FR. Conceicao Rodrigues College Of Engineering

Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50

Department of Humanities and Science

B.E. (Information Technology) (semester II) (2018-2019)

Lecture Plan:

Subject: Applied Mathematics 2 (FEC201) **Credits-5**

Syllabus:

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
FEC201	Applied Mathematics-II	04	--	01	04	--	01	05

Course Code	Course Name	Examination Scheme							
		Theory				Term Work	Pract	Oral	Total
		Internal Assessment			End Sem Exam				
		Test1	Test2	Av of Test 1 & 2					
FEC201	Applied Mathematics-II	20	20	20	80	25	--	--	125

Objectives

1. To provide students with sound foundation in applied mathematics to solve real life problems in industry.
2. To provide hands on experience in using Scilab software to handle real life problems.

Outcomes: Learner will be able to…

1. Apply the concepts of First Order and first degree Differential equation to the engineering problems.
2. Apply the concepts of Higher Order Linear Differential equation to the engineering problems.
3. Apply concepts of Beta and Gamma function to the engineering Problems.
4. Apply SCILAB programming techniques to solve differential equation to model complex engineering activities.
5. Apply concepts of Double integral of different coordinate systems to the engineering problems.
6. Apply concepts of triple integral of different coordinate systems to the engineering problems.

Module	Detailed Contents	Hrs.
01	**Differential Equations of First Order and First Degree** 1.1 Exact differential Equations, Equations reducible to exact form by using integrating factors. 1.2 Linear differential equations (Review), equation reducible to linear form, Bernoulli's equation. 1.3: Simple application of differential equation of first order and first degree to electrical and Mechanical Engineering problem (no formulation of differential equation)	4 3 2
02	**Linear Differential Equations With Constant Coefficients and Variable Coefficients Of Higher Order** 2.1. Linear Differential Equation with constant coefficient- complementary function, particular integrals of differential equation of the type f(D)y = X where X is e^{ax}, sin(ax+b), cos (ax+b), x^n, e^{ax}V, xV. 2.2. Cauchy's homogeneous linear differential equation and Legendre's differential equation, Method of variation of parameters.	6 3
03	**Numerical solution of ordinary differential equations of first order and first degree, Beta and Gamma Function** 3.1. (a)Taylor's series method (b)Euler's method (c) Modified Euler method (d) Runga-Kutta fourth order formula (SciLab programming is to be taught during lecture hours) 3.2 .Beta and Gamma functions and its properties.	4 4
04	**Differentiation under Integral sign, Numerical Integration and Rectification** 4.1. Differentiation under integral sign with constant limits of integration. 4.2. Numerical integration- by (a) Trapezoidal (b) Simpson's 1/3rd (c) Simpson's 3/8th rule (all with proof). (Scilab programming on (a) (b) (c) (d) is to be taught during lecture hours) 4.3. Rectification of plane curves.	2 3 3

05	**Double Integration** 5.1. Double integration-definition, Evaluation of Double Integrals. 5.2. Change the order of integration, Evaluation of double integrals by changing the order of integration and changing to polar form.	2 7
06	**Triple Integration and Applications of Multiple Integrals.** 6.1. Triple integration definition and evaluation (Cartesian, cylindrical and spherical polar coordinates). 6.2. Application of double integrals to compute Area, Mass, Volume. Application of triple integral to compute volume.	3 6

Term Work:

General Instructions:

1. Batch wise tutorials are to be conducted. The number of students per batch should be as per University pattern for practical.
2. Students must be encouraged to write Scilab Programs in tutorial class only. Each Student to write atleast 4 Scilab tutorials (including print out) and at least 6 class tutorials on entire syllabus.
3. SciLab Tutorials will be based on (i)Curve Tracing (ii) Taylor's series method, Euler's method Modified Euler method, RungaKutta fourth order formula (iii) Ordinary Differential Equation and (iv) Trapezoidal Simpson's 1/3rd and Simpson's 3/8th rule.

The distribution of Term Work marks will be as follows -

Attendance (Theory and Tutorial): 05 marks
Class Tutorials on entire Syllabus: 10 marks
SciLab Tutorials : 10 marks

Assessment:

Internal Assessment Test:

Assessment consists of two class tests of 20 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

End Semester Theory Examination:

1. Question paper will comprise of total 06 questions, each carrying 20 marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 3 to 4 marks will be asked.
4. Remaining questions will be mixed in nature.(e.g. Suppose Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
5. In question paper weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.

References:

1. A text book of Applied Mathematics, P.N.Wartikar and J.N.Wartikar, Vol – I and –II by Pune VidyarthiGraha.
2. Higher Engineering Mathematics, Dr.B.S.Grewal, Khanna Publication
3. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley EasternLimited, 9thEd.
4. Numerical methods by Dr. P. Kandasamy ,S.Chand Publications

Course Outcomes:

Upon completion of this course students will be able to:

FEC201.1 Solve first order and higher order differential equations.

FEC201.2 Apply numerical methods to solve Differential Equations

FEC201.3 Apply Beta-Gamma functions to solve integration problems.

FEC201.4 Rectify the given curve (using Cartesian, polar and parametric form)

FEC201.5 Apply the concept of multiple integrals to find area of the given region and mass of given lamina.

