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$			
7	[1 1 1]	Understand	CO 2	AHSB02.06
	Find the characteristic roots of the matrix $\begin{vmatrix} 1 & 1 & 1 \end{vmatrix}$ and the			
	corresponding characteristic vectors. Express A ⁵ -4A ⁴ -7A ³ +11A ² -A-10I as a linear polynomial in A,			
8	Express $A^5-4A^4-7A^3+11A^2-A-10I$ as a linear polynomial in A,	Understand	CO 2	AHSB02.06
	where $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$			
9	Verify Cayley-Hamilton theorem for A= $\begin{pmatrix} 1 & 2 & -1 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{pmatrix}$	Understand	CO 2	AHSB02.11
	Verify Cayley-Hamilton theorem for $A = \begin{bmatrix} 2 & 1 & -2 \end{bmatrix}$			
10	and find $A^{-1} \& A^4$.	Understand	CO 2	AHSB02.10
10	Diagonalize the matrix A= $\begin{pmatrix} 1 & 1 & 1 \\ 0 & 2 & 1 \\ -4 & 4 & 3 \end{pmatrix}$ by linear transformation	Chiderstand	02	AIISD02.10
	Diagonalize the matrix $A = \begin{bmatrix} 0 & 2 & 1 \end{bmatrix}$ by linear transformation			
	$\begin{pmatrix} -4 & 4 & 3 \end{pmatrix}$			
	and hence find A^4 .			
11	(1+ A)	II. I. action 1	CO 2	
11	Evaluate the double integral $\int_{0}^{\pi} r^{2} \cos \theta dr d\theta.$	Understand	CO 2	AHSB02.12
	Evaluate the double integral $\int_{0}^{1} \int_{0}^{1} r \cos \theta dr d\theta$.			
12	$1\sqrt{x}$	Understand	CO 2	AHSB02.12
	Evaluate the double integral $\int_{0}^{1} \int_{0}^{\sqrt{x}} (x^2 + y^2) dx dy.$			
	J J 0 x			
13	Evaluate the double integral $\int_{0}^{5} \int_{x}^{x^{2}} (x + y) dx dy$. Evaluate the double integral $\int_{0}^{5} \int_{0}^{x^{2}} x(x^{2} + y^{2}) dx dy$.	Understand	CO 2	AHSB02.12
	Evaluate the double integral $\iint x(x^2 + y^2) dx dy$.			
14	<u>0</u> 0 π/	Understand	CO 2	AHSB02.12
14	Evaluate the double integral $\int_0^1 \int_0^{\frac{\pi}{2}} r \sin \theta d\theta dr$.	Underställu		A115D02.12
	Evaluate the double integral $\int_0^{1} \int_0^{1} r \sin \theta d\theta dr$.			
		TT 1 1	CO 2	AHSB02.13
15	By changing the order of integration evaluate the double integral	Understand	CO_2	
	By changing the order of integration evaluate the double integral $\int_{1}^{1} \int_{1}^{2-x} xy dx dy$	Understand	02	
15	$\int_{0}^{1} \int_{x^{2}}^{2-x} xy dx dy.$			
	$\int_{0}^{1} \int_{x^{2}}^{2-x} xy dx dy.$ By changing the order of integration Evaluate the double integral	Understand	CO 2	AHSB02.13
15	$\int_{0}^{1} \int_{x^{2}}^{2-x} xy dx dy.$			
15	$\int_{0}^{1} \int_{x^{2}}^{2-x} xy dx dy.$ By changing the order of integration Evaluate the double integral			
15	$\int_{0}^{1} \int_{x^{2}}^{2-x} xy dx dy.$ By changing the order of integration Evaluate the double integral			

17	sc.	I In denotes a	<u> </u>	
17	Find the value of $\iint xydxdy$ taken over the positive quadrant of	Understand	CO 2	AHSB02.12
	x^2 y^2 1			
	the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1.$			
18	Evaluate the double integral using change of variables	Understand	CO 2	AHSB02.13
	$\int_{0}^{\infty}\int_{0}^{\infty}e^{-(x^2+y^2)}dxdy.$			
19	By transforming into polar coordinates Evaluate $\iint \frac{x^2 y^2}{x^2 + y^2} dx dy$	Understand	CO 2	AHSB02.12
	over the annular region between the circles $x^2 + y^2 = a^2$ and			
	$x^2 + y^2 = b^2$ with $b > a$.			
