ode	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut	Total
FEC201	**Applied Mathematics-II**	04	-	01	04	-	01	05

Sub Code	Subject Name	Examination Scheme							
		Theory				Term Work	Practical exam	Oral exam	Total
		Internal Assessment			End sem. exam				
		Test 1	Test 2	Av. of Test 1 & 2					
FEC201	**Applied Mathematics-II**	20	20	20	80	25	--	--	125

Course Objectives: 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.

Learning objectives:

1) To use Gamma function to solve different type of Integrals and to understand Gamma function as generalize factorial function.
2) To understand the Beta function and its application
3) To understand First order first degree Differential equations and its applications in in basic electrical circuits and motion of a particle.
4) To find the Area of a Bounded Region and calculating mass of lamina using double integral.
5) To solve triple integral and understand their applications in physics like to compute total volume of a solid.
6) To build ability to solve differential equations numerically. To provide an overview of the experimental aspect of applied mathematics.

Course outcomes:

At the end of this course, students will be able to

1. Apply this knowledge to solve the problems.
2. Apply and analyse various types of numerical methods for solving differential equations.
3. Solve and analyse the Differential equations and its application in related field of engineering.
4. Solve the model by selecting and applying a suitable mathematical method like Trapezoidal rule, Simpson's $(1/3)^{rd}$ rule etc.
5. Interpreting the mathematical results practically.
6. Find and analyse area, mass of lamina and volume of solid by using double and triple integration,
7. Find length of arc of a given curve.
8. Inculcate the habit of Mathematical Thinking.

Detailed Syllabus

Sr. No.	Topics	Hours
	Prerequisite: Idea of Curve tracing in cartesian, parametric and polar forms. Straight lines, Circles, Parabolas, Hyperbola, Astroid, Cycloid, Lemniscate of Bernoulli, Cardiode. Concept of Solid Geometry -Planes, Spheres, Cones, Cylinders, Paraboloids (Tracing of curves by using SciLab).	
1	**Module-1**: **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 hrs 3 hrs 2 hrs
2	**Module-2**: **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 hrs. 3 hrs
3	**Module-3: 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 hrs 4 hrs
4	**Module -4: 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 hrs 3 hrs 3 hrs

5.	**Module-5: 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 hrs 7 hrs
6.	**Module-5: 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 hrs 6 hrs

Recommended Books:

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

Theory Examination:

1. Question paper will comprise of 6 questions, each carrying 20 marks.
2. Total 4 questions need to be solved.

3. Question No.1 will be compulsory and based on entire syllabus wherein sub questions of 3 to 4 marks will be asked.

4: Remaining questions will be randomly selected from all the modules.

5: Weightage of marks should be proportional to number of hours assigned to each Module.

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 has to write at least 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, Runga- Kutta 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

The final certification and acceptance of Term- Work ensures the satisfactory Performance of laboratory work and minimum passing in the Term Work.