SWARNANDHRA
COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

Accredited by National Board of Accreditation, AICTE, New Delhi, Accredited by NAAC with "A" Grade – 3.32 CGPA, Recognized under 2(f) & 12(B) of UGC Act 1956, Approved by AICTE, New Delhi, Permanent Affiliation to JNTUK, Kakinada Seetharampuram, W.G.DT., Narsapur-534280, (Andhra Pradesh)

DEPARTMENT OF S&H
TEACHING PLAN

Course Code	Course Title	Semester	Branches	Contact Periods/Weeks	Academic Year	Date of commencement of Semester
23BS2T04	Differential Equations and Vector Calculus	II	B.Tech / Common to All Branches	73/16	2024-25	20-01-2025

COURSE OUTCOMES
At the end of the course, the student will be able to

1	CO1: Solve the differential equations related to various engineering fields. (K3)
2	CO2: Identify solution methods for partial differential equations that model physical processes.(K2)
3	CO3: Interpret the physical meaning of different operators such as gradient, curl and divergence.(K2)
4	CO4: Estimate the work done against a field, circulation and flux using vector calculus.(K3)

UNIT	OutComes / Bloom'sLevel	Topics No.	Topics/Activity	Text Book/ Reference	Contact Hour	Delivery Method
			Differential Equations of first order and first degree			
		1.1	Introduction- Differential equations of first order and first degree	T1& R1	1	
		1.2	Separation of Variables	T1& R1	1	
		1.3	Solutions of Linear differential equations	T1& R1	1	
			Practice problems	T1& R1	1	
			Practice problems	T1& R1	1	
	CO1: The student will be able to solve the differential equations related to various engineering fields (K3)	1.4	Solutions of Bernoulli's equations	T1& R1	1	Chalk & Talk, Active Learning, PPT & Tutorial
			Practice problems	T1& R1	1	
			Practice problems	T1& R1	1	
I		1.5	Solutions of Exact equations	T1& R1	1	
			Practice problems	T1& R1	1	
		1.6	Solutions of equation s reducible to exact forms.	T1& R1	1	
			Practice problems	T1& R1	1	
			Practice problems	T1& R1	1	
			Practice problems	T1& R1	1	
		1.7	Newton's Law of cooling	T1& R1	1	
		1.8	Law of natural growth and decay	T1& R1	1	
		1.9	Electrical circuits	T1& R1	1	
					17	

			Linear differential equations of higher order (Constant Coefficients)			
II	CO1: The student will be able to solve the differential equations related to various engineering fields (K3)	2.1	Definitions and Solution of homogeneous and non-homogeneous equations of higher order with constant coefficients	T1& R1	1	Chalk & Talk, Active Learning, PPT & Tutorial
			Practice problems	T1& R1	1	
			Practice problems	T1& R1	1	
		2.2	P.I. of $f(D)y = e^{ax}$	T1& R1	1	
			Practice problems	T1& R1	1	
		2.3	P.I. of $f(D)y = \sin ax$ or $\cos ax$	T1& R1	1	
			Practice problems	T1& R1	1	
		2.4	P.I. of $f(D)y = $ polynomials in x^n	T1& R1	1	
			Practice problems	T1& R1	1	
		2.5	P.I. of $f(D)y = e^{ax}v(x)$ and $f(D)y = x^k v(x)$	T1& R1	1	
			Practice problems	T1& R1	1	
			Practice problems	T1& R1	1	
		2.6	Method of Variation of parameters.	T1& R1	1	
			Practice problems	T1& R1	1	
			Practice problems	T1& R1	1	
		2.7	Solutions of Simultaneous linear equations	T1& R1	1	
			Practice problems	T1& R1	1	
		2.8	L-C-R Circuit problems	T1& R1	1	
			Practice problems	T1& R1	1	
				Total	**19**	
			Partial Differential Equations			
III	CO2: The student will be able to identify solution methods for partial differential equations that model physical processes.	3.1	Formation of Partial Differential Equations by elimination of arbitrary constants	T1& R1	1	Chalk & Talk, Active Learning, PPT & Tutorial
			Practice problems	T1& R1	1	
		3.2	Formation of Partial Differential Equations by elimination of arbitrary functions	T1& R1	1	
			Practice problems	T1& R1	1	
		3.3	Solutions of first order linear equations using Lagrange's method by method of Grouping	T1& R1	1	
			Practice problems	T1& R1	1	
		3.4	Solutions of first order linear equations using Lagrange's	T1& R1	1	

