

M.E Semester: 3 Mechanical Engineering (Thermal Engineering)
Subject Name: MODELING, SIMULATION & COMPUTER APPLICATION

A. Course Objective

- To present a problem oriented in depth knowledge of Modeling, Simulation & Computer Application
- To address the underlying concepts and methods behind Modeling, Simulation & Computer Application

B. Teaching / Examination Scheme

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
		L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
CODE	NAME	Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
METH301	Modeling Simulation & Computer Application	4	2	0	6	5	3	70	30	20	30	150

C. Detailed Syllabus

1. Concept of system and environment; Continuous and discrete system; linear and nonlinear systems; stochastic activities; static and dynamic models; principles used in modeling; Models classifications, Mathematical models, Physical models, analog models and others, Estimation of model parameters;
2. Technique of simulation; experimental nature of simulation; numerical computation techniques; continuous system models; analog and hybrid simulation; feedback systems; Stochastic variables; discrete and continuous probability functions; random numbers; rejection method.
3. Computer technique for simulation; computer generation of Pseudo random; Application, Modeling of Civil, Electrical and Mechanical components of small hydro and Renewable Energy Projects.
4. Introduction to SCILAB/MAT lab Environment, Defining Matrices, Matrix Manipulation Data Structures, 2D Graphics, 3D Graphics, Flow Control, Editor/Debugger window
5. Creating Matlab functions, Improving code performance, Error Correcting, Various Simulation tools.

D. Lesson Planning

Sr.No.	Date/Week	Unit No.	% Weightage	Topic No:
1	1 st , 2 ^{ed} , 3 ^{ed}	Unit 1	20 %	1
2	4 th , 5 th , 6 th	Unit 2	20 %	2
3	7 th , 8 th , 9 th	Unit 3	20 %	3
4	10 th , 11 th , 12 th	Unit 4	20 %	4
5	13 th , 14 th , 15 th	Unit 5	20 %	5

E. Instructional Method & Pedagogy

1. At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
2. Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
3. Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
4. One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
5. Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6. Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.
7. The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
8. Experiments shall be performed in the laboratory related to course contents.

F. **Students Learning Outcomes**

- The student can identify different areas of Modeling, Simulation & Computer Application
- Can find the applications of all the areas in day to day life.

G. **Recommended Study Materials**

• **Text & Reference Books:**

1. System Simulation, Geoffrey Gordon Prentice-Hall
2. System Simulation, The Art and Science, Robert E. Shannon Prentice – Hall
3. System Modeling and Control, J. Schwarzenbach and K. F. Gill, Edward Arnold
4. Modeling and Analysis Of Dynamic Systems, Charles M. Close & Dean K. Frederick Houghton Mifflin
5. Simulation of Manufacturing, Allan Carrie John, Wiley & Sons
6. Computational Heat Transfer, Y. Jaluria and K. E. Torrance Hemisphere Publishing
7. System Simulation Dr. D. S. Hira

