

**JAWAHARAL NEHRU TECHNOLOGICAL UNIVERSITY
ANANTAPUR**

**COURSE STRUCTURE FOR I YEAR B.TECH (CCC)
CIVIL ENGINEERING**

S.NO	CODE	Subject	Credits
1	C1BS01	Mathematics –I	
2	C1BS02	Mathematics – II	
3	C1CS12	Programming and Data Structures	
4	C1CE01	Mechanics of Solids	
5	C1EM01	Electrical and Mechanical Technology	
6	C1CE02	Surveying	
7	C1CE03	Surveying Field Work	
8	C1CS13	Computer lab	

C1BS01 MATHEMATICS-I

UNIT-I :

Sequences - Series - Convergence and divergence - Ratio test - Comparison test - Integral test - Cauchy's root test - Raabe's test – Absolute and conditional convergence. Rolle's theorem - Lagrange's Mean Value theorem - Cauchy's Mean value Theorem - Generalized Mean Value theorem (Taylor's Theorem)

UNIT-II :

Functions of several variables - limit and continuity - partial differentiation -Chain rule - Total derivative - Euler's theorem, Jacobian - Functional dependence. Maxima and Minima of functions of two variables with and with out constraints, Radius, Center and Circle of Curvature - Evolutes and Envelopes.

UNIT-III :

Curve tracing - Cartesian, polar and parametric curves. Applications of integration to lengths, volumes and surface areas in Cartesian and Polar coordinates.

UNIT-IV :

Differential equations of first order and first degree - formation. Exact, linear and Bernoulli. Applications to Newton's Law of cooling, Law of natural growth and decay, Orthogonal trajectories, Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax} , $\sin ax$, $\cos ax$, polynomial in x , $e^{V(x)}$, $x^{V(x)}$, method of variation of parameters.

UNIT-V :

Laplace transforms of standard functions - Inverse transform - Linearity - first shifting Theorem. Transforms of derivatives and integrals - Unit step function - second shifting theorem - Dirac's delta function - Differentiation and integration of transforms - Multiple integrals: Double and triple integrals -change of variables – Change of order of integration.

UNIT-VI :

Vector Differential Calculus: Gradient, Divergence, Curl and their related properties of sums, Products, Laplacian and second order operators. Vector integral Calculus: Vector integration - Line integral - work done -Potential function - area, surface and volume integrals. Green's theorem, Stoke's and Gauss' Divergence Theorem. Verification of Green's, Stoke's and Gauss' Theorems. Curvilinear Coordinates - Cylindrical, Spherical Coordinates – Expressions of Grad, div, curl in Spherical, Cylindrical and Curvilinear Coordinates.

C1BS02 MATHEMATICS – II

UNIT-7:

Matrices — brief review — Inverse of a matrix by adjoint , elementary row transformations — Rank - Normal form — eachelon form. Augmented matrix— Consistency — Solution of system of simultaneous linear homogeneous and non-homogeneous equations.

UNIT-8:

Eigen values, Bigen vectors — properties — Cayley-Hamilton Theorem (Inverse and powers of a matrix by Cayley-Hamifton theorem). Quadratic forms —positive, negative definite — Diagnolization of matrix. Calculation of powers of matrix — Modal and spretral matrices. Real matrices — Symmetric, skewsymmetric, orthogonal. Linear Transformation — Orthogonal Transformation. Quadratic forms — Reduction of quadratic form to canonical form — index —signature.
Complex matrices Hermitian, Skew-Herimitian and Unitary — Eigen values and elgen vectors of complex matrices and their properties.

TEXT BOOKS:

1. Iyengar, Krishna Gandhi, "A Text Book of Engineering Mathematics ", Vol-1, 2002, S.Chand.
2. B.V. Ramana, " Engineering Mathematics", 2002, TMH.
3. C. Sanakraiah, "Engineering Mathematics – I", 2002, Vijaya.
4. P. Nageswara Rao, Y. Narsimhulu, Prabhakara Rao, "Engineering Mathematics I", 2002.

REFERENCE BOOKS:

1. S. K. V. S. Sri Rama Chary, M. Bhujanga Rao, Shankar, "Engineering Mathematics", 2000, BSP
2. Erwin Kreyszig, "Advanced Engineering Mathematics" , 8e, 2001 , John Wiley.
3. Michael D. Green Berg, "Advanced Engineering Mathematics ", 2e, PHI.
4. Sarveswara Rao Koneru, "Engineering Mathematics ", 2002, Orient Longman .
5. N. P. Bali, "Engineering Mathematics – I", Laxmi.

UNIT – I

Formation of Partial differential equations by elimination of arbitrary constants and arbitrary functions - solutions of standard first order equations of type I, II, III and IV. Solution of one-dimensional heat equation, one-dimensional wave equation and two-dimensional Laplace's equation by the method of separation of variables.

