SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)

SREE SAINATH NAGAR, A. RANGAMPET – 517 102

LESSON PLAN

Name of the Subject : Multivariable Calculus and Differential Equations

Class & Semester : I B.Tech - I Semester

S. No.	Topic	No. of periods	Book(s) followed	Topics for self-study
UNIT – I:FIRST ORDER DIFFERENTIAL EQUATIONS				
1.	Linear and Bernoulli type equations	1	T1	1.Differential equations of type (a)variables separable (b) Homogeneous and non-homogeneous 2.Applicatins of DE (a) deflection of beams (b) spring mass systems (c) whirls and shafts
2.	Exact equations	1	T1	
3.	**Tutorial**	**1**		
4.	Equations reducible to exact.	2	T1	
5.	**Tutorial**	**1**		
6.	Orthogonal trajectories (Both Cartesian and polar forms).	1	T1	
7.	Newton's Law of cooling	1	T1	
Total periods required:		**8**		
UNIT – II: HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS				
8.	Differential operator *D*, Solution of second order , higher order homogeneous linear equations with constant coefficients	2	T1	(a)Euler-Cauchy type homogenous linear equations with variable coefficients (b) Legendre- type homogenous linear equations with variable coefficients (c) simple harmonic motions
9.	**Tutorial**	**1**		
10.	Operator methods for finding particular integrals Case .1 when RHS = e^{ax}	1	T1	
11.	Case .2 when RHS = sin ax (or) cos ax	1	T1	
12.	Case .3 when RHS = x^n	1	T1	
13.	Case .4 when RHS = $e^{ax}V(x)$	1	T1	
14.	Case .5 whenRHS = xV(x).	1	T1	
15.	**Tutorial**	**1**		
16.	Method of Variation of Parameters	1	T1	
17.	Applications to oscillatory electrical circuits.,	1	T1	
Total periods required:		**11**		
UNIT -III: FUNCTIONS OF SEVERAL VARIABLES				
18.	Limits and Continuity of Functions of two variables	2	T1	(a)Partial differentiation, chain rule, exact
19.	Jacobian, Functional dependence	2	T1	

S. No.	Topic	No. of periods	Book(s) followed	Topics for self-study
	Total derivatives			differential
20.	**Tutorial**	**1**		
21.	Taylor's Theorem	1	T1	(b) Chain rule
22.	maxima and minima of functions of two variables without constraints	1	T1	
23.	**Tutorial**	**1**		
24.	maxima and minima of functions of two variables with constraints	1	T1	
25.	Lagrange's method of undetermined multipliers	1	T1	
Total periods required:		**10**		
UNIT – IV: APPLICATIONS OF INTEGRATION AND MULTIPLE INTEGRALS				
26.	Applications of integration to lengths of curves	2	T1	(a)curvature, radius, centre and circle of curvature (b) properties of curve tracing and related problems (c) volumes of solids of revolutions
27.	Areas of surfaces of revolution	1	T1	
28.	**Tutorial**	**1**		
29.	Double integrals	1	T1	
30.	Area enclosed by plane curves	1	T1	
31.	change of order of integration	1	T1	
32.	**Tutorial**	**1**		
33.	change of variables in integrals	2	T1	
34.	Triple integrals	1	T1	
35.	volumes of solids	1	T1	
Total periods required:		**12**		
UNIT – V: VECTOR CALCULUS				
36.	Gradient of a scalar field and Directional Derivative	2	T1	(a)Vector differentiation (b)Tangents, normal (c) vector identities (d)Laplace operators and related identities
37.	Divergence and Curl of a Vector field	2	T1	
38.	Line integrals independent of path – work done	1	T1	
39.	**Tutorial**	**1**		
40.	Surface Area, Surface Integrals, Flux across a surface	1	T1	
41.	Greens Theorem (without proof)- verification - applications	2	T1	
42.	**Tutorial**	**1**		
43.	Divergence theorem of Gauss (without proof)- verifications and applications.	2	T1	
44.	Stokes's Theorem (without proof) – verifications and applications.	2	T1	
Total periods required:		**14**		
Grand total periods required:		**55**		

TEXT BOOK:

T1. T.K.V. Iyengar, B. Krishna Gandhi,S.Ranganatham and M.V.S.S.N. Prasad, ***Engineering Mathematics, vol-1***, S. Chand & Company13/e, 2014

REFERENCE BOOKS:

R1. Grewal, B.S., ***Higher engineering mathematics*** Khanna publishers, Delhi, 42/e,2012

R2. Kreyszig, E., ***Advanced Engineering Mathematics*** John Wiley and Sons, Inc.,9/e, 2012.