BT MRE-II(R/S)-06-23-2322 Reg. No. | | | | | | | | |

B

B.Tech. Degree II Semester Regular/Supplementary Examination in Marine Engineering June 2023

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 to determine eigen values and eigen vectors of a matrix.
CO2: Solve ordinary differential equations and linear differential equations of higher order with constant coefficients and apply them in engineering problems.
CO3: Determine Fourier series expansion of functions and transform.
CO4: Solve linear differential equation and integral equation using Laplace transform.
CO5: Understand the basic concepts of probability and different probability distribution.
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 for $A=\begin{bmatrix}2 & 2 & -5\\ 3 & 7 & -15\\ 1 & 2 & -4\end{bmatrix}$.	10	L4	1	2.4.1
	(b)	Test for consistency of the following equations $x-2y+3z=2;\ 2x+y+z=-4;\ 4x-3y+z=8.$	5	L3	1	2.4.1
		OR				
II.	(a)	Solve the system of equations using Jacobi's method $10x+y-z=11.19;\ x+10y+z=28.08;\ -x+3y+10z=35.61$ Correct to two decimal places.	10	L4	1	2.4.1
	(b)	Verify Cayley Hamilton theorem for $A=\begin{bmatrix}1 & 0\\ 2 & -1\end{bmatrix}$.	5	L3	1	2.4.1
III.	(a)	Find the differential equation of simple harmonic motion given by $x=C\sin(nt+\alpha)$ where C and α are arbitrary constants.	5	L3	2	2.4.1
	(b)	Solve $\frac{dy}{dx}=xy\left(1+yx^2\right)$.	10	L2	2	2.4.1
		OR				
IV.	(a)	Solve $\left(e^x+e^{-x}\right)dy-\left(e^x-e^{-x}\right)dx=0$	5	L2	2	2.4.1
	(b)	Solve $\frac{d^2y}{dx^2}-12\frac{dy}{dx}+36y=e^{6x}$.	5	L2	2	2.4.1
	(c)	Find the orthogonal trajectories of the family of parabola $y^2=mx$.	5	L3	2	2.4.1

(P.T.O.)

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		Question	Marks	BL	CO	PI
V.	(a)	If $f(x+2\pi)=f(x)$, find the Fourier series expansion of $f(x)=x^2$ in the interval $(-\pi,\pi)$.	8	L4	3	2.4.1
	(b)	Find the half range Fourier sine series expansion of the function $f(x)=e^x$ in the interval (0, 1).	7	L4	3	2.4.1
		OR				
VI.	(a)	Define beta function. Evaluate the integral $\int_0^1 x^m\left(1-x^2\right)^n dx$ in terms of beta function.	7	L2	3	2.4.1
	(b)	Find the Fourier series expansion of the function $f(x)=x+x^2$ in the interval $(-\pi,\pi)$.	8	L2	3	2.4.1
VII.	(a)	Find the Laplace transform of the function $f(t)=\begin{cases}\sin\omega t, & 0<t<\frac{\pi}{\omega}\\ 0, & \frac{\pi}{\omega}<t<\frac{2\pi}{\omega}\end{cases}$.	5	L3	4	2.4.1
	(b)	Evaluate $L\left(\int_0^\infty \frac{\sin 5t-\cos 3t}{t}dt\right)$.	10	L3	4	2.4.1
		OR				
VIII.	(a)	Find the inverse Laplace transform of $\frac{1}{s(s+a)^3}$.	10	L3	4	2.4.1
	(b)	Solve by the method of transforms, the equation $y''+4y'+3y=e^{-t}$ given that $y(0)=y'(0)=1$.	5	L4	4	2.4.1
IX.	(a)	A and B throw alternately with a pair of dice. A wins if he throws 6 before B throws 7 and B wins if he throw 7 before A throws 6. If A begins, find his chance of winning.	7	L3	5	2.4.1
	(b)	A die is tossed thrice. A success is 'getting 1 or 6' on a toss. Find the mean and the variance of the number of successes.	8	L3	5	2.4.1
		OR				
X.	(a)	In a sampling a large number of parts manufactured by a machine, the mean number of defectives in a sample of 20 is 2. Out of 1000 such samples, how many would be expected to contain at least 3 defective parts?	9	L3	5	2.4.1
	(b)	In 256 sets of 12 tosses of a coin, in how many cases one can expect 8 heads and 4 tails?	6	L3	5	2.4.1

Bloom's Taxonomy Levels
L2 = 23%, L3 = 50%, L4 = 27%.

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