CO-PO Mapping

	PO1	
FEC201.1	3	**PO1:** Engineering graduates will be able to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
FEC201.2	3	
FEC201.3	3	
FEC201.4	3	
FEC201.5	3	

CO Assessment Tools:

FEC201.**1:** **Direct Methods(80%):** Test1+Tutorial 1+Tutorial 2+End Exam

CO1 dm = 0.3*Test1+0.2*Tutorial 1+0.2* Tutorial 2+0.3*End Exam

Indirect Methods(20%): Course Exit Survey(CES)

CO1 idm =1xCES

MEC401.1 = (0.8 x CO1 dm) + (0.2 x CO1 idm)

FEC201.**2:** **Direct Methods(80%):** Tutorial 3++Test 2+End Exam

CO2dm = 0.3*Tutorial 3+0.4*Test 2+0.3* End Exam

Indirect Methods(20%): Course Exit Survey(CES)

CO2 idm=1xCES

ITC401.2 = (0.8 x CO2 dm) + (0.2x CO2 idm)

FEC201.**3:** **Direct Methods(80%):** Tutorial 4+Test 2+ End Exam

CO3 dm=0.3*Tutorial 3+0.3*Test 2+0.4* End Exam

Indirect Methods(20%): Course exit survey(CES)

CO3 idm=1xCES

ITC401.3 = (0.8 x CO3 dm) + (0.2 x CO3 idm)

FEC201.**4:** **Direct Methods(80%):** Tutorial 6**+**Test 2**+** End Exam

CO4 dm = 0.3*Tutorial 3+0.3*Test 2+0.4* End Exam

Indirect Methods(20%): Course Exit Survey(CES)

CO4 idm =1xCES

ITC401.4 = 0.8xCO4dm + 0.2* CO4idm

FEC201.**5:** **Direct Methods(80%):** Tutorial 5**+**Test 2**+** End Exam

CO5dm = 0.3*Tutorial 3+0.3*Test 2+0.4* End Exam

Indirect Methods(20%): Course Exit Survey(CES)

CO5 idm =1xCES

ITC401.5 = (0.8 XCO5 dm) + (0.2*x CO5 idm)

Curriculum Gap/Content beyond syllabus (if any): Nil

Lecture Plan:

Sr. No.	*Name of the Topic*	*Planned Date*	*Executed Date*	*Remark*
1	Introduction to AM 2	01/01/2019	02/01/2019	
2	Exact Differential Equations	02/01/2019	04/01/2019	
3	Integration Factor (IF) – product variable	03/01/2019	05/01/2019	
4	IF, DE reducible to exact	04/01/2019	09/01/2019	
5	Liner Differential Equations, Derivative form	07/01/2019	10/01/2019	
6	Bernoulli's Differential Equations	08/01/2019	11/01/2019	
7	Higher order Differential Equations	09/01/2019	14/01/2019	
8	Operations on operators	10/01/2019	15/01/2019	
9	Non-homogeneous case ($X = e^{ax}$)	11/01/2019	16/01/2019	
10	Non-homogeneous case ($X = \sin ax, \cos ax$)	14/01/2019	17/01/2019	
11	Non-homogeneous polynomial case	15/01/2019	18/01/2019	
12	Combinations of the above functions	17/01/2019	21/01/2019	

13	Non-homogeneous case ($X = e^{ax}\sin ax$))	21/01/2019	22/01/2019	
14	Non-homogeneous case ($X = e^{ax}V(x)$)	22/01/2019	24/01/2019	
15	Partial fraction on operators	24/01/2019	28/01/2019	
16	Non-homogeneous case ($X = xV(x), x^2V(x)$)	28/01/2019	29/01/2019	
17	Variation of parameters	29/02/2019	30/01/2019	
18	Revision for UT 1	---	01/02/2019	
19	Revision for UT 1	---	07/02/2019	31/1 Sports day 4/2 to 6/2 UT 1
20	Cauchy's differential Equation	01/02/2019	11/02/2019	
21	Legendry's differential Equation	07/02/2019	18/02/2019	
23	Euler's method, Euler's modified method	08/02/2019	21/02/2019	
24	Taylor series method, R-K method of order 4	11/02/2019	22/02/2019	
25	Examples on numerical DE	12/02/2019	25/02/2019	13/2 to 15/2 Euphoria
26	Gamma function	21/02/2019	26/02/2019	
27	Beta function	22/02/2019	28/02/2019	19/2 Shivjayanti
28	Beta function	25/02/2019	05/03/2019	
29	Duplication formula	26/02/2019	07/03/2019	
30	DUIS	28/02/2019	08/03/2019	
31	Change of order	01/03/2019	12/03/2019	4/3 Mahashivratri
32	Partition of region	05/03/2019	13/03/2019	
33	Change of order and evaluation	07/03/2019	13/03/2019	
34	Change to polar	08/03/2019	14/03/2019	
35	Area	11/03/2019	19/03/2019	
36	Mass of a plain lamina	12/03/2019	20/03/2019	15/2 Crescendo 21/3 Holi
37	Area and Mass examples	18/03/2019	25/03/2019	
38	Rectification of curves (Hypocycloid, parabola)	19/03/2019	26/03/2019	
39	Rectification of curves (Cycloid, Cardioide)	22/03/2019	26/03/2019	
40	Rectification (Loop, non-standard curves)	25/03/2019	27/03/2019	
41	Rectification (Intersection of curves)	26/03/2019	28/03/2019	
42	Numerical integration	28/03/2019	29/03/2019	
43	Triple integration – Cylindrical polar system	29/03/2019	01/04/2019	
44	Triple integration – Spherical polar system	01/04/2019	ND	
45	Volume	02/04/2019	ND	

ND: Not decided