20	Find the area of the region bounded by the parabola $y^2 = 4ax$ and $x^2 = 4ay$.	Understand	CO 2	AHSB02.12
Part -	C (Problem Solving and Critical Thinking Questions)			
1	$\begin{bmatrix} i & 0 & 0 \end{bmatrix}$	Understand	CO 2	AHSB02.06
	Find Eigen values and Eigen vectors of $A = \begin{bmatrix} 0 & 0 & i \end{bmatrix}$			
	$\begin{bmatrix} 0 & i & 0 \end{bmatrix}$			
2	Examine whether the vectors [2,-1,3,2], [1,3,4,2], [3,5,2,2] is linearly independent or dependent?	Understand	CO 2	AHSB02.07
3	Find Eigen values and corresponding Eigen vectors of the matrix	Understand	CO 2	AHSB02.06
	$\begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$			
4	Verify Cayley-Hamilton theorem for If $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$	Understand	CO 2	AHSB02.11
5	Verify Cayley-Hamilton theorem for $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$ and find A ⁻¹ .	Understand	CO 2	AHSB02.11
6		Understand	CO 2	AHSB02.12
	Evaluate $\iint r^3 dr d\theta$ over the area included between the circles $r = 2\sin\theta$ and $r = 4\sin\theta$.	Chaelstand	002	1115002.12
7	Find the area of the cardioid $r = a(1+\cos\theta)$.	Understand	CO 2	AHSB02.12
8	Find the area of the region bounded by the curves $y = x^3$ and $y = x$.	Understand	CO 2	AHSB02.12
9	Evaluate $\iint xydxdy$ taken over the positive quadrant of the	Understand	CO 2	AHSB02.12
	ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1.$			
10	By changing the order of integration Evaluate the double integral $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} dy dx$	Understand	CO 2	AHSB02.13

	MODULE-III					
	FUNCTIONS OF SINGLE VARIABLES AND TRIPLE INTEGRALS					
	Part - A (Short Answer Questi					
1	Discuss the applicability of Rolle's theorem for any function f(x) in interval [a,b].	Understand	CO 3	AHSB02.14		
2	Discuss the applicability of Lagrange's mean value theorem for any function $f(x)$ in interval [a,b].	Understand	CO 3	AHSB02.14		
3	Discuss the applicability of Cauchy's mean value theorem for any function $f(x)$ in interval [a,b].	Understand	CO 3	AHSB02.14		
4	Interpret Rolle's theorem geometrically.	Understand	CO 3	AHSB02.14		
5	Interpret Lagrange's mean value theorem geometrically.	Remember	CO 3	AHSB02.14		
6	Given an example of function that is continuous on [-1, 1] and for which mean value theorem does not hold.	Understand	CO 3	AHSB02.14		
7	Using Lagrange's mean value theorem, find the value of c for $f(x) = \log x$ in (1, e).	Understand	CO 3	AHSB02.14		
8	Explain why mean value theorem does not hold for $f(x) = x^{2/3}$ in [-1,1]	Understand	CO 3	AHSB02.14		
9	Find the region in which $f(x) = 1 - 4x - x^2$ is increasing using mean value theorem.	Understand	CO 3	AHSB02.14		
10	If $f'(x) = 0$ throughout an interval [a, b], using mean value theorem show that $f(x)$ is constant.	Understand	CO 3	AHSB02.14		
11	Find the value of triple integral $\int_{-1}^{1} \int_{-2}^{2} \int_{-3}^{3} dx dy dz$.	Understand	CO 3	AHSB02.15		
12	Find the volume of the tetrahedron bounded by the coordinate planes and the plane $x+y+z=1$.	Understand	CO 3	AHSB02.15		
13	State the formula to find volume of the region using triple integration in Cartesian form.	Understand	CO 3	AHSB02.15		
14	Evaluate the triple integral $\int_0^2 \int_1^3 \int_1^2 xy^2 z dz dy dx$	Understand	CO 3	AHSB02.15		
15	Evaluate the triple integral $\int_0^a \int_0^x \int_0^y xyz dz dy dx$	Understand	CO 3	AHSB02.15		
16	Evaluate the triple integral $\int_{0}^{1} \int_{0}^{2} \int_{0}^{3} (x + y + z) dz dy dx$	Understand	CO 3	AHSB02.15		
17	Evaluate the triple integral $\int_0^1 \int_0^1 \int_0^1 xz dz dy dx$	Understand	CO 3	AHSB02.15		
18	Evaluate the triple integral $\int_{-2}^{2} \int_{-3}^{3} \int_{-1}^{1} e^{x+y+z} dz dy dx$	Understand	CO 3	AHSB02.15		
19	Evaluate the triple integral $\int_0^2 \int_0^3 \int_0^1 dz dy dx$	Understand	CO 3	AHSB02.15		
20	Evaluate the triple integral $\int_0^1 \int_{-1}^1 \int_{-1}^1 (x^2 + y^2 + z^2) dz dy dx$	Understand	CO 3	AHSB02.15		
Part 1	- B (Long Answer Questions)	Understand	CO 3	AHSB02.14		
1	Verify Rolle's theorem for the function $f(x) = e^{-x} \sin x$ in the interval $[0, \pi]$.	Onderstand	05	AIISD02.14		
2	Show that for any $x > 0, 1 + x < e^x < 1 + xe^x$	Understand	CO 3	AHSB02.14		
3	Verify Lagrange's mean value theorem for $f(x) = x^3 - x^2 - 5x + 2x + 1 + x + 1$ [0, 4]	Understand	CO 3	AHSB02.14		
4	$f(x) = x^{3} - x^{2} - 5x + 3 \text{ in the interval } [0,4].$ If a <b, <math="" prove="" that="">\frac{b-a}{1+b^{2}} < Tan^{-1}b - Tan^{-1}a < \frac{b-a}{1+a^{2}} using</b,>	Understand	CO 3	AHSB02.14		
	Lagrange's Mean value theorem and hence deduce the following.					
	(i) $\frac{\pi}{4} + \frac{3}{25} < Tan^{-1}\frac{4}{3} < \frac{\pi}{4} + \frac{1}{6}$					

