BT MRE-II(R/S)-06-24-3233 Reg. No. | | | | | | | | |

C

B.Tech. Degree II Semester Regular/Supplementary Examination in Marine Engineering June 2024

19-208-0201 ENGINEERING MATHEMATICS II

(2019 Scheme)

Time: 3 Hours Maximum Marks: 60

Course Outcome

On successful completion of the course, the students will be able to:

CO1: Solve linear system of equations and to determine eigen values and vectors of a matrix.
CO2: Solve ordinary differential equations and linear differential equations of higher orders with constant coefficient and apply them in engineering problems.
CO3: Determine fourier series expansions of functions and transforms.
CO4: Solve linear differential equations and Integral equations using Laplace transforms.
CO5: Understand the basic concepts of probability and different probability distributions.

Bloom's Taxonomy Levels (BL): L1 – Remember, L2 – Understand, L3 – Apply, L4 –Analyze, L5 – Evaluate, L6 – Create

PI – Programme Indicators

(Answer *ALL* questions) (5 × 15 = 75)

			Marks	BL	CO	PI
I.	(a)	Find the Eigen values and Eigen vectors of the matrix. $\begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$	7	L3	1	1
	(b)	By reducing to Echelon form find the rank of the matrix. $\begin{bmatrix} 1 & 0 & 2 & 1 \\ 0 & 1 & -2 & 1 \\ 1 & -1 & 4 & 0 \\ -2 & 2 & 8 & 0 \end{bmatrix}$	8	L3	1	1
		OR				
II.	(a)	Verify Cayley Hamilton Theorem for the matrix $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ and find its Inverse.	8	L3	1	1
	(b)	Using Jacobi's iteration method, solve the following by taking **six** iterations. $20x + y - 2z = 17$, $3x + 20y - z = -18$, $2x - 3y + 20z = 25$	7	L3	2	1

(P.T.O.)

			Marks	BL	CO	PI
III.	(a)	Solve $(x+1)\frac{dy}{dx}-y=e^{3x}(x+1)^2$.	7	L3	2	1
	(b)	Solve $\frac{d^2y}{dx^2}-3\frac{dy}{dx}+y=\sin 2x+e^{5x}$.	8	L2	2	1
		OR				
IV.		Solve the simultaneous equations, $\frac{dx}{dt}+2x-3y=0$, $\frac{dy}{dt}-3x+2y=0$.	15	L3	2	1
V.	(a)	Find the Fourier series expansion of $f(x)=x, -\pi \le x \le \pi$.	8	L3	2	1
	(b)	Find the half range cosine series expansion of $f(x)=x^2, 0 \le x \le \pi$.	7	L3	2	1
		OR				
VI.	(a)	Prove that $\beta(m,n)=\frac{\Gamma(\mathrm{m})\Gamma(\mathrm{n})}{\Gamma(\mathrm{m+n})}$.	7	L3	3	1
	(b)	Find the Fourier series expansion of $f(x)=x^2, -\pi \le x \le \pi$.	8	L3	3	1
VII.	(a)	Use transform methods to solve $\frac{d^2x}{dt^2}-2\frac{dx}{dt}+x=e^t$ with $x(0)=2$ and $x'(0)=-1$.	8	L3	4	1
	(b)	Find the Laplace transform of $e^{-3t}(2\cos 5t-3\sin 5t)$.	7	L3	4	1
		OR				
VIII.	(a)	Apply Convolution theorem to evaluate $L^{-1}\left[\frac{s}{(s^2+a^2)^2}\right]$.	8	L2	4	1
	(b)	Find the inverse Laplace transform of $\frac{s^2-3s+4}{s^3}$.	7	L3	4	1
IX.		A random variable X has the following probability distribution.	15	L3	5	1

X	-2	-1	0	1	2	3
P(X=x)	$\frac{1}{10}$	k	$\frac{1}{5}$	2k	$\frac{3}{10}$	3k

(i) Find the value of k

(ii) Find $P(-2<X<2)$

(iii) Find $P(X<2)$.

OR

			Marks	BL	CO	PI
X.	(a)	The mean and variance of a binomial random variable X are 16 and 8 respectively. Find $P(X=0)$.	7	L5	5	1
	(b)	Ten coins are thrown simultaneously. Find the probability of getting at least 7 heads.	8	L5	5	1

Blooms's Taxonomy Level

L2 – 15%, L3 – 75%, L5 – 10%.

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