UNIT –II

Fourier integral theorem- Finite and infinite Fourier Transform – Inverse Transforms – Solution to initial boundary value problems. – Z – Transforms. – Inverse Z – Transforms. – Simple Properties – solution of differences equations.

UNIT –III

Complex functions – Continuity – differentiability – Analyticity – Cauchy – Reiman Equations in Cartesian and polar coordinates. Harmonic and Conjugate harmonic functions.

UNIT –IV

Elementary functions and their properties of Sin Z, Cos Z, e^z , log Z, Cosh Z, Sinh Z. Line integral – Cauchy's Integral Theorem – Cauchy's Integral formula – derivative of analytic functions – Taylor's and Laurent's Series. Zeroes and Poles,

UNIT –V

Residue- Residue theorem – Evaluation of standard real integrals – Argument principle – Rouche's theorem and Fundamental theorem of algebra.
Conformal mapping of function Z^n , Sin Z, Cos Z, e^z , log Z.
Bilinear Transformation.

UNIT –VI

Numerical Methods-I:

Iterative methods, bisection, Regula false position, Newton-Raphson. –successive approximation methods. Solution of linear simultaneous algebraic equations – Gauss – Jordan and Gauss – Seidel's methods.

UNIT –VII

Numerical Methods-II:

Interpolation. Forward differences – backward differences and central differences. Interpolation Methods. Least square approximation of functions – Linear regression – Polynomial regression.

UNIT –VIII

Numerical Methods-III:

Numerical interpolation by Trapezoidal and Simpson's 1/3 and 3/8th rules – Numerical solution of differential equations by Euler's method – Runge – Kutta methods – Milne's predictor – Corrector methods.

Recommended Text Books

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| 1. Engineering Mathematics | by B.V., Ramana, TMH, Second Edition – 2004. |
| 2. Engineering Mathematics-I | by Iyengar, Krishna Gandhi et.al, S. Chand, 2002. |
| 3. Engineering Mathematics-II | by C. Sankaraiah, Vijaya Publication 2002. |
| 4. NUMERICAL METHODS | by S.S.Sastry, Prentice-Hall Ltd |

C1CS12 PROGRAMMING AND DATA STRUCTURES

UNIT-I : Computer awareness -- qualitative treatment only

Computers : Capabilities , types of computers , Application areas , functional block diagram , central processing unit , functions of ALU and control unit in CPU. Microprocessors CISC/RISC processor. Address word , RAM , ROM cache memory, associate memory. Magnetic disc , tape , floppy , optical disc, address bus , data bus. Functions of I-O devices , key board , mouse , light pen , printers , monitors , plat panel display unit. Machine language , assembly language , high level language. Compiler , assembler , operating system , types of operating systems , number system algorithm , flow chart.

UNIT-II : Computer programming in C – I :

Basic structure of C program. C tokens , data types , variable declaration , assigning values , operators in C , expressions , evaluation , input-output operations , IF and SWITCH statements , WHILE , DO-WHILE and FOR statements , C programs covering all the above aspects.

UNIT-III : Computer programming in C-II :

String variables in C , declaration , reading , writing , functions in C , user defined functions , category of functions , string handling functions , nesting of functions , recursion , variables and storage classes , structures , arrays , unions , pointers , C programs covering all the above aspects.

UNIT-IV : Computer programming in C-III :

File management in C , opening , closing , reading , writing , and I-O operations on files , file copy program , string I-O in files , detecting errors in reading / writing , C programs covering all the above aspects.

UNIT-V : Introduction to Graphics in C :

Text mode Vs Graphics mode , text in graphics mode , drawing lines , various geometric figures , filling using simple graphics functions in C.

UNIT -VI

One dimensional and multi-dimensional arrays, initialization, application, applications, program examples. Single linked list, double linked list, header, circular list, applications program examples.

UNIT -VII

Stacks, representation, infix, postfix and prefix programs, recursion, recursion in C, applications of stacks. Queues, representation queues, circular queues applications, program examples.

UNIT -VIII

Binary tree, representation, tree traversals. Graph, representation graph traversals, spanning trees. Searching techniques. linear and binary search methods.

Sorting method exchange sort, selection sort, quick sort, tree sort, C programs.