$f(x) = e^x, g(x) = e^{-x}$ UnderstandCO 3AHSB02.146Find value of the C using Cauchy's mean value theorem for $f(x) = \sqrt{x} \& g(x) = \frac{1}{\sqrt{x}}$ in [a,b] where $0 < a < b$ UnderstandCO 3AHSB02.147Verify Cauchy's mean value theorem for $f(x) = x^2 \& g(x) = x^3 \ln [1,2]$ and find the value of c.UnderstandCO 3AHSB02.148Verify Cauchy's mean value theorem for $f(x) = x^2 \& g(x) = x^3 \ln [1,2]$ understandUnderstandCO 3AHSB02.149Using mean value theorem, for 0 < a < b, prove that $-\frac{1}{b} < \log \frac{1}{a} < \frac{b}{-1} = 1$ $1 - \frac{1}{a} < \log \frac{1}{a} < \frac$		5			
5Analyze the value of c in the interval [3, 7] for the functionUnderstandCO 3AHSB02.146Find value of the C using Cauchy's mean value theorem for $f(x) = \sqrt{x}$ & $g(x) = \frac{1}{\sqrt{x}}$ in [a,b] where $0 < a < b$ UnderstandCO 3AHSB02.147Verify Cauchy's mean value theorem for $f(x) = x^2$ & $g(x) = x^3$ in [1,2]UnderstandCO 3AHSB02.14and find the value of c.where m, are positive integers in [a, b].UnderstandCO 3AHSB02.149Using mean value theorem, for $f(x) = (x - a)^m (x - b)^n$ UnderstandCO 3AHSB02.149Using mean value theorem, for $0 < a < b$, prove that $1 = \frac{1}{6} \log \frac{b}{a} < \frac{b}{a} - 1$ and hence show that $\frac{1}{6} \log \frac{c}{6} < \frac{1}{5}$.UnderstandCO 3AHSB02.1410Find all numbers to between a and b b which satisfies lagranges mean value theorem, for the following function(x)-(x-1)(x-2)(x-3) in [0.4]UnderstandCO 3AHSB02.1511Evaluate the triple integral $\int_{0}^{1} \int_{0}^{1} \int_{0}^{1} \int_{0}^{1} \int_{0}^{1} \int_{0}^{1} \int_{0}^{1} e^{x^2/y^2/x^2/x^2/x^2/x^2/x^2/x^2/y^2/x^2/y^2/x^2/y^2/x^2/x^2/x^2/y^2/x^2/y^2/x^2/y^2/x^2/y^2/x^2/x^2/x^2/x^2/x^2/x^2/x^2/x^2/x^2/x$		$\frac{5\pi + 4}{20} < Tan^{-1} 2 < \frac{\pi + 2}{4}$			
6Find value of the C using Cauchy's mean value theorem for $f(x) = \sqrt{x} \& g(x) = \frac{1}{\sqrt{x}}$ in [a,b] where $0 < a < b$ UnderstandCO 3AHSB02.147Verify Cauchy's mean value theorem for $f(x) = x^2 \& g(x) = x^3$ in [1,2] and find the value of c.UnderstandCO 3AHSB02.148Verify Rolle's theorem for the function $f(x) = (x - a)^m (x - b)^n$ where m, nare positive integers in [a, b].UnderstandCO 3AHSB02.149Using mean value theorem, for $0 < a < b$, prove that value theorem, for $0 < a < b$, prove thatUnderstandCO 3AHSB02.1410Find all numbers to the following function(x)= (x - 1)(x - 2)(x - 3) in [0.4]UnderstandCO 3AHSB02.1411Evaluate the triple integral $\int_{0}^{1} \int_{0}^{1} \int_{0}^{1} \int_{0}^{1} xyzdxdydz$.UnderstandCO 3AHSB02.1512Evaluate the triple integral $\int_{0}^{1} \int_{0}^{1} \int_{0}^{1} xyzdxdydz$.UnderstandCO 3AHSB02.1513Evaluate the triple integral $\int_{0}^{1} \int_{0}^{1} \int_{0}^{1} xyzdxdydz$.UnderstandCO 3AHSB02.1514Find the volume of the tetrahedron bounded by the plane $x = 0, y=0, z=0;$ and $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$ and the coordinate planes by triple integration.CO 3AHSB02.1515Using triple integration find the volume of the sphere $x^2 + y^2 + z^2 = a^2$.UnderstandCO 3AHSB02.1516Evaluate $\iint_{0} \int_{0}^{1} \int_{0}^{1} x^2 y^2 dx^2 dy dx$ UnderstandCO 3AHSB02.1517Evaluate $\iint_{0} \int_{0}^{1} dx^2 dy dx$ where k is the region bounded by the plane $x = 0, x = 1, y = 0,$	5	Analyze the value of c in the interval [3, 7] for the function	Understand	CO 3	AHSB02.14
7Verify Cauchy's mean value theorem for $f(x) = x^2 \& g(x) = x^3 \ln [1,2]$ UnderstandCO 3AHSB02.14and find the value of c.8Verify Kolle's theorem for the function $f(x) = (x - a)^m (x - b)^n$ UnderstandCO 3AHSB02.149Using mean value theorem, for $0 < a < b$, prove thatUnderstandCO 3AHSB02.1410 $Find all numbers e between a and b b which satisfies lagranges meanvalue theorem, for the following function(x) = (x - 1)(x - 2)(x - 3) in [0.4]UnderstandCO 3AHSB02.1411Evaluate the triple integral \int_{0}^{1} \int_{0}^{1} \int_{0}^{1-y^2-y^2} xyzdxdydz.UnderstandCO 3AHSB02.1512Evaluate the triple integral \int_{0}^{1} \int_{0}^{1-y^2-y^2} xyzdxdydz.UnderstandCO 3AHSB02.1513Evaluate the triple integral \int_{0}^{1} \int_{0}^{1-x^2-y^2} xyzdxdydz.UnderstandCO 3AHSB02.1514Find the volume of the tetrahedron bounded by the planex = 0, y=0, z=0; and \frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1 and the coordinate planes by tripleintegration.CO 3AHSB02.1515Using triple integration find the volume of the sphere x^2+y^2+z^2=a^2.UnderstandCO 3AHSB02.1516Evaluate \iint_{0} dxdydz where v is the finite region of space formed bythe planes x = 0, y = 0, z = 1, \frac{x}{a^2} + \frac{y^2}{2^2} + \frac{y^2}{2^2} = 1UnderstandCO 3AHSB02.1516Evaluate \iint_{0} (x + y + z)dzdydx where R is the region bounded bythe planes x = 0, x = 1, y = 0, z = 1.UnderstandCO 3AHSB02.1516Evaluate \iint_{0} (f_{0} \int_{\sqrt{x^2+y^2}} xy dz dy dxUnderstand<$	6		Understand	CO 3	AHSB02.14
