Course Name: B. Tech. (Hons.) CS / B. Tech. EC (VLSI)

Course Outcome

CO 1: Know the rank of a matrix and its applications in solving systems of linear equations
CO 2: Find the Eigen values and Eigen vectors of a square matrix
CO 3: Solve ordinary and partial differential equations of higher orders
CO 4: Classify the linear partial differential equations as elliptic, parabolic and hyperbolic
CO 5: Expand a function in half range Fourier sine and cosine series
CO 6: Apply the method of separation of variables to solve wave and heat flow equations of one dimension

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Mid Term Examination, Even Semester 2021-22
B. Tech. (Hons.) CS / B. Tech. EC (VLSI), I-Year, II-Semester
BMAS 0105, Linear Algebra and Differential Equations

Time: 2 Hours **Maximum Marks: 15**

Section – A

Attempt All Questions 1 X 3 = 3 Marks

No.	Detail of Question	Marks	CO	BL	KL
1	Define elementary matrix with a counter example.	1	1	U	F
2	Solve: $(D^3+D^2-D-1)y=\sin 2x$	1	3	E	C
3	Find the particular integral of $(D^2+1)y=e^{2x}\sin 3x$	1	3	E	C

Section – B

Attempt All Questions 2 X 3 = 6 Marks

No.	Detail of Question	Marks	CO	BL	KL
1	State the conditions under which a system of linear non-homogeneous equations will have (i) no solution (ii) a unique solution and (iii) an infinite number of solutions.	2	1	U	C
2	State Cayley-Hamilton theorem. Use it to express $2A^5-3A^4+A^2-4I$ as a linear polynomial in A, when $A=\begin{bmatrix}3 & 1\\ -1 & 2\end{bmatrix}$.	2	2	A	P
3	Apply the method of variation of parameters to solve $(D^2+4)y=4\tan 2x$	2	3	A	P

Section – C

*Attempt **All** Questions*

3 X 2 = 6 Marks

No.	Detail of Question	Marks	CO	BL	KL
1	Reduce the matrix $A=\begin{bmatrix}2 & -2 & 0 & 6\\ 4 & 2 & 0 & 2\\ 1 & -1 & 0 & 3\\ 1 & -2 & 1 & 2\end{bmatrix}$ to the normal form $\begin{bmatrix}I_r & 0\\ 0 & 0\end{bmatrix}$ and hence determine its rank. OR Solve the following ordinary simultaneous differential equations: $\frac{dx}{dt}+\frac{dy}{dt}-2y=2\cos t-7\sin t,\quad \frac{dx}{dt}-\frac{dy}{dt}+2x=4\cos t-3\sin t$	3	1, 3	E	M
2	Investigate for what values of λ, μ the simultaneous equations $x+y+z=6,\ x+2y+3z=10,\ x+2y+\lambda z=\mu$ have (i) no solution (ii) a unique solution and (iii) an infinite number of solutions. OR Determine the eigen-values and eigen-vectors of the matrix $A=\begin{bmatrix}6 & -2 & 2\\ -2 & 3 & -1\\ 2 & -1 & 3\end{bmatrix}$.	3	1, 2	An	P