Course code	Course Name	L-T-P-Credits	Year of Introduction
ME305	**COMPUTER PROGRAMMING & NUMERICAL METHODS**	**2-0-1-3**	**2016**

Prerequisite: Nil

Course Objectives:
- To equip students with fundamentals of computer programming
- To provide fundamental idea about the use of computer programming and numerical methods for analyzing the basic engineering problems.

Syllabus

Introduction to computer programming concept, control statements, basics pointers, Introduction to Class and Object, Errors and approximations, curve fitting, Solution of Partial differential equations, Numerical problems and preparation of computer programs.

Expected outcomes:
- The students will be able to write computer programs for numerical solutions for engineering problems like system of equations and heat equations..

Text Books
1. Balagurusamy, Computer Programming 1e McGraw Hill Education , 2013
2. Balagurusamy, Numerical Methods 1e McGraw Hill Education, 1999
3. Jose S., Computer Programming and Numerical Methods, Pentagon, 2015.
4. Ravichandran D., Programming with C++, Tata McGraw Hill, 2007.

Reference Books
1. Balaguruswamy E., Object Oriented Programming with C++, Tata McGraw Hill, 1992.
2. Barkakati N., Object Oriented Programming in C++, SAMS, 1991.
3. Gerald C. F. and P. O. Wheatley, Applied Numerical Analysis, Pearson,2004.
4. Kamthane A. M., Object Oriented Programming with ANSI & Turbo C++,
5. Lippman S. B. and J. Lajoie, C++ Primer, Pearson Education, 2005.
   Pearson Education, 2009.

Course Plan			
Module	**Contents**	**Hours**	**Sem. Exam Marks**
I	Introduction to Computer programming concept –internal representation of data - Algorithm and flow chart, Basics of procedure oriented and object oriented programming. Introduction to C++: Structure of C++ program; Keywords; Identifiers; Data types – integer, real, character, string, boolean, enumeration, Constant and Variables; Operators – assignment, arithmetic, relational, logical, increment, decrement and conditional operators; Statements – simple & compound, declaration statements. Input and output streams.	5	15%
II	Control statements: `if`, `if-else`, `switch`, `for`, `while`, `do-while`, `break` and `continue` statements, Arrays – one dimensional & two dimensional; Functions: inline functions, function over loading, Functions with default arguments, recursion.	7	15%
FIRST INTERNAL EXAM			

III	Basics of Pointers. Function call by value, call by reference. Preparation of programs for evaluation of Factorial of a number, infinite series, Sorting, Searching and Matrix multiplication.	8	15%
IV	Introduction to Class and Object- definition, data members, member function. private & public member functions, member access, friend declaration, class objects, predefined classes, initialization. Inheritance- base class and derived class. Simple programs using the above features. (No programming questions for University examination and internals)	7	15%
SECOND INTERNAL EXAM				
V	Errors and approximations, sources of errors. Solution of linear system of equations: Gauss elimination, Gauss-Jordan and Gauss–Seidel methods. Interpolation: Lagrange and Aitken techniques.	7	20%
VI	Curve fitting: method of least squares, non-linear relationships, Linear correlation, measures of correlation. Solution of Partial differential equations: classification, Laplace equation, Finite difference method. Numerical problems and preparation of computer programs for the above methods	8	20%
END SEMESTER EXAM				

Question Paper Pattern

Maximum marks: 100   **Time: 3 hrs**

The question paper should consist of three parts

Part A
There should be 2 questions each from module I and II
Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part B
There should be 2 questions each from module III and IV
Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part C
There should be 3 questions each from module V and VI
Each question carries 10 marks
Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

Note: Each question can have a maximum of four sub questions, if needed.