Construction for (a) f(a) f(a) f(a) f(a) f(a) f(a) f(a)		$f(x) = \sqrt{x} \& g(x) = \frac{1}{\sqrt{x}}$ in [a,b] where $0 < a < b$			
8 Verify Rolle's theorem for the function $f(x) = (x - a)^m (x - b)^n$ Understand CO 3 AHSB02.14 9 Using mean value theorem, for 0 < a < b, prove that	7		Understand	CO 3	AHSB02.14
$\frac{1}{1} - \frac{1}{b} < \log \frac{b}{a} < \frac{b}{a} - 1 \text{ and hence show that } \frac{1}{6} < \log \frac{6}{5} < \frac{1}{5}.$ 10 Find all numbers c between a and b b which satisfies lagranges mean value theorem. for the following function(x)= (x-1)(x-2)(x-3) in [0.4] 11 Evaluate the triple integral $\int_{0}^{1} \int_{0}^{1} \int_{0}^{1$	8	Verify Rolle's theorem for the function $f(x) = (x - a)^m (x - b)^n$	Understand	CO 3	AHSB02.14
value theorem ,for the following function(x)= (x-1)(x-2)(x-3) in [0 4]11Evaluate the triple integral $\int_{0}^{1} \int_{0}^{1-x^{2}} xyz dx dy dz$.UnderstandCO 3AHSB02.1512Evaluate the triple integral $\int_{0}^{0} \int_{0}^{2} \int_{0}^{1-x^{2}} \int_{0}^{0} \int_{1-x^{2}-y^{2}-z^{2}}^{2} dx dy dz$.UnderstandCO 3AHSB02.1513Evaluate $\int_{0}^{1} \int_{0}^{\sqrt{1-x^{2}}} \int_{0}^{\sqrt{1-x^{2}-y^{2}}} \frac{dx dy dx}{\sqrt{1-x^{2}-y^{2}-z^{2}}} \frac{dx dy dz}{\sqrt{1-x^{2}-y^{2}-z^{2}-z^{2}}}$.UnderstandCO 3AHSB02.1514Find the volume of the tetrahedron bounded by the planeUnderstandCO 3AHSB02.15x=0,y=0,z=0; and $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$ and the coordinate planes by triple integration.UnderstandCO 3AHSB02.1515Using triple integration find the volume of the sphere $x^{2}+y^{2}+z^{2}=a^{2}$.UnderstandCO 3AHSB02.1516Evaluate $\iint_{y} dxdy dz$ where v is the finite region of space formed by the planes x=0, y=0, z=0 and $2x+3y+4z=12$.UnderstandCO 3AHSB02.1517Evaluate $\iint_{R} (x + y + z) dz dy dx$ where R is the region bounded by the plane $x = 0, x = 1, y = 0, y = 1, z = 0, z = 1$.UnderstandCO 3AHSB02.1519If R is the region bounded by the planes $x=0, y=0, z=1, z=0, z=1$.UnderstandCO 3AHSB02.1520Evaluate $\int_{0}^{1} \int_{\sqrt{x}^{2} x+y^{2}} xy dz dy dx$ UnderstandCO 3AHSB02.1521If R is the region bounded by the planes $x=0, y=0, z=1$ and the cylinder $x^{2} + y^{2} = 1$, evaluate $\int_{0}^{1} \int_{\sqrt{x}^{2} x+y^{2}} xy dz dy dx$ UnderstandCO 3	9		Understand	CO 3	AHSB02.14
12 $\log^2 x$ $x + \log y$ UnderstandCO 3AHSB02.1513Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} \frac{dxdydx}{\sqrt{1-x^2-y^2-x^2}}$ UnderstandCO 3AHSB02.1514Find the volume of the tetrahedron bounded by the planeUnderstandCO 3AHSB02.1514Find the volume of the tetrahedron bounded by the planeUnderstandCO 3AHSB02.1515Using triple integration find the volume of the sphere $x^2 + y^2 + z^2 = a^2$.UnderstandCO 3AHSB02.1516Evaluate $\iint_v dxdydz$ where v is the finite region of space formed byUnderstandCO 3AHSB02.1516Evaluate $\iint_v dxdydz$ where v is the finite region of space formed byUnderstandCO 3AHSB02.1517Evaluate $\iint_v (x + y + z)dzdydx$ where R is the region bounded byUnderstandCO 3AHSB02.1518Find the volume of the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{x^2}{a^2} = 1$ UnderstandCO 3AHSB02.1519If R is the region bounded by the planes $x=0, y=0, z=1$ and the cylinder $x^2 + y^2 = 1, evaluate \iint_x xyzdxdydz$.UnderstandCO 3AHSB02.1520Evaluate $\int_0^1 \int_0^1 \int_x^1 xyzdxdydz$.UnderstandCO 3AHSB02.151Verify the hypothesis and conclusion of rolles thorem for the function defined below $f(x) = \frac{\log(k^2 + eb)}{(a+b)x}$ in $[a b]$ UnderstandCO 3AHSB02.142Verify the hypothesis and conclusion of rolles thorem for the function defined below $f(x) = \frac{\log(k^2 + eb)}{(a+b)x}$ in $[a b]$ UnderstandCO 3AHSB02.14	10	Find all numbers c between a and b b which satisfies lagranges mean value theorem ,for the following function(x)= (x -1)(x -2)(x -3) in [0 4]	Understand	CO 3	AHSB02.14
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$x^2 + y^2 = 1$, evaluate $\iint_{\mathbb{R}} xyzdxdydz$.UnderstandCO 3AHSB02.1520Evaluate $\int_0^1 \int_0^1 \int_{\sqrt{x^2 + y^2}}^2 xyz dz dy dx$ UnderstandCO 3AHSB02.15Part - C (Problem Solving and Critical Thinking Questions)1Verify the hypothesis and conclusion of rolles thorem for the function defined below $f(x) = x^3 - 6x^2 + 11x - 6 in [1 3]$ UnderstandCO 3AHSB02.142Verify the hypothesis and conclusion of rolles thorem for the function defined below $f(x) = \frac{\log \mathbb{E}x^2 + ab}{(a+b)x} in [a b]$ UnderstandCO 3AHSB02.14	19	If R is the region bounded by the planes $x=0, y=0, z=1$ and the cylinder	Understand	CO 3	AHSB02.15
