SRI VENKATESWARA COLLEGE OF ENGINEERING

COURSE DELIVERY PLAN - THEORY

Department of Applied Mathematics	LP: MA18252 Rev. No: 00
B.E : Marine Regulation: 2018 Sub. Code / Sub. Name : MA18252 / Mathematics for Marine Engineering - II Unit : II – Ordinary differential equations – Higher order and applications	Date: 08.04.2022

Unit Syllabus: Higher (nth) order linear differential equations - definition and complementary solution, Methods of obtaining PI, Method of variation of parameters, Method of undetermined coefficients, Cauchy's Homogeneous LDE and Legendre's equations, System of Ordinary Differential Equations Simultaneous equations in symmetrical form, Applications to deflection of beams, struts and columns. Applications to electrical circuits and coupled circuits.

Objective: To solve differential equations of certain types, including systems of differential equations that they might encounter in the same or higher semesters.

Session No *	Topics to be covered	Ref	Teaching Aids
13	Introduction to solution of second and higher order linear ODE with constant coefficients.	2-Ch 13, Pg 777-778	BB/PPT
14	Complementary solution of higher order ODE	2-Ch 13, Pg 777-780	BB/PPT
15	Particular integrals of exponential and trigonometric functions and algebraic expression	2-Ch 13, Pg 783-788	BB/PPT
16	Tutorial class	Worksheet	BB
17	Particular integrals of the combinations of exponential and trigonometric expressions, exponential and algebraic expressions	2-Ch 13, Pg 788-796	BB/PPT
18	Method of Variation of parameters & Method of undetermined coefficients	2-Ch 13, Pg 796-797	BB/PPT
19	Cauchy's homogeneous linear differential equation & Legendre's linear differential equation	2-Ch 13, Pg 797-802	BB/PPT
20	Tutorial class	Worksheet	BB
21	System of ordinary differential equations and Simultaneous equations	2-Ch 13, Pg 803-808	BB/PPT
22	Applications to deflection of beams, struts and columns	1-Ch 14, Pg 565-569	BB/PPT
23	Applications to electrical circuits and coupled circuits	1-Ch 14, Pg 560-564	BB/PPT
24	Tutorial class	1-Ch , 2- Ch 13	BB

Content beyond syllabus covered (if any): Applications of DE's to boundary value problems such as one dimensional wave equation and heat equation.

* Session duration: 50 mins

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Department of Applied Mathematics	LP:MA18252 Rev. No: 00
B.E : Marine Regulation: 2018 Sub. Code / Sub. Name :MA18252 / Mathematics for Marine Engineering - II Unit : III – Vector calculus	Date: 08.04.2022

Unit Syllabus: Gradient Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds

Objective: To know the basics of vector calculus comprising of gradient, divergence and curl and line, surface and volume integrals along with the classical theorems involving them.

Session No *	Topics to be covered	Ref	Teaching Aids
1	Introduction to Gradient , Divergence , Curl	1-Ch 8, Pg 350-351, 355-356	BB/PPT
2	Problems in Gradient , Divergence, Curl and Directional derivative	1-Ch 8, Pg 352-354, 359-362	BB/PPT
3	Irrotational and solenoidal vector fields	1-Ch 8,Pg 356-357,382-386	BB/PPT
4	Tutorial class	Worksheet	BB
5	Vector integration	1-Ch 8, Pg 363-368	BB/PPT
6	Green's Theorem, Gauss divergence Theorem and Stoke's Theorem (excluding proof)	1-Ch 8, Pg 369-376	BB/PPT
7	Problems on Green's theorem.	1-Ch 8, Pg 369-372	BB/PPT
8	Tutorial class	Worksheet	BB
9	Problems on Gauss divergence Theorem.	1-Ch 8, Pg 376-382	BB/PPT
10	Problems on Stoke's Theorem	1-Ch 8, Pg 372-376	BB/PPT
11	Verifications and Extra Problems	1-Ch 8, Pg 382	BB/PPT
12	Tutorial class	Worksheet	BB
	CAT I		

Content beyond syllabus covered (if any):

* Session duration: 50 mins

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COURSE DELIVERY PLAN - THEORY

Department of Applied Mathematics	LP:MA18252 Rev. No: 00 Date: 08.04.2022
B.E : Marine Regulation: 2018 Sub. Code / Sub. Name :MA18252 / Mathematics for Marine Engineering - II Unit : V – Laplace Transform	

Unit Syllabus: Laplace transform – Conditions for existence – Transform of elementary functions – Basic properties– Transform of derivatives and integrals – Transform of unit step function and impulse functions – Transform of periodic functions. Definitions of Inverse Laplace transform as contour integral – Convolution theorem (excluding proof) – Initial and final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

Objective: To have a sound knowledge of Laplace transform and its properties.
To solve certain linear differential equations using the Laplace transform technique which have applications in other subjects of the current and higher semesters.

