FR. Conceicao Rodrigues College Of Engineering
Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50
Department of Humanities & Sciences

F.E. (A) (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

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%

LECTURE PLAN OF DIV A				
SR NO	TOPIC	PLAN DATE	ACTUAL DATE	CO
1	Introduction 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	9/1/2020	
6	Reducible to Linear Differential Equation	13/1/2020	10/1/2020	
7	Extra problems on first order	14/1/2020	13/1/2020	
8	Higher order Differential Equation with constant coeff.	15/1/2020	14/1/2020	
9	Homogeneous ,Non Homog Differential Equation	16/1/2020	15/1/2020	
10	Particular Integral	17/1/2020	16/1/2020	
11	Particular Integral	20/1/2020	17/1/2020	
12	Problems on Particular Integral	21/1/2020	20/1/2020	
13	Variation of Parameters	23/1/2020	21/1/2020	
14	Practice Problems on above	24/1/2020	23/1/2020	
15	Introduction to Gamma Function	27/1/2020	24/1/2020	
16	Examples on Gamma Function	28/1/2020	27/1/2020	
17	Introduction to Beta Function	30/1/2020	28/1/2020	
18	Problems on Beta Function	31/1/2020	29/1/2020	
19	Problems on Beta Function	3/2/2020	30/1/2020	
20	Numerical Method (Euler's Method)	4/2/2020		
21	R-K Method of order 2 and 4	6/2/2020		
22	Numerical Integration	7/2/2020	24/2/2020	
23	Numerical Integration	10/2/2020	24/2/2020	
24	Tracing of Curves	11/2/2020	4/2/2020	
25	Tracing of Curves	13/2/2020		
26	Rectification (cartesian form)	14/2/2020	6/2/2020	
27	Rectification (cartesian form)	24/2/2020	7/2/2020	
28	Polar form	25/2/2020	10/2/2020	
29	Polar form	2/3/2020	11/2/2020,13/2/2020	
30	Introduction to Double Integration	4/3/2020		
31	Evaluation of Double Integration	5/3/2020		
32	Find the limits of the region of integration	9/3/2020		
33	Change the order of integration	12/3/2020		

34	Change the order of integration	13/3/2020		
35	Change to polar	24/3/2020		
36	Change to polar	26/3/2020		
37	Area of the region	27/3/2020		
38	Area of the region	30/3/2020		
39	Triple Integration(evaluation)	31/3/2020		
40	Spherical coordinates	1/4/2020		

4.3 Tutorial Plan

	DIVISION -A			
	SEMESTER- I			
Tut.No	**Topic Planned**	**Planned Date**	**Actual Date**	**Mapped with CO**
	BATCH-A			
1	Differential Equation of order 1	30/1/2020	30/1/2020	CO1
2	Differential Equation of higher order with constant coefficient	6/2/2020	6/2/2020	CO1
3	Beta Gamma Functions	13/2/2020	13/2/2020	CO3
4	Numerical methods to solve differential equations	5/3/2020		CO2
5	Rectification	12/3/2020		CO4
6	Evaluate double Integration	26/3/2020		CO5
7	Scilab	19/3/2020		
	BATCH-B			
1	Differential Equation of order 1	31/1/2020	31/1/2020	CO1
2	Differential Equation of higher order with constant coefficient	7/2/2020	7/2/2020	CO1
3	Beta Gamma Functions	14/2/2020	14/2/2020	CO3
4	Numerical methods to solve differential equations	6/3/2020		CO2
5	Rectification	20/3/2020		CO4
6	Evaluate double Integration	27/3/2020		CO5
7		13/3/2020		

	Scilab			
	BATCH-C			
1	Differential Equation of order 1	29/1/2020	29/1/2020	CO1
2	Differential Equation of higher order with constant coefficient	5/2/2020	5/2/2020	CO1
3	Beta Gamma Functions	12/2/2020	12/2/2020	CO3
4	Numerical methods to solve differential equations	26/2/2020		CO2
5	Rectification	4/3/2020		CO4
6	Evaluate double Integration	1/4/2020		CO5
7	Scilab	11/3/2020 18/3/2020		