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	2	Verify the hypothesis and conclusion of rolles thorem for the	Understand	CO 3	AHSB02.14
3 Use lagranges mean value theorem to establish the following Understand CO 3 AHSB02.14	3	Use lagranges mean value theorem to establish the following	Understand	CO 3	AHSB02.14

i	nequalities $x \le \sin^{-1}x \le \frac{x}{\sqrt{1-x^2}}$ for $0 \le x \le 1$			
	Calculate approximately $\sqrt[5]{245}$ by using L.M.V.T.	Understand	CO 3	AHSB02.14
	Verify Cauchy's mean value theorem for $f(x) = x^3 \& g(x) = 2-x$ in 0,9] and find the value of c.	Understand	CO 3	AHSB02.14
06 F	Evaluate $\int_{a}^{a} \int_{a}^{b} \int_{a}^{c} (x + y + z) dx dy dz$	Understand	CO 3	AHSB02.15
07	Evaluate $\int_0^2 \int_0^2 \int_0^2 (x + y + z) dx dy dz$.	Understand	CO 3	AHSB02.15
E	Evaluate $\int_{0}^{a} \int_{0}^{b} \int_{0}^{c} (x + y + z) dx dy dz$. Evaluate $\int_{0}^{1} \int_{0}^{\sqrt{1-x^{2}}} \int_{0}^{\sqrt{1-x^{2}-y^{2}}} xyz dx dy dz$	Understand	05	An3002.13
08	Evaluate	Understand	CO 3	AHSB02.15
	$\int_{-1}^{1} \int_{0}^{z} \int_{x-z}^{x+z} (x+y+z) dx dy dz$			
	Evaluate $\iint \frac{dxdydz}{(x+y+z+1)^3}$ where D is the region bounded by the planes x=0, y=0, z=0, x+y+z=1	Understand	CO 3	AHSB02.15
10 E	Evaluate $\iiint xyz dxdydz$ where D is the region bounded by the positive octant of the sphere $x^2+y^2+z^2=a^2$.	Understand	CO 3	AHSB02.15
	MODULE-IV			
	FUNCTIONS OF SEVERAL VARIABLES AND EXT Part - A (Short Answer Question)		NCTION	
1	If $x = \frac{u^2}{v}$, $y = \frac{v^2}{v}$, find the value of $\frac{\partial(u, v)}{\partial(x, y)}$	Understand	CO 4	AHSB02.17
2	The stationary point of the function $f(x, y) = x^2 + y^2 + xy + x - 4y + 5$	Understand	CO 4	AHSB02.18
3	If $x = u(1-v)$, $y = uv$, find the value of J' .	Understand	CO 4	AHSB02.17
4	Calculate $\frac{\partial(x, y, z)}{\partial(u, v, w)}$ if $u = \frac{2yz}{x}, v = \frac{3zx}{y} = \frac{4xy}{z}$	Understand	CO 4	AHSB02.17
5	If $x = u(1+v)$, $y = v(1+u)$ then find the value of $\frac{\partial(x, y)}{\partial(u, v)}$	Understand	CO 4	AHSB02.17
6	Write the condition for the function $f(x,y)$ to be functionally dependent.	Understand	CO 4	AHSB02.17
7	Define jacobian of a function.	Understand	CO 4	AHSB02.17
8	Define a saddle point for the function of f(x, y).	Understand	CO 4	AHSB02.17
9	Write the condition for the function $f(x,y)$ to be functionally independent.	Understand	CO 4	AHSB02.17
10	Define a extreme point for the function of $f(x, y)$.	Understand	CO 4	AHSB02.18
11	Define Stationery points	Lindanata 1	CO 4	ALISDO2 19
11 12	Define <u>Stationary points</u> Define maxium function ?	Understand Understand	CO 4 CO 4	AHSB02.18 AHSB02.18
12	Define a minimum function?	Understand	CO 4	AHSB02.18 AHSB02.18
13	If u and v are functions of x and y then prove that $J J' = 1$	Understand	CO 4	AHSB02.18
15	$X = rcos\theta$, $Y = rsin\theta$ find J	Understand	CO 4	AHSB02.17
16	If $X = \log(xtan^{-1}y)$ then f_{xy} is equal to zero	Understand	CO 4	AHSB02.16
17	If $f(x,y,z)=0$ then the values $\frac{\partial x}{\partial y} \frac{\partial y}{\partial z} \frac{\delta z}{\delta x}=-1$	Understand	CO 4	AHSB02.16
18	Prove that if the function u,v,w of three independent variables x,y,z	Understand	CO 4	AHSB02.17

19If $x = \cos^2 y$ + $\sin^2 y$, then Show that $x = \frac{br}{ar} + y = 0$ UnderstandCO 4AHSB02.20Write the properties of maxima and minima under the various conditions.UnderstandCO 4AHSB02.21I) If $x = u(1 - v)$, $y = uv$ then prove that IJ^{-1} . (ii) If $x + y^2 = u$, $y + z^2 = v$, $z + x^2 = w$ find the value of $\frac{\partial(x, y, z)}{\partial(u, v, w)}$ UnderstandCO 4AHSB02.2If $u = x^2 - y^2$, $v = 2xy$ where $x = r \cos \theta$, $y = r \sin \theta$ then show that $\frac{\partial(u, r)}{\partial(r, \theta)} = 4r^3$ UnderstandCO 4AHSB02.3If $x = e^r \sec \theta$, $y = e^r$ tan θ prove that $\frac{\partial(x, y)}{d(r, \theta)} \frac{\partial(r, \theta)}{\partial(x, y)} = 1$.UnderstandCO 4AHSB02.4If $ux = yz$, $vy = xx$, $wz = xy$ find $\frac{\partial(x, x)}{\theta(u, w)}$ UnderstandCO 4AHSB02.5If $x = \frac{u^2}{v}$, $y = \frac{v^2}{u}$ then find the Jacobian of the function u and v with respect to x and yCO 4AHSB02.6Show that the functions $u = x^2 + y^2 + z^2 - 2xy - 2yz - 2xz$ and $w = x^3 + y^3 + z^3 - 3xyz$ are functionally related.UnderstandCO 4AHSB02.7If $x = u$, $y = \tan v$, $z = w$ then prove that $\frac{\partial(x, yz)}{\partial(u, v, w)} = usc^2 v$ UnderstandCO 4AHSB02.8Show that the functions $u = e^s$ is $n, y = e^s$ cos y are not functionally dependent.CO 4AHSB02.AHSB02.9Prove that $u = x + y + z$, $v = xy + yz + zx$, $w = x^2 + y^2 + z^2$ are functionally dependent.CO 4AHSB02.10If $u = x + y + z$, $v = xy + yz = uww$ Prove that $u = x + y + z$, $v = xy + yz = ww$ Prove that $u = x + y + z, v = xy + yz = ww$ <		are not independent ,then the Jacobian of u,v,w w.r.t x,y,z is			
