

The logo for Jawaharlal Nehru Technological University consists of several overlapping circles in blue, black, and yellow.

**Jawaharlal Nehru Technological  
University, Telangana B.E./B.Tech  
MECH Sem 1 syllabus**

## **Mathematics - I**

### **MA101BS: MATHEMATICS - I**

#### **UNIT-I: Matrices**

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method; Gauss Seidel Iteration Method.

#### **UNIT-II: Eigen values and Eigen vectors**

Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation

#### **UNIT-III: Sequences & Series**

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences.

Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test; Cauchy's Integral test; Cauchy's root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

#### **UNIT-IV: Calculus**

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series.

Applications of definite integrals to evaluate surface areas and

volumes of revolutions of curves (Only in Cartesian coordinates),  
Definition of Improper Integral: Beta and Gamma functions and their applications.

## **UNIT-V: Multivariable calculus (Partial Differentiation and applications)**

Definitions of Limit and continuity.

Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

### **TEXTBOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

### **REFERENCES:**

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

## **Engineering Physics**

### **PH102BS: ENGINEERING PHYSICS**

#### **UNIT-I: Introduction to Mechanics**

Transformation of scalars and vectors under Rotation transformation, Forces in Nature, Newton's laws and its completeness in describing particle motion, Form invariance of Newton's second law, Solving Newton's equations of motion in polar coordinates, Problems including constraints and friction, Extension to cylindrical and spherical coordinates.

#### **UNIT-II: Harmonic Oscillations**

Mechanical and electrical simple harmonic oscillators, Complex number notation and phasor representation of simple harmonic motion, Damped harmonic oscillator: heavy, critical and and electrical oscillators, Mechanical and electrical impedance, Steady state motion of forced damped harmonic oscillator, Power observed by oscillator.

### **UNIT-III: Waves in one dimension**

Transverse wave on a string , The wave equation on a string , Harmonic waves, Reflection and transmission of waves at a boundary, Impedance matching , Standing waves and their Eigen frequencies , Longitudinal waves and the wave equations for them, Acoustic waves and speed of sound, Standing sound waves.

### **UNIT-IV: Wave Optics**

Huygen's principle, Superposition of waves and interference of light by wave front splitting and amplitude splitting, Young's double slit experiment, Newton's rings, Michelson's interferometer, Mach-Zehnder interferometer, Frunhofer diffraction from a single slit and circular aperture, Diffraction grating- resolving power.

### **UNIT-V: Lasers and Fibre Optics**

Lasers: Introduction to interaction of radiation with matter, Coherence, Principle and working of Laser, Population inversion, Pumping, Types of Lasers: Ruby laser, Carbon dioxide (CO<sub>2</sub>) laser, He-Ne laser, Applications of laser. Fibre Optics: Introduction, Optical fibre as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres.

### **TEXT BOOKS:**

1. Engineering Mechanics, 2nd ed.- MK Harbola, Cengage Learning
2. I. G. Main, "Vibrations and waves in physics", 3rd Edn, Cambridge University Press, 2018.
3. Ajoy Ghatak, " Optics", McGraw Hill Education, 2012

### **REFERENCES:**

1. H. J. Pain, "The physics of vibrations and waves", Wiley, 2006
  2. O. Svelto, "Principles of Lasers"
  3. "Introduction to Mechanics", M.K.Verma, Universities Press
- light damping, Energy decay in a damped harmonic oscillator, Quality factor, Mechanical

## **Programming for Problem Solving**

### **CS103ES/CS203ES: PROGRAMMING FOR PROBLEM SOLVING**

#### **Unit - 1: Introduction to Programming**

Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating,

compiling and executing a program etc., Number systems  
Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming  
Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments

Bitwise operations: Bitwise AND, OR, XOR and NOT operators  
Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do- while loops

I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.  
Command line arguments

## **Unit - II: Arrays, Strings, Structures and Pointers:**

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays

Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings

Structures: Defining structures, initializing structures, unions, Array of structures

Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self referential structures in linked list (no implementation)

Enumeration data type

## **Unit - III: Preprocessor and File handling in C:**

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef

Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

## **Unit - IV: Function and Dynamic Memory Allocation:**

Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function,

passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries  
Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions  
Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

### **Unit - V: Introduction to Algorithms:**

Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc.

Basic searching in an array of elements (linear and binary search techniques),

Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms),

Basic concept of order of complexity through the example programs

### **TEXT BOOKS:**

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

### **REFERENCE BOOKS:**

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice
2. Hall of India
3. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
4. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
5. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

## **Engineering Graphics**

### **ME104ES/ME204ES: ENGINEERING GRAPHICS**

#### **UNIT - I**

**Introduction to Engineering Drawing:** Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola - General method only. Cycloid, Epicycloid and Hypocycloid, Scales - Plain & Diagonal.

## **UNIT- II**

**Orthographic Projections:** Principles of Orthographic Projections - Conventions - Projections of Points and Lines, Projections of Plane regular geometric figures.—Auxiliary Planes.

## **UNIT - III**

Projections of Regular Solids - Auxiliary Views - Sections or Sectional views of Right Regular Solids - Prism, Cylinder, Pyramid, Cone - Auxiliary views - Sections of Sphere

## **UNIT - IV**

Development of Surfaces of Right Regular Solids - Prism, Cylinder, Pyramid and Cone, Intersection of Solids: Intersection of - Prism vs Prism- Cylinder Vs Cylinder

## **UNIT - V**

**Isometric Projections:** Principles of Isometric Projection - Isometric Scale - Isometric Views -Conventions - Isometric Views of Lines, Plane Figures, Simple and Compound Solids - Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa - Conventions

**Introduction to CAD: (For Internal Evaluation Weightage only):**

Introduction to CAD Software Package Commands.- Free Hand Sketches of 2D- Creation of 2D Sketches by CAD Package

## **TEXTBOOKS:**

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford

## **REFERENCE BOOKS:**

1. Engineering Drawing / Basant Agrawal and McAgrawal/ McGraw Hill
  2. Engineering Drawing/ M. B. Shah, B.C. Rane / Pearson.
  3. Computer Aided Engineering Drawing - K Balaveera Reddy et al - CBS Publishers
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