Reg. No. ☐☐☐☐☐☐☐   **A**

B.Tech. Degree III Semester Regular/Supplementary Examination in Marine Engineering November 2022

19-208-0301 ENGINEERING MATHEMATICS-III
(2019 *Scheme*)

Time: 3 Hours   Maximum Marks: 60

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

CO1:   Transform a region to another region using conformal mapping and calculate residues.
CO2:   Understand different sampling distributions for statistical analysis of data and fit a best curve to the data.
CO3:   Solve algebraic and transcendental equations and differential equations by numerical methods.
CO4:   Solve difference equations and apply it to engineering problems.
CO5:   Perform numerical differentiation and integration.
Bloom's Taxonomy Levels (BL): L1 – Remember, L2 – Understand, L3 – Apply, L4 –Analyze, L5 – Evaluate, L6 – Create
PO – Programme Outcome

			(5 × 15 = 75)	Marks	BL	CO	PO
I.	(a)	What are the Cauchy Reimann conditions? Verify the same for $f(z) = z^2$.		7	L1	1	1.3.1
	(b)	If a function is analytic then show that it is independent of $\bar{z}$.		8	L2	1	1.3.1
		OR					
II.	(a)	Find an analytic function whose imaginary part is $3x^2y - y^3$ and which vanishes at $z = 0$.		8	L2	1	1.3.1
	(b)	Evaluate $\int_c z\,dz$ where C is the first quadrant of the unit circle $|z| = 1$ from $z = i$ to $z = 1$.		7	L2	1	1.3.1
III.	(a)	Define the following terms: (i) Population (ii) Sample (iii) Statistic (iv) Parameter.		6	L1	2	1.3.1
	(b)	A random sample is taken from a normal population with mean 45 and standard deviation 3. Calculate the standard error for a population of 75. Find the probability of the sample mean being negative.		9	L3	2	1.3.1
		OR					
IV.	(a)	Fit a straight lin $y = ax + b$ which fits best to the following data:		6	L2	2	1.3.1
	(b)	Find the correlation coefficient and regression lines from the following:		9	L2	2	1.3.1

IV. (a) table:

x	1	3	5	7	8	10
y	110	131	118	92	81	79

IV. (b) table:

x	1	3	5	7	8	10
y	8	12	15	17	18	20

(P.T.O.)

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			Marks	BL	CO	PO

V. (a) Find a real root of the equation $\sin x - xe^x = 0$ correct to four decimal places by Regula Falsi method. — 8 L2 3 1.3.1

(b) Use Newtons method to solve $x^4 - x - 11 = 0$ correct to three decimal places. — 7 L2 3 1.3.1

OR

VI. (a) Using Taylor series method solve the differential equation $dy/dx = x^2 + y^2 + 5e^{3x}$ where $y(0) = 1$ at $x = 0.3$. — 7 L2 3 1.3.1

(b) Solve $\dfrac{dy}{dx} = 1n(x+y), y(0) = 1$ correct to three decimal places at $x = 0.2$, using Euler's method by taking $h = 0.2$. — 8 L2 4 1.3.1

VII. (a) Find a difference equation satisfied by $y = \dfrac{a}{x} + b$. — 8 L2 4 1.3.1

(b) Find the factorial polynomial of $f(x) = x^3 - x^2 - x - 1$ and hence or otherwise evaluate $\Delta^3 f(x)$. — 7 L2 4 1.3.1

OR

VIII. (a) Solve the difference equation $(\Delta^2 - 3\Delta + 2)y_n = 0$. — 5 L2 4 1.3.1

(b) Solve the equation $y_{n+4} - 2y_{n+2} + y_n = 5^n$. — 5 L2 4 1.3.1

(c) Solve $y_{n+2} + y_{n+1} + y_n = n^2$. — 5 L2 4 1.3.1

IX. (a) From the following data, evaluate $\cos 39°$ and $\cos 41°$ using Gauss interpolation formula: — 7 L2 5 1.3.1

X (in degree)	10	20	30	40	50
cosx	0.9848	0.9397	0.8660	0.7660	0.6428

(b) Evaluate f(4) using appropriate interpolation formula from the following: — 8 L3 5 1.3.1

(x)	0	10	20	30
F(x)	7	18	32	48

OR

X. (a) Evaluate $\dfrac{dy}{dx}$ at $x = 8$ from the following: — 7 L2 5 1.3.1

x	0	2	4	6	8
y	4	8	15	7	6

(b) Evaluate $\int_0^{\frac{\pi}{2}} \sin x\, dx$ using: — 8 L2 5 1.3.1

(i) Trapezoidal rule.

(ii) Simpson's rule by taking $h = \dfrac{\pi}{12}$.

Bloom's Taxonomy Levels
L1 = 10%, L2 = 80%, L3 = 10%,

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