20 Write the properties of maxima and minima under the various Understand CO 4 AHSB02. Part = B (Long Answer Questions) AHSB02. 1 i) If $x = v(1 \cdot v)$, $y = vv$ then prove that $JJ'=1$. Understand CO 4 AHSB02. $\ddot{c}(x, y, z)$ $\ddot{c}(u, v, w)$ AHSB02. 2 If $u = x^2 - y^2$, $v = 2xy$ where $x = r \cos \theta$, $y = r \sin \theta$ then show that $\frac{\partial(u, v)}{\partial(r, \theta)} = 4r^3$ Understand CO 4 AHSB02. 3 If $x = e^r \sec \theta$, $y = e^r \tan \theta$ Prove that $\frac{\partial(x, y)}{\partial(r, \theta)} \frac{\partial(r, \theta)}{\partial(x, y)} = 1$. Understand CO 4 AHSB02. 4 If $ux = yz$, $vy = xx$, $wz = xy$ find $\frac{\partial(x, yz)}{\partial(u, w)}$ Understand CO 4 AHSB02. 5 If $x = \frac{u^2}{v}$, $y = \frac{v^2}{u}$ then find the Jacobian of the function u and v with respect to x and y Understand CO 4 AHSB02. 6 Show that the functions u Understand CO 4 AHSB02. 7 If $x = u, y = tax, z = w$ then prove that $\frac{\partial(x, yz)}{\partial(u, w)} = u \sec^2 v$ Understand CO 4 AHSB02. 8 Show	19	always equals to zero. If $z = \cos(\frac{x}{2}) + \sin^{\frac{1}{2}}$ then Show that $x^{\frac{\partial z}{2}} + x^{\frac{\partial z}{2}} = 0$	Understand	CO 4	AHSB02.20
conditions.Image: Conditions.Part - B (Long Answer Questions)Image: Conditions.1i) If $x = u(1 - v)$, $y = w$ when prove that U^{1-1} .ii) If $x + y^2 = u$, $y + z^2 = v$, $z + x^2 = w$ find the value of $\frac{\partial(x, y, z)}{\partial(u, v, w)}$.2If $u = x^2 - y^2$, $v = 2xy$ where $x = r \cos \theta$, $y = r \sin \theta$ then show that $\frac{\partial(u, y)}{\partial(r, \theta)} = 4r^3$.3If $x = e^r \sec \theta$, $y = e^r \tan \theta$ Prove that $\frac{\partial(x, y)}{\partial(r, \theta)} \frac{\partial(r, \theta)}{\partial(x, y)} = 1$.4If $u = x^2 - y^2$, $v = 2xy$ may $z = xy \ find \frac{\partial(u, y)}{\partial(u, y)}$.5If $x = v^r \sec \theta$, $y = e^r \tan \theta$ Prove that $\frac{\partial(x, y)}{\partial(u, y)}$.6Show that the functions $u = x^2 + y^2 + z^2 - 2xy - 2yz - 2xz$, and $u = x + y + z, v = x^2 + y^2 + z^2 - 2xy - 2yz - 2xz$, and $w = x^3 + y^3 + z^3 - 3xyz$ are functionally related.7If $x = u, y = \tan v, z = w$ then prove that $\frac{\partial(x, y, z)}{\partial(u, v, w)} = u \sec^2 v$.8Show that the functions $u = e^r \sin y, v = e^r \cos y$ are not functionally related.9Prove that $u = x + y + z, v = xy + yz + zz - ww = x^2 + y^2 + z^2$ are functionally related.9Prove that $u = x + y + z, v = xy + yz + zz = ww = 0$.9Prove that $u = x + y + z, v = xy + yz + zz = ww = 0$.9Prove that $u = x + y + z, v = x^2 + y^2 + z^2 = a$.10If $u = x, y + x, z = w = y + x, z = ww = 0$.9Prove that $u = x + y + z, w = x^2 + y^2 + z^2 = a$.11Find the maximum and minimum of the function $x, y = x^2 + y^2 + z^2$ are functionally conduct and $CO 4$.12Find the maximum and minimum of the function $xy = x^2 + y^2 = 1$.13Find the maximum and minimum of the function $xy = x^2 + y^2 = 1$. </td <td></td> <td>Write the properties, of maxima and minima under the various</td> <td></td> <td></td> <td></td>		Write the properties, of maxima and minima under the various			
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Inctiou			Understand	CO 4	AHSB02.20
19Find the value of the largest rectangular parallelepiped that can beUnderstandCO 4AHSB02.	19	Find the value of the largest rectangular parallelepiped that can be	Understand	CO 4	AHSB02.20

				1
	inscribed in the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1.$			
	inscribed in the empsoid $\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} = 1$.			
20	Find the stationary points of $U(x, y) = \sin x \sin y \sin(x + y)$ where	Understand	CO 4	AHSB02.20
	$0 < x < \pi, 0 < y < \pi$ and find the maximum value of the function U.			
Part	t – C (Problem Solving and Critical Thinking)			
1	If $u = x + 3y^2 + z^3$, $v = 4x^2yz$, $w = 2z^2 - xy$ then find	Understand	CO 4	AHSB02.17
	$\frac{\partial(u,v,w)}{\partial(x,y,z)} \text{ at } (1,-1,0).$			
	$O(\lambda, y, \zeta)$	Understand	CO 4	
2	If $u = e^{xyz}$, show that $\frac{\partial^3 u}{\partial x \partial y \partial z} = (1 + 3xyz + x^2y^2z^2)e^{xyz}$	Understand		AHSB02.16
3	If	Understand	CO 4	AHSB02.16
	$u = \log(x^2 + y^2 + z^2)$, prove that			
	$(x^{2} + y^{2} + z^{2})\left(\frac{\partial^{2}u}{\partial x^{2}} + \frac{\partial^{2}u}{\partial x^{2}} + \frac{\partial^{2}u}{\partial x^{2}}\right) = 2$			
4		Understand	CO 4	AHSB02.17
4	Determine whether the following functions are functionally dependent or not .If functionally dependent , find the relation	Understand	04	Апзд02.17
	between them .			
