FR. Conceicao Rodrigues College Of Engineering

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

Department of Humanities & Sciences

F.E. (E) (semester II) (2019-2020)

Lesson Plan

Subject: Applied Mathematics II (FEC201) **Credits-4**

Syllabus:

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	Total
FEC201	Engineering Mathematics-II	3	--	1*	3	1	--	4

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract. /oral	Total
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)			
		Test1	Test 2	Avg.					
FEC201	Engineering Mathematics-II	20	20	20	80	3	25	--	125

Objectives

1. The course is aimed to develop the basic Mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve as basic tools for specialized studies in many fields of engineering and technology.
2. To provide hands on experience in using SCILAB software to handle real lifeproblems

Outcomes:

Learners will be able to…

1. Solve various types of First Order differential equation.
2. Solve various types of Higher Order Differentialequation.
3. Illustrate the concepts of Beta and Gamma function,DUIS andrectification.
4. Apply the concepts of Doubleintegral
5. Apply the concept of Tripleintegral.
6. Apply the principles of Numerical Method for solving differential equation and numerical integration analytically and using Scilabalso.

Module	Detailed Contents	Hrs.
01	**Differential Equations of First Order and First Degree** Exact differential Equations, Equations reducible to exact form by using integratingfactors. Linear differential equations (Review), equation reducible to linear form, Bernoulli'sequation. **# Self learning topics:**Simple application of differential equation of first order and first degree to electrical and Mechanical Engineering problem	4 2
02	**Linear Differential Equations With Constant Coefficients and Variable CoefficientsOf Higher Order** Linear Differential Equation with constant coefficient- complementary function,particular integrals of differential equation of the type f(D)y = X where X is ()(). Method of variation ofparameters. **# Self learning topics:** Cauchy's homogeneous linear differential equation and Legendre's differential equation, Applications of Higher order differential equation.	4 2
03	**Beta and Gamma Function, Differentiation under Integral sign and Rectification** Pre-requisite: Tracing of curves Beta and Gamma functions and itsproperties. Differentiation under integral sign with constant limits ofintegration.	2
	1.3 Rectification of plane curves.(Cartesian and polar) **# Self learning topics:** Rectification of curve in parametric co-ordinates.	2 2
04	**Multiple Integration-1** Double integration- definition, Evaluation of Double Integrals.(Cartesian &Polar) Evaluation of double integrals by changing the order ofintegration. Evaluation of integrals over the given region. (Cartesian &Polar) **# Self learning topics:** Application of double integrals to compute Area, Mass.	2 2 2
05	**Multiple Integration-2** Evaluation of double integrals by changing to polarcoordinates. Application of double integrals to computeArea Triple integration definition and evaluation (Cartesian, cylindrical and spherical polarcoordinates). **# Self learning topics:**Application of triple integral to compute volume.	2 2 2
06	**Numerical solution of ordinary differential equations of first order and first degree, and , Numerical Integration** Numerical solution of ordinary differential equation using (a) Euler'smethod (b)Modified Euler method, (c) Runge Kuttafourth order method Numerical integration- by (a) Trapezoidal (b) Simpson's 1/3rd (c) Simpson's 3/8th rule(all withproof). **# Selflearningtopics:** Numerical solution of ordinary differential equation using Taylorseriesmethod.	3 3

Term Work

General Instructions:

1. Batch wise tutorials are to be conducted. The number of students per batch should be as per University pattern forpracticals.
2. Students must be encouraged to write SCILAB Programs in tutorial class only. Each Student has to write at least 4 SCILAB tutorials (including print out) and at least 6 class tutorials on entiresyllabus.
3. SCILAB Tutorials will be based on (i) Euler Method, (ii) Modified Euler Method, (iii) Runge-KuttaMethodoffourthorder,(iv)TrapezoidalRule,(v)Simpson's1/3rdRule

   (vi) Simpson's 3/8thrule

The distribution of marks for term work shall be as follows:

- Class Tutorials on entire syllabus **: 10marks**
- SCILABTutorials **: 10marks**
- Attendance (Theory and Tutorial) **: 05marks**

The final certification and acceptance of TW ensures the satisfactory performance of laboratory work and minimum passing in the TW.