Session No *	Topics to be covered	Ref	Teaching Aids
25	Definition of Laplace transform and Sufficient conditions for existence	1-Ch 21, Pg 797-798	BB/PPT
26	Transform of elementary functions and basic properties	1-Ch 21, Pg 798-802	BB/PPT
27	Transform of derivatives and integrals	1-Ch 21, Pg 805-808	BB/PPT
28	Derivatives and integrals of transforms	1-Ch 21, Pg 808-811	BB/PPT
29	Tutorial Class	Worksheet	BB
30	Transform of unit step function and unit impulse function, Transform of periodic function	1-Ch 21, Pg 803-805	BB/PPT
31	Definition of Inverse Laplace transform as contour Integral	1-Ch 21, Pg 811-818	BB/PPT
32	Extra problems using properties of inverse Laplace transform	1-Ch 21, Pg 820-821	BB/PPT
33	Tutorial class	Worksheets	BB
34	Convolution theorem(excluding proof), Initial and Final value theorems	1-Ch 21, Pg 818-820	BB/PPT
35	Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques	1-Ch 21, Pg 821-824	BB/PPT
36	Tutorial class	Worksheets	BB
	CAT II		

Content beyond syllabus covered (if any): Applications of Laplace transforms in Physics to find out the harmonic vibration of a beam which is supported at its two ends.

*** Session duration: 50 mins**

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Department of Applied Mathematics	LP:MA18252 Rev. No: 00
B.E : Marine Regulation: 2018 Sub. Code / Sub. Name :MA18252 / Mathematics for Marine Engineering - II Unit : IV – Analytic functions	Date: 08.04.2022

Unit Syllabus : Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy – Riemann equation and Sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping : w= z+c, cz, 1/z, and bilinear transformation.

Objective: To understand analytic functions and their interesting properties.

To know conformal mappings with a few standard examples that have direct application.

Session No *	Topics to be covered	Ref	Teaching Aids
37	Introduction to functions of a complex variable, Definition – Analytic function, Derivatives of Analytic function.	2-Ch 19, Pg 1033-1034	BB/PPT
38	Necessary and Sufficient conditions for a function to be analytic, Problems using Cauchy Riemann Equations	2-Ch 19, Pg 1035-1037	BB/PPT
39	Tutorial class	Worksheet	BB
40	Properties of Analytic Function	1-Ch 20, Pg 740-744	BB/PPT
41	Harmonic Function and Harmonic conjugate	1-Ch 20, Pg 744-745	BB/PPT
42	Construction of Analytic Functions by using Milne's Thomson Method	1-Ch 20, Pg 746-748	BB/PPT
43	Tutorial class	Worksheet	BB
44	Conformal Mapping, Transformation: z + a, az ,1/z	2-Ch 19, Pg 1048-1053	BB/PPT
45	Transformations: z^2, e^z	1-Ch 20, Pg 756-760	BB/PPT
46	Bilinear transformation	2-Ch 19, Pg 1054-1055	BB/PPT
47	Extra problems in Conformal mapping	2-Ch 19, Pg 1055-1061	BB/PPT
48	Tutorial class	Worksheet	BB

Content beyond syllabus covered (if any):

*** Session duration: 50 mins**

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COURSE DELIVERY PLAN - THEORY

Department of Applied Mathematics	LP:MA18252 Rev. No: 00
B.E : Marine Regulation: 2018 Sub. Code / Sub. Name :MA18252 / Mathematics for Marine Engineering - II Unit : I – Ordinary differential equations – First order and applications.	Date: 08.04.2022

Unit Syllabus: Definition, order and degree, formation of differential equation. Solution of first order, first degree equations in variable separable form, homogeneous equations, other substitutions, Equations reducible to homogeneous and exact differential equations. Equations reducible to exact Integration Factor, Linear differential equation of first order first degree, reducible to linear, Applications to electrical circuits and orthogonal trajectories.

Objective: To solve differential equations of first order first degree, including systems of differential equations that they might encounter in the same or higher semesters.

Session No *	Topics to be covered	Ref	Teaching Aids
49	Definition of order and degree of a differential equation, Formation of differential equation	1-Ch 11, Pg 464-466	BB/PPT
50	Solution of first order, first degree equation in variable separable form	1-Ch 11, Pg 466-469	BB/PPT
51	Solution of Homogeneous equations	1-Ch 11, Pg 470-471	BB/PPT
52	Equations reducible to homogeneous form	1-Ch 11, Pg 471-473	BB/PPT
53	Tutorial class	Worksheet	BB
54	Equations reducible to exact differential equations	1-Ch 11, Pg 481-484	BB/PPT
55	Equations reducible to exact integration factor	1-Ch 11, Pg 478-481	BB/PPT
56	Linear differential equation of first order, first degree	1-Ch 13, Pg 473-476	BB/PPT
57	Tutorial class	Worksheet	BB
58	Applications to electrical circuits	1-Ch 11, Pg 504-506	BB/PPT
59	Applications to orthogonal trajectories	1-Ch 11, Pg 494-497	BB/PPT
60	Tutorial class	Worksheet	BB
	CAT III		

Content beyond syllabus covered (if any):

* Session duration: 50 mins

Sub Code / Sub Name: MA18252 / Mathematics for Marine Engineering – II

REFERENCES:

1. Bali N. P and Manish Goyal, "Text book of Engineering Mathematics", 3rd Edition, Laxmi Publications (p) Ltd., 2008.
2. Grewal. B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications, Delhi, 2007.
3. Ramana B.V, "Higher Engineering Mathematics",Tata McGraw Hill Publishing Company, New Delhi, 2007.
4. Glyn James, "Advanced Engineering Mathematics", 3rd Edition, Pearson Education, 2007.
5. Erwin Kreyszig, "Advanced Engineering Mathematics", 7th Edition, Wiley India, 2007.
6. Jain R.K and Iyengar S.R.K, "Advanced Engineering Mathematics", 3rd Edition, Narosa Publishing House Pvt. Ltd., 2007.

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Date	08.04.2022	08.04.2022
Remarks *:		
Remarks *:		

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD