

OBJECTIVE

This course comprehends the fundamental idea on various computing techniques that are useful for the engineering studies. It starts with logic and basic problem solving, then gives the idea on some important numerical methods to solve certain problems, and provides thorough idea on C programming. Finally, this gives an understanding on certain computing tools, which are generally used in engineering applications.

UNIT – I LOGICAL THINKING AND ALGORITHMS 9

Problem solving - Logical thinking – statements – conditional statements – representing problem solution – flow charts – logic – symbolic logic – truth tables – Math puzzles – magic triangles – magic squares – alphabetic puzzles – Cross number puzzles. Number System – Binary – Hexadecimal – octal – decimal. Problem solving approaches- Heuristics – Divide and conquer, and greedy algorithms for summation, factorial and Base conversion.

UNIT – II NUMERICAL METHODS 9

Engineering problem solving process – mathematical model – Numerical Methods: Approximations – Round off and truncation errors – Roots of equations – Newton – Raphson method – Linear algebraic equations – Gauss elimination – Curve fitting – Regression and interpolation.

UNIT – III C PROGRAMMING PRIMITIVES 9

C programming fundamentals – Compilation process – Variables – Data types – Expressions – Operators – Looping – Decisions – Arrays.

UNIT – IV C PROGRAMMING CONCEPTS 9

Functions – Recursion – Structures – Unions – Character strings – Pointers – Dynamic memory allocation – Programs involving pointers to strings – Use of Dynamic memory allocation.

UNIT – V PROBLEM SOLVING TOOLS (MATLAB AND PROCESSING) 9

Program Design process – projectile problem - Matlab functions – Data import and export utilities – Matrices of numbers and arrays of strings – Graphics – 2D and 3D plots – Solving numerical method problems using Matlab – Understanding the basics and programming with Processing tool – visualization – Animation.

TOTAL: 45

TEXTBOOKS:

1. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009
2. Brian Hahn, Dan Valentine "Essential Matlab for Engineers and Scientists", Newnes, 3rd Edition, 2007.
3. Stevan C, Chapra, Raymond P Canale "Numerical Methods for Engineers", Fifth Edition, TMH, 2006.

REFERENCES:

1. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education, 2006.
2. Zbigniew Michalewicz and David B. Fogel, "How to solve it: Modern Heuristics", Second Edition, Springer, 2010.
3. Ashok N. Kamthane, "Computer programming", Pearson Education, 2007.
4. Kenneth A. Reek, "Pointers on C", Pearson Education, 2007.
5. <http://processing.org/learning/>
6. R.G. Dromey, "How to Solve it by Computer", Pearson Education, Fourth Reprint, 2007
7. Stephen G. Kochan, "Programming in C", Third Edition, Pearson Education, 2007