

← Mid Term



Course Name: Engineering Mathematics- II

Course Outcome

CO1- Know the rank of a matrix and its applications in solving systems of linear equations

CO2- Understand complex matrices

CO3- Find the Eigen values and Eigen vectors of a square matrix

CO4- Solve ordinary and partial differential equations of higher orders and its applications

Printed Pages: 2

University Roll No.

Mid Term Examination, Even Semester 2021-22

B.Tech, Year-I, Semester-II

Sub. Code-BMAS1102 & Sub. Name- Engineering Mathematics II

Time: 2 Hours

Maximum Marks: 30

Instruction for students:

1. Attempt all questions
2. Support your solution with proper justification.

Section – A

3 X 5 = 15 Marks

No.	Detail of Question	Marks	CO	BL	KL
1	Discuss the applications of matrix and solve the homogeneous system of linear equations by using matrix method: $\begin{aligned} x + 3y + 2z &= 0, \\ 2x - y + 3z &= 0, \\ 3x - 5y + 4z &= 0, \\ x + 17y + 4z &= 0. \end{aligned}$	1+2	1	A	P
2	Define rank of a matrix. Find the rank of matrix $A = \begin{bmatrix} 2 & 3 & 4 & -1 \\ 5 & 2 & 0 & -1 \\ -4 & 5 & 12 & -1 \end{bmatrix}$ by using the elementary transformations.	1+2	1	E	F
3	If $A = \begin{bmatrix} 2+i & 3 & -1+3i \\ -5 & i & 4-2i \end{bmatrix}$ is a complex matrix, verify that A^*A is Hermitian matrix where A^* is the conjugate transpose of A .	3	2	An	C, P
4	Obtain the general solution of the differential equation: $\frac{d^2y}{dx^2} - 3 \frac{dy}{dx} + 2y = \cos 3x + \sin 2x$	3	4	U, E	P





5	Solve the following second order differential equation: $\frac{d^2y}{dx^2} - 6 \frac{dy}{dx} + 9y = 6e^{3x} + 7e^{-2x} - \log 2$	3	4	A, E	P
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Section – B

5 X 3 = 15 Marks

No.	Detail of Question	Marks	CO	BL	KL
1	Determine the values of constants a and b for which the system of equations $\begin{bmatrix} 3 & -2 & 1 \\ 5 & -8 & 9 \\ 2 & 1 & a \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} b \\ 3 \\ -1 \end{bmatrix}$ has (i) a unique solution (ii) no solution (iii) an infinitely many solutions.	5	1	An	C, P
2	Discuss the Eigen values and Eigen vectors in Sciences and Engineering. Find the Eigen values and Eigen vectors of the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$	1+4	3	A	C
3	An electrical circuit has a capacitor of capacity C, inductor with an inductance L and a resistor of resistance R. The current i is flowing through it. The charge q ($= \frac{di}{dt}$) on the plates of the capacitor is governed by the following differential equation: $\frac{dq}{dt} + \frac{R}{L} q + \frac{1}{LC} \int q dt = 0,$ where, $R^2 = \frac{4L}{C}$. Given that R, L and C are constants. Obtain the general solution for current i in terms of t. Also achieve the particular solution for i in terms of t if the initial conditions are: $i = 0$ at $t = 0$ and, $\frac{di}{dt} = 1$ at $t = 0$.	5	4	C	M

CO – Course Outcome, BL – Abbreviation for Bloom's Taxonomy Level (R-Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, C-Create), KL – Abbreviation for Knowledge Level (F-Factual, C-Conceptual, P-Procedural, M-Metacognitive).