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 Examination

In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.

1. Question paper will comprise of 6 questions, each carrying 20marks.
2. Question number 1 will be compulsory and based on maximum contents of thesyllabus
3. Remaining questions will be mixed in nature (for example, if Q.2 has part (a) from module 3 then part (b) will be from other than module3)
4. Total four questions need to be solved.

References

1. Higher Engineering Mathematics, Dr. B. S. Grewal, KhannaPublication
2. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern Limited, 9thEd.
3. Engineering Mathematics by Srimanta Pal and Subodh,C. Bhunia, Oxford University Press
4. Applied Numerical Methods with MATLAB for Engineers and Scientists by Steven Chapra, McGrawHill

Elementary Linear Algebra with Application by Howard Anton and Christ Rorres.6th edition. John Wiley & Sons,INC.

Course Outcomes:

Upon completion of this course students will be able to:

1. Solve first order and higher order differential equations.
2. Apply numerical methods to solve Differential Equations
3. Apply Beta-Gamma functions to solve integration problems.
4. Rectify the given curve(using Cartesian, polar and parametric form)
5. Apply the concept of multiple integrals to find area of the given region and mass of given lamina.

Mapping of CO and PO/PSO

Relationship of course outcomes with program outcomes: Indicate 1 (low importance), 2 (Moderate Importance) or 3 (High Importance) in respective mapping cell.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
FEC201.1	**3**											
FEC201.2	**3**											
FEC201.3	**2**											
FEC201.4	**2**											
FEC201.5	**3**											
TOTAL												
CO-PO MATRIX												

Justification

PO1: COs are mapped to this PO1 because the students gain basic knowledge on mathematical concepts required for higher semesters (mathematics and technical application)

CO Assessment Tools:

	Direct Methods										Indirect Methods
	T-1	**T-2**	**T-3**	**T-4**	**T-5**	**T-6**	**SCILAB**	**TEST 1**	**TEST 2**	**Uni. Exam**	**Course Exit Survey**
CO1	20%	20%						30%		30%	100%
CO2			20%				30%		20%	30%	100%
CO3				40%				30%		30%	100%
CO4					40%				30%	30%	100%
CO5						40%			30%	30%	100%

Applied Mathematics 2			**Academic Year: 2019-20**	
FE-E			**Semester: II**	
Sr. No.	***Name of the Topic***	***Planned Date***	***Executed Date***	***Remark***
	CO1:1. Solve first order and higher order differential equations.			
1	Introuduction to Differential Equation	6/1/2020	6/1/2020	
2	Exact differential equation,Integrating factor	7/1/2020	7/1/2020	
3	Integrating factor and problems on that	8/1/2020	8/1/2020	
4	Linear Differential Equation	9/1/2020	9/1/2020	
5	Bernoulli's Differential Equation	10/1/2020	10/1/2020	
6	Reducible to Linear Differential Equation	13/1/2020	13/1/2020	C01 : 16 Lect
7	Extra problems on first order	14/1/2020	14/1/2020	
8	Higher order Differential Equation	15/1/2020	15/1/2020	
9	Homogeneous ,Non Homog Differential Equation	16/1/2020	16/1/2020	
10	Particular Integral	17/1/2020	17/1/2020	
11	Particular Integral	21/1/2020	20/1/2020	
12	Problems on Particular Integral	22/1/2020	22/1/2020	
13	Variation of Parameters	23/1/2020	23/1/2020	
14	Practice Problems on above	24/1/2020	24/1/2020	
	CO2: 2. Apply numerical methods to solve Differential Equationsand integration			
15	Numerical Method (Euler's Method)	28/1/2020	28/1/2020	
16	R-K Method of order 2 and 4	29/1/2020	29/1/2020	CO2: 3
17	Taylor's series method	30/1/2020	30/1/2020	
18	Numerical integration	31/1/2020	31/1/2020	
	CO3: 3. Apply Beta-Gamma functions to solve integration problems.			
19	Introuduction to Gamma Function	4/2/2020	3/2/2020(extra lecture)	
20	Examples on Gamma Function	5/2/2020	4/2/2020	CO3: 6
21	Introuduction to Beta Function	6/2/2020	4/2/2020(extra lecture)	
22	Problems on Beta Function	7/2/2020	5/2/2020	
23	DUIS(with one parameter)	11/2/2020	6/2/2020	
	DUIS(with one parameter)	12/2/2020	7/2/2020	
	CO4: 4. Rectify the given curve(using Cartesian, polar and parametric form)			
24	Rectification (cartesian form)	13/2/2020		
25	Polar form	14/2/2020		CO4: 4
	Rectification (parametric form)	3/3/2020		
26	Rectification (cartesian form)	4/3/2020		