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			method by method of multipliers			
			Practice problems	T1& R1	1	
		3.5	Solutions of Homogeneous Linear Partial differential equations with constant coefficients.	T1& R1	1	
			Practice problems	T1& R1	1	
			Practice problems	T1& R1	1	
		CBS	Non-linear Partial Differential Equations	T1& R1	1	
				T1& R1	1	
				Total	**13**	
			Vector Differentiation			
IV	CO3: The student will be able to interpret the physical meaning of different operators such as gradient, curl and divergence.	4.1	Scalar and Vector point functions and vector operator Del	T1& R1	1	Chalk & Talk, Active Learning, PPT & Tutorial
			Practice Problems	T1& R1	1	
		4.2	Del applies to scalar point functions- Gradient	T1& R1	1	
			Practice Problems	T1& R1	1	
		4.3	Directional derivative	T1& R1	1	
			Practice Problems	T1& R1	1	
		4.4	Del applied to vector point functions-Divergence-Solenoidal	T1& R1	1	
			practice problems	T1& R1	1	
		4.5	Del applied to vector point functions- Curl-Irrotational and Scalar Potential Function	T1& R1	1	
			practice problems	T1& R1	1	
		4.6	vector identities- Properties	T1& R1	1	
				T1& R1	1	
				Total	**12**	
			Vector Integration			
V	CO4: The student will be able to estimate the work done against a field, circulation and flux using vector calculus.	5.1	Line integral-circulation-work done, Surface integral	T1& R1	1	Chalk & Talk, Active Learning, PPT & Tutorial
			practice problems	T1& R1	1	
				T1& R1	1	
		5.2	Green's theorem in the plane (without proof)	T1& R1	1	
			practice problems	T1& R1	1	
				T1& R1	1	
		5.3	Stokes's theorem (without proof)	T1& R1	1	

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			practice problems	T1& R1	1	
				T1& R1	1	
		5.4	Divergence theore(without proof)	T1& R1	1	
			practice problems	T1& R1	1	
				T1& R1	1	
				Total		**12**
			CUMULATIVE PROPOSED PERIODS			**73**

Text Books:

S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1	T1: B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers, 2017

Reference Books:

S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1	R1: Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley &2018.

Web Details

1	https://youtu.be/6r5jfT8xrXM?si=YqGI4d-xFZnQvErW
2	https://theengineeringmaths.com/wp-content/uploads/2017/11/chapter11diff-eq.pdf
3	https://theengineeringmaths.com/wp-content/uploads/2016/02/Partial-differential-equations.pdf
4	https://youtu.be/FfJtVvQtqTM?si=i52YhHk0nlDfJsBi
5	https://youtu.be/v5J_3o5AFoY?si=SGRHuLoqHzbjoQof

S.No.		Name	Signature with Date
i.	Faculty I	P. V. NARAYANA	P.V.Narayen
ii.	Faculty II	V V S MADHAVACHARYULU	
iii.	Faculty III	P.VENKATA RAO	
iv.	Faculty IV	D. SAILAJA KUMARI	
v.	Faculty V	P.SIRISHA	
vi.	Faculty VI	P.ESTER RANI	
vii.	Faculty VII	G.MADHAVI	
viii.	Faculty VIII	P.JNANA PRASUNA	
ix.	Faculty IX		
x.	Course Coordinator	D. SAILAJA KUMARI	
xi.	Module Coordinator	P. V. NARAYANA	P.V.Naraya
xii.	HOD	Dr. SWAMINADHAM	V.Iwani

Principal