Text Books:

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| 1. Programming in ANSI-C: | E. Balaguru Swamy, TMH |
| 2. Numerical Methods: | V.Rajaraman |

Reference Books :

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| 1. Computer and commonsense : | Shelly & Hunt / PHI |
| 2. Programming in C : | D.Ravichandra / New age |
| 3. Programming in C: | Schaum series |
| 4. Let us C : | Yeshwant Kanetkar |
| 5. Mastering Turbo C : | Stankelly – Bootle / BPB |
| 6. Numerical Methods : | V.Rajaraman |
| 7. Introduction to Computers: | P.Radhakrishna / Hi-Tech. |

C1CE01 MECHANICS OF SOLIDS

UNIT I

- a) Principal stresses and Principal Planes: Stresses on two mutually perpendicular planes Normal stress and tangential stresses _ Principal stresses and Principal planes and their direction - Mohr's circle – Determination of stresses on any plane, Principal planes; and principal stresses. – Principal strains – Mohr's circle for principal strains.
- b) Theories of Failure: Principal stress theory – Principal strain theory – Principal strain energy theory – Maximum shear strain energy theory, max shear stress theory.

UNIT II

Thick Cylinders and Wire wound thin cylinders – Lamé's equation – Hoop stress and radial stress – Compound Cylinders – Shrink fit pressure – Wire wound cylinders – Design of thick cylinder by various theories.

UNIT III

- a) Torsion End: Torsion of compound section – Non-circular sections - Torsional constant – Transmission of H.P combined bending and torsion – Design of shafts by various theories.
- b) Springs: Open coiled and carriage springs – Open coiled springs axial load and axial moment.

UNIT IV

- a) Beams Curved in Plan: Ring beams supported on 4,6 and 8 columns for symmetrical loading.
- b) Shear Centre: Shear center for various standard sections.
- c) Unsymmetrical bending: Centroidal principal axes of a section – Moments of inertia referred to any set of rectangular axes – Graphical methods for locating principal axes. Resolution of bending moments into two components axes through the centroid – Stresses in beams – Location of neutral axis – Deflection of beams under unsymmetrical bending.

UNIT V

- a) Analysis of Pin-jointed plane and space Trusses: Method of sections for plane frames – Tension coefficient method for plane frames – Tension coefficient method for space frames.
- b) Eccentrically loaded columns – Rankine's empirical formulae – Secant formulae – Laterally loaded columns.

TEXT BOOKS:

Mechanics of Solids by Dr.B.C.Punnaia

Mechanics of Solids by Vazrani & Ratwani

Mechanics of Solids by L.S.Srinath

Mechanics of Solids by Jindal.

CIEM01 ELECTRICAL & MECHANICAL TECHNOLOGY

PART: A

ELECTRICAL TECHNOLOGY

1. Application of Kirchoffs laws to d.c. electrical circuits – analogy between electrical and magnetic circuits – Composite magnetic circuits – self and mutual inductances – coefficient of coupling.
2. D.C. Machines: Principles of e.m.f. generation – Construction features – elementary idea of simple lap and wave windings – methods of excitation – e.m.f. equation.
3. Principles of operation of d.c. motor – methods of varying speed – torque equation – motor starters.
4. A.C. Circuits: RMS and average values, form factor for sinusoidal waves – phasor representation – pure resistance, inductance and capacitance connected to a.c. supply- a.c. series, parallel and series parallel circuits - active, reactive power and power factor. Balanced poly-phase circuits – star and delta connections.

5. Single phase transformers: Constructional features – Types – principles of operation – no load and load phasor diagrams.
6. 3 Phase induction motors: Constructional features – types – principle of operation – slip – starters.
7. Alternators: Constructional features – types – e.m.f. equation.
8. Synchronous Motors: Principle of operation, methods of starting.
9. Electrical Measuring instruments: Construction and principle of operation of moving coil, moving Iron, ammeters and voltmeters, construction and operation of energy meters.

TEXT BOOK :

1. Electrical Technology : E. HUGHES.

PART : B

MECHANICAL TECHNOLOGY

Welding processes: Introduction to welding classification of welding processes, Oxyacetylene welding – equipment, welding fluxes and filler rods, Gas cutting. Introduction to arc welding – Manual metal arc welding. Submerged arc welding, TIG and MIG processes, soldering and brazing Importance, comparison and applications.

Description and working of steam engines and steam turbines (Prime movers)- impulse and Reaction turbines.

Description and working of I.C. Engines – 4 stroke and 2 stroke engines – comparison – Gas Turbines – Closed and open type gas turbines.

Reciprocating Air compressors – description and working of single stage and multistage reciprocating air compressors – inter cooling.

Transmission of power; Belt, Rope, Chain and gear drive-simple problems.

Block diagram of a vapour compression refrigeration system. Names of common refrigerates. Basic principles of air-conditioning. Room and General air conditioning systems Ducting – Different types of ventilation system.

Earth moving machinery and Mechanical handling equipment – bull dozers - power showels – Excavators – concrete mixer – Belt and bucket conveyers.

TEXT BOOKS:

Mechanical Technology by Khurmi.

Mechanical Technology by Kodandaraman C.P.

Construction Planning; Equipment and Methods – Purify.