	$u = \frac{x-y}{x+z}, v = \frac{x+z}{y+z}$			
5	Determine whether the following functions are functionally	Understand	CO 4	AHSB02.18
5	dependent or not .If functionally dependent , find the relation	Understand	04	AII3D02.10
	between them .			
	$u = \frac{x+y}{1-xy}, v = tan^{-1}x + tan^{-1}y$			
	1-xy'			
6	Find the maxima value of $u = x^2 y^3 z^4$ with the constrain condition	Understand	CO 4	AHSB02.18
	-			
	2x + 3y + 4z = a		GO 4	
7	Find the point of the plane $x + 2y + 3z = 4$ that is closed to the	Understand	CO 4	AHSB02.20
	origin.		GO 4	
8	Divide 24 into three parts such that the continued product of the first,	Understand	CO 4	AHSB02.18
9	square of the second and cube of the third is maximum. Find three positive numbers whose sum is 100 and whose product is	Understand	CO 4	AHSB02.18
	maximum.	Onderstand	004	7415002.10
10	A rectangular box open at the top is to have volume of 32 cubic ft .	Understand	CO 4	AHSB02.18
	Find the dimensions of the box requiring least material for its			
	construction.			
	MODULE-V			
	VECTOR CALCULUS Part - A (Short Answer Question	one)		
1	Define gradient of scalar point function.	Remember	CO 5	AHSB02.19
2	Define divergence of vector point function.	Remember	CO 5	AHSB02.19 AHSB02.19
3	Define curl of vector point function.	Remember	CO 5	AHSB02.19
4	State Laplacian operator.	Understand	CO 5	AHSB02.19
5	Find curl \overline{f} where $\overline{f} = \text{grad} (x^3 + y^3 + z^3 - 3xyz)$.	Understand	CO 5	AHSB02.19
6	Find the angle between the normal to the surface $xy=z^2$ at the points (4, 1, 2) and (3,3,-3).	Understand	CO 5	AHSB02.19
7	Find a unit normal vector to the given surface $x^2y+2xz = 4$ at the	Understand	CO 5	AHSB02.19
	point(2,-2,3).			
8	point(2,-2,3). If \bar{a} is a vector then prove that grad $(\bar{a},\bar{r}) = \bar{a}$.	Understand	CO 5	AHSB02.19
	point(2,-2,3).	Understand Remember	CO 5 CO 5	AHSB02.19 AHSB02.19

10	\overline{r}	Understand	CO 5	AHSB02.19
	Show that $\nabla(f(r)) = \frac{\overline{r}}{r} f'(r).$			
	, ,			
11	Prove that $f = yzi + zxj + xyk$ is irrotational vector.	Understand	CO 5	AHSB02.19
12	Show that $(x+3y)i+(y-2z)j+(x-2z)k$ is solenoidal.	Understand	CO 5	AHSB02.20
13	Define work done by a force, circulation.	Understand	CO 5	AHSB02.20
14	State Stokes theorem of transformation between line integral and surface integral.	Understand	CO 5	AHSB02.22
15	Prove that div curl $\overline{f}=0$ where $\overline{f}=f_1\overline{i}+f_2\overline{j}+f_3\overline{k}$.	Understand	CO 5	AHSB02.20
16	Define line integral on vector point function.	Remember	CO 5	AHSB02.21
17	Define surface integral of vector point function F .	Remember	CO 5	AHSB02.21
18	Define volume integral on closed surface S of volume V.	Remember	CO 5	AHSB02.21
19	State Green's theorem of transformation between line integral and double integral.	Understand	CO 5	AHSB02.22
20	State Gauss divergence theorem of transformation between surface integral and volume integral.	Understand	CO 5	AHSB02.22
	Part - B (Long Answer Question			
1	Evaluate $\int_{C} \overline{f} \cdot d\overline{r}$ where $\overline{f} = 3xyi - y^2j$ and C is the parabola $y=2x^2$	Understand	CO 5	AHSB02.21
2	from points $(0, 0)$ to $(1, 2)$.	Un densten d	CO 5	
2	from points (0, 0) to (1, 2). Evaluate $\iint_{S} \overline{F}.d\overline{s} \text{ if } \overline{F} = yzi + 2y^2j + xz^2k \text{ and } S \text{ is the Surface of}$	Understand	CO 5	AHSB02.21
	the cylinder $x^2+y^2=9$ contained in the first octant between the planes z = 0 and z = 2.			
3	Find the work done in moving a particle in the force field	Understand	CO 5	AHSB02.21
	$\overline{F} = (3x^2)i + (2zx - y)j + zk$ along the straight line from(0,0,0)			
4	to (2,1,3). Find the circulation of	Understand	CO 5	AHSB02.21
	$\overline{F} = (2x - y + 2z)\overline{i} + (x + y - z)\overline{j} + (3x - 2y - 5z)\overline{k} \text{ along}$	Chucistand	005	1110002.21
	the circle $x^2 + y^2 = 4$ in the xy plane.			
5	Verify Gauss divergence theorem for the vector point function $F = (x^3-yz)i - 2yxj + 2zk$ over the cube bounded by $x = y = z = 0$ and	Understand	CO 5	AHSB02.22
6	x = y = z = a.	Understand	CO 5	
6	Verify Gauss divergence theorem for $2x^2yi - y^2j + 4xz^2k$ taken over	Understand	CO 5	AHSB02.22
	the region of first octant of the cylinder $y^2 + z^2 = 9$ and $x = 2$.			
7	Verify Green's theorem in the plane for	Understand	CO 5	AHSB02.22
	$\int_{C} (x^2 - xy^3) dx + (y^2 - 2xy) dy$ where C is a square with vertices			
	(0,0),(2,0),(2,2),(0,2).			
8	Applying Green's theorem evaluate $\iint (y - \sin x) dx + \cos x dy$ where C	Understand	CO 5	AHSB02.22
	is the plane triangle enclosed by $y = 0$, $y = \frac{2x}{\pi}$, and $x = \frac{\pi}{2}$.			