	CO5: 5. Apply the concept of multiple integrals to find area of the given region and mass of given lamina.				
27	Introuduction to Double Integration	5/3/2020			
28	Evaluation of Double Integration	6/3/2020		CO5: 12	
29	Find the limits of the region of integration	11/3/2020			
	Change the order of integration	12/3/2020			
30	Change the order of integration and evauation	13/3/2020			
31	Change to polar	17/3/2020			
32	Change to polar and evaluation	18/3/2020			
33	Area of the region	19/3/2020			
34	Mass of the Lamina	20/3/2020			
35	Introuduction to Triple Integration	24/3/2020			
36	Evaluation of Triple Integration	26/3/2020			
37	Find limits (Triple Integration)	27/3/2020			
38	Spherical coordinates	31/3/2020			
40	Cylindrical coordinates	1/4/2020			

4.3 Tutorial Plan

	DIVISION -E			
	SEMESTER- I			
Tut. No	**Topic Planned**	**Planned Date**	**Actual Date**	**Mapped with CO**
	BATCH-A			
1	Differential equation of First order	21/1/2020	21/1/2020	CO1
2	Differential equation of higher order	28/1/2020	28/1/2020	CO1
3	Numerical Method	4/2/2020	4/2/2020	CO2
4	Beta and Gamma funtion	11/2/2020	11/2/2020	CO3
5	DUIS and Rectification	3/3/2020	/3/2020	CO4
6	Double Integration and Triple integration	17/3/2020	/3/2020	CO5
7	Scilab-I	24/3/2020	/3/2020	
8	Scilab-II	31/3/2020	/3/2020	
	BATCH-B			
1	Differential equation of First order	23/1/2020	23/1/2020	CO1
2	Differential equation of higher order	30/1/2020	30/1/2020	CO1

3	Numerical Method	6/2/2020	6/2/2020	CO2
4	Beta and Gamma funtion	13/2/2020	13/2/2020	CO3
5	DUIS and Rectification	5/3/2020	/3/2020	CO4
6	Double Integration and Triple integration	12/3/2020	/3/2020	CO5
7	Scilab-I	19/3/2020	/3/2020	
8	Scilab-II	26/3/2020	/3/2020	
	BATCH-C			
1	Differential equation of First order	20/1/2020	20/1/2020	CO1
2	Differential equation of higher order	27/1/2020	27/1/2020	CO1
3	Numerical Method	3/2/2020	3/2/2020	CO2
4	Beta and Gamma funtion	10/2/2020	10/2/2020	CO3
5	DUIS and Rectification	2/3/2020	/3/2020	CO4
6	Double Integration and Triple integration	9/3/2020	/3/2020	CO5
7	Scilab-I	16/3/2020	/3/2020	
8	Scilab-II	23/3/2020	/3/2020	