C1CE02 SURVEYING

UNIT I

Theodolite Survey

1. Theodolite – Component parts – Temporary adjustment – Measurement of Horizontal and vertical angles – Miscellaneous operations with theodolite.
2. Traverse survey with theodolite – methods of traverse in-closed traverse – check-traverse-computations – Gales Traverse table.
3. Omitted measurements problems – Permanent adjustment of transit theodolite.
4. Trigonometrical levelling – Calculation of elevations and distances of objects accessible and inaccessible problems.

UNIT II

Tacheometry

1. Tacheometry – Principles of stadia method of tacheometry for horizontal sights and inclined sights – Distance and elevation formula for staff vertical and normal problems
2. Tacheometry – Principle of subtense method (Movable hair method) Vertical base observation – Horizontal base substance measurement; subtense bar-problems – Tacheometric tables.

UNIT III

Curves

1. Curves – Simple curves definition – Elements of simple curves – setting out simple curves by linear and angular methods – problems.
2. Curves – Obstacles to the location of simple curves – problems – compound curves – setting out compound curves.
3. Transition curves – Requirements – Super elevation – Equilibrium – Cant-cant deficiency – Centrifugal ratio – Calculation of length of transition curve – Equation of ideal transition curve – Characteristics of transition curves – Calculation of deflection angles – Computations and setting out transition curves.
4. Reverse curves – vertical curves – types of vertical curves length of vertical curve computations and setting out a vertical curve-problems.

C1CE03 SURVEYING FIELD WORK

UNIT IV

Geodetic Surveying

1. Geodetic surveying – Triangulation – Classification of Triangulation systems – Triangulation figures – triangulation survey operations – Problems on intervisibility and height of triangulation stations – Trigonometrical levelling – Geodetical observations Refraction and curvature corrections – Axis signal correction – Determination of difference in elevation by single and reciprocal observations problems.
2. Base line corrections – Satellite station – Reduction to center problems.
3. Triangulation Adjustment.

UNIT V

1. Hydrographic surveying – Soundings – Methods of locating soundings – Three point problem.
2. Photographic surveying – Terrestrial photogrammetry – Photo – Theodolite – Definitions calculation of horizontal and vertical angles from terrestrial photograph – Elevation of point by photographic measurement problems – Stereo photogrammetry.
3. Study of Modern surveying instruments like a) Laser level 2) Electronic Theodolite 3) EDM 4) Total station.
4. Aerial photogrammetry – Definitions – Scale of vertical photograph-computation of length of a line between points of different elevation from vertical
Photographic measurements – Determination of flying height – Relief displacement – problems – Flight planning – Plotting the survey form vertical photographs.
5. Principles of Remote sensing, concept of Electromagnetic spectrum, spectral signatures for Land, Soil and water bodies, active and passive Remote Sensing, Thermal Infrared and Microwave region utilities; Indian Remote sensing Satellite sensors and their spatial and spectral Resolutions, FCC and interpretation key for land use and water bodies mapping.

BOOKS:

- 1.Principles of Remote Sensing by Paul Curran.
- 2.A Text Book of Surveying Vol – I and II B.C. Punmia
- 3.A Text Book of Surveying Vol – I and Vol. II : T.P. Kanetkar.

1.Study of theodolite in detail – practice for measurement of horizontal and vertical angles.

2.Measurement of horizontal angles by method of repetition

3.Measurement of horizontal angles by reiteration

4.Heights and distance problem.

5.Determination of distance between inaccessible points.

6.Determination of elevation of given object keeping the instrument station and object in the same vertical plane.

7.Heights and distance using Principles of tachometric surveying.

8.Curve setting

9.Setting out works.

C1CS13 COMPUTER PRACTICE LAB

1. Write a C program to evaluate the following series. Assume suitable values for x.
 $Y = 1 + x^2/2! + x^4/4! + x^6/6! + \dots$ upto 10 terms
2. Write a C program to obtain the product of two matrices A of size (3x3) and B of size (3x2). The result matrix C is to be printed out along with A and B. Assume suitable values for A & B.
3. Write C procedures to add, subtract, multiply and divide two complex numbers (x+iy) and (a+ib). Also write the main program that uses these procedures.
4. Write a function that will scan a character string passed as an argument and convert all lower case characters into their upper case equivalents.
5. Write C program to find the root of the equation $x^3/4x+a=0$ to 3 significant digits using Newton-Raphson method.
6. Write C program to implement linear regression.
7. Write C program to implement Gauss – Jordan method.
8. Write C program to implement Gauss – Seidal method.
9. Write C program to evaluate the integral
 $S = \int f(x) dx$
10. Write C program to solve the following differential equation using Runge-Kutta fourth order method.

$$Dy/dx = x^2 + y^2, y(0) = 1, \text{ Solution required for } x > 0$$