9	Apply Green's Theorem in the plane for	Understand	CO 5	AHSB02.22
	$\int_{C} (2x^2 - y^2) dx + (x^2 + y^2) dy$ where C is a is the boundary of the area			
	enclosed by the x-axis and upper half of the circle $x^2 + y^2 = a^2$.			

10	Verify Stokes theorem for $f = (2x - y)i - yz^2j - y^2zk$ where S	Understand	CO 5	AHSB02.22
	is the upper half surface of the sphere $x^2 + y^2 + z^2 = 1$ bounded by			
	the projection of the xy plane.			
11		Understand	CO 5	AHSB02.24
11	Verify Stokes theorem for $\overline{f} = (x^2 - y^2)\overline{i} + 2xy\overline{j}$ over the box bounded by the planes $x=0, x=2, y=0, y=b$	Understand	05	Апзв02.24
12	by the planes x=0, x=a, y=0,y=b. Find the directional derivative of the function $\phi = xy^2 + yz^3$ at the	Understand	CO 5	AHSB02.21
	point P(1,-2,-1) in the direction to the surface $x \log z - y^2 =$			
	-4 at (-1,2,1).			
13	If $\overline{F} = 4xz\overline{i} - y^2\overline{j} + yz\overline{k}$ evaluate $\int \overline{F}.\overline{n}ds$ where S is the surface of	Understand	CO 5	AHSB02.20
	S			
14	the cube x = 0, x = a, y = 0, y = a, z = 0, z = a. If $\overline{f} = (5xy - 6x^2)\overline{i} + (2y - 4x)\overline{j}$ evaluate $\int \overline{f}.d\overline{r}$ along the	Understand	CO 5	AHSB02.21
	C			
15	curve C in xy-plane $y = x^3$ from (1,1) to (2,8).	TT. 1. action 1	CO 5	AUGD02.21
15	Evaluate the line integral $\int (x^2 + xy)dx + (x^2 + y^2)dy$ where C is	Understand	CO 5	AHSB02.21
16	the square formed by lines $x = \pm 1$, $y = \pm 1$.	Understand	CO 5	AHSB02.19
	If $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$ show that $\nabla r^n = nr^{n-2}\vec{r}$.			
17	Evaluate by Stokes theorem $\int (e^x dx + 2y dy - dz)$ where c is the	Understand	CO 5	AHSB02.22
	c			
	curve $x^2+y^2=9$ and $z=2$.			
18	Verify Stokes theorem for the function $x^2 \overline{i} + x \overline{j}$ integrated round the	Understand	CO 5	AHSB02.22
	square in the plane $z=0$ whose sides are along the line $x=0,y=0,x=a$,			
10	y=a.	XX 1 / 1	<u> </u>	AUGD02.22
19	Evaluate by Stokes theorem $\int (x+y)dx + (2x-z)dy + (y+z)dz$	Understand	CO 5	AHSB02.22
	where C is the boundary of the triangle with vertices			
	(0,0,0),(1,0,0),(1,1,0).			
20	Verify Green's theorem in the plane for	Understand	CO 5	AHSB02.22
	$\int (3x^2 - 8y^2) dx + (4y - 6xy) dy$ where C is a region bounded by			
	$y=\sqrt{x}$ and $y=x^2$. Part – C (Problem Solving and Critica	L Thinking)		
	Verify Gauss divergence theorem for $\overline{f} = x^2 \overline{i} + y^2 \overline{j} + z^2 \overline{k}$ taken	Understand	CO 5	AHSB02.22
1	over the cube bounded by $x=0,x=a, y=0,y=b, z=0,z=c$.			
2	Find the work done in moving a particle in the force field	Understand	CO 5	AHSB02.21
	$\overline{F} = (3x^2)i + (2zx - y)j + zk$ along the curve defined by			
	$x^2 = 4y, 3x^3 = 8z$ from x=0 and x=2.			
	x = y, 5x = 0, from $x = 0$ and $x = 2$.			
3	Show that the force field given by	Understand	CO 5	AHSB02.20
	$\overline{F} = 2xyz^3i + x^2z^3j + 3x^2yz^2k$ is conservative. Find the work			
	done in moving a particle from $(1,-1,2)$ to $(3,2,-1)$ in this force			
4	field.	Understand	CO 5	AHSB02.21
4	Show that the vector $(x^2 - yz)i + (y^2 - zx)j + (z^2 - xy)k$ is	Understand	005	Ansb02.21
	irrotational and find its scalar potential function.			

5	Using Gauss divergence theorem evaluate $\iint_{s} \vec{F}.d\bar{s}$, for the $\vec{F} = y\vec{i} + x\vec{j} + z^{2}\vec{k}$ for the cylinder region S given by $x^{2} + y^{2} = a^{2}$, $z = 0$ and $z = b$.	Understand	CO 5	AHSB02.22
6	Find the directional derivative of $\phi(x, y, z) = x^2 yz + 4xz^2$ at the point(1,-2,-1) in the direction of the normal to the surface f(x, y, z) = x logz - y ² at (-1,2,1).	Understand	CO 5	AHSB02.20
7	Using Green's theorem in the plane evaluate $\int_{c} (2xy - x^{2})dx + (x^{2} + y^{2})dy$ where C is the region bounded by $y = x^{2}$ and $y^{2} = x$.	Understand	CO 5	AHSB02.22
8	Applying Green's theorem evaluate $\int_{c} (xy + y^2) dx + x^2 dy$ where C is the region bounded by $y = \sqrt{x}$ and $y = x^2$.	Understand	CO 5	AHSB02.22
9	Verify Green's Theorem in the plane for $\int_{C} (3x^2 - 8y^2) dx + (4y - 6xy) dy$ where C is the region bounded by x=0, y=0 and x + y=1.	Understand	CO 5	AHSB02.22
10	Verify Stokes theorem for $\overline{F} = (y - z + 2)i + (yz + 4)j - xzk$ where S is the surface of the cube x=0, y=0, z=0 and x=2,y=2,z=2 above the xy-plane.	Understand	CO 5	AHSB02.22

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