

## **Syllabus for Applied Mathematics- III (EN/ET/EE/Mech) Scheme (Theory: 4 hrs, Tutorial: 1hr.)**

### **UNIT - I: LAPLACE TRANSFORM (15Hrs)**

Definition, Properties, Evaluation of integrals by Laplace Transform, Inverse Laplace Transform and its Properties, Convolution theorem (statement only), Laplace Transform of Periodic Functions (statement only), Unit Step Function and Unit Impulse Function, Applications of Laplace Transform to solve Ordinary Differential Equations, Simultaneous Differential Equations, Integral Equations & Integro-Differential Equations.

### **UNIT – II: FOURIER SERIES & FOURIER TRANSFORM (08 Hrs)**

Periodic functions and their Fourier Expansions, Even and Odd functions, Change of interval, Half Range Expansions.

Fourier Transform: Definition and Properties (excluding FFT), Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform to Solve Integral Equation.

### **UNIT – III: CALCULUS OF VARIATIONS(05 Hrs)**

Functionals, Maxima and minima of functionals, Euler's equation(statement only), Functionals dependent on First & Second order derivatives, Isoperimetric Problems, Solution of Boundary Value problems by Rayleigh-Ritz method.

### **UNIT- IV: FUNCTIONS OF COMPLEX VARIABLE (12 Hrs)**

Analytic function, Cauchy- Riemann Conditions, Harmonic Functions (excluding orthogonal system), Milne-Thomson Method, Cauchy Integral Theorem & Integral Formula (Statement only), Taylor's & Laurent's series (Statement only), Zeros and Singularities of Analytic function, Residue Theorem (Statement only), Contour integration (Evaluation of real definite integral around unit circle and semi-circle).

### **UNIT - V: PARTIAL DIFFERENTIAL EQUATIONS(08Hrs)**

Partial Differential Equations of First Order First Degree i.e. Lagrange's form, Linear Homogeneous Equations of higher order with constant coefficients. Method of separations of variables, Simple Applications of Laplace Transform to solve Partial Differential Equations (One dimensional only).

## **UNIT –VI: MATRICES(12Hrs)**

Linear and Orthogonal Transformations, Linear dependence of vectors, Characteristics equation, Eigen values and Eigen vectors, Statement and Verification of Cayley Hamilton Theorem [without proof], Reduction to Diagonal form, Reduction of Quadratic form to Canonical form by Orthogonal transformation, Sylvester's theorem [without proof], Solution of Second Order Linear Differential Equation with Constant Coefficients by Matrix method.

### Text Books

1. Higher Engineering Mathematics by B.S. Grewal, 40<sup>th</sup> Edition, Khanna Publication
2. Advanced Engineering Mathematics by Erwin Kreyszig, 8<sup>th</sup> Edition, Wiley India
3. Applied Mathematics for Engineers & Physicist by L.R. Pipes and Harville,
4. Calculus of variation by Forrey

### Reference Books

1. A Text Book of applied Mathematics, Volume II , by P.N. Wartikar & J.N. Wartikar, Poona Vidyarthi Griha Prakashan
2. Introductory methods of Numerical Analysis, by S.S. Sastry, PHI
3. Mathematics for Engineers by Chandrika Prasad
4. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.

**B. E. Third Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

**ELECTRONIC DEVICES AND CIRCUITS**

**Duration : 2 Hr.**

**College Assessment : 25 Marks**

**University Assessment : 25 Marks**

**Subject Code : BEENE302P / BEECE302P/ BEETE302P**

**[ 0 – 2 – 0**

**– 1]**

---

**Objectives :** To study basic concepts, DC circuits, AC circuits, semiconductors, Semiconductor devices, Power supply, Bipolar and Field effect transistor amplifiers, Frequency response of amplifier.

**Outcome :**

After completion of the practicals:

1. The students will get the basic concepts of different semiconductor components.
  2. They will be able to understand the use of semiconductor devices in different electronic circuits.
  3. They will be able to calculate different performance parameters of transistors.
  4. They will be able to plot and study the characteristics of semiconductor devices.
- 

**List of Experiments :**

1. To Plot V-I Characteristics of Si/Ge Diode.
2. To study Half Wave and Full Wave rectifier with and without Capacitor filter.
3. To study Input-output characteristics of Common Emitter Configuration.
4. To Determine the h-parameter of CE amplifiers.
5. To find Bandwidth of RC coupled Amplifier.
6. To Study RC Oscillator (RC-Phase Shift and Wien Bridge Oscillator).
7. To Study LC Oscillators (Colpitt's and Hartley Oscillator).
8. To study transistorized Astable Multivibrator.
9. To study Cross-over distortion in Class-B power amplifier.
10. To find the operating point of transistor.
11. To study transistor as an amplifier.
12. To study FET characteristics.

**Note :** Minimum 8 Practicals to be conducted.

**B. E. Third Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

**ELECTRONIC DEVICES AND CIRCUITS**

**Duration : 3 Hr.**

**College Assessment : 20 Marks**

**University Assessment : 80 Marks**

**Subject Code : BEENE302T / BEECE302T/ BEETE302T**

**[ 4 – 0 – 1 –**

**5]**

---

**Objectives :**

- (1) To present a clear consistent picture of the internal physical behavior of many electronic devices so that their studies of electronic circuits and system will be meaningful.
  - (2) To develop the basic tools with which they can later learn about newly developed devices and applications.
- 

**Outcome :**

1. This subject will give an overview of various semiconductor devices.
  2. At the end of this course, the students will be able to analyze and design amplifier circuits, oscillators and filter circuits employing BJT, FET devices.
- 

**Unit I : Diodes and it's applications**

**(08)**

PN junction diode, Volt-amp characteristics, Temperature dependence, Transition and Diffusion capacitance of PN junction , Zener and Avalanche Breakdown, **Diode Rectifiers:** Half wave, Full wave and Bridge rectifiers, Types of Filters, Ripple factor , Voltage Doublers.

**Unit II : BJT Biasing:**

**(10)**

Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, Necessity of BJT biasing, Transistor biasing methods, Stability factor, Thermal stabilization, Thermal runaway and Compensation circuits, Transistor as an Amplifier

**Unit III : Transistor Small Signal Analysis & Negative feedback amplifier**

**((12)**

h-parameter model, Analysis of Transistor Amplifier circuits using h-parameters, CB,CE and CC Amplifier configurations and performance factors.

**Principle of Negative feedback** in electronic circuits, Voltage series, Voltage shunt, Current series, Current shunt types of Negative feedback, Typical transistor circuits effects of Negative feedback on Input and Output impedance, Voltage and Current gains, Bandwidth, Noise and Distortion.

**Unit IV :****(10)**

**Principle of Positive feedback**, Concept of Stability in electronics circuits, Barkhausen criteria for oscillation, Principle of operation of RC Phase Shift, Wien Bridge, Colpitt's, Hartley, Crystal oscillators.

Principle of operation of Transistorized Astable, Bistable and Monostable multivibrator.

**Unit V : Power Amplifiers:****(10)**

Power dissipations in transistors, Harmonic distortion, Amplifiers Classification,(Class-A, Class-B, Class-C, Class-AB) Efficiency, Push-pull and complementary Push-pull amplifiers, Cross-over distortion.

**Unit VI : Field Effect Transistor and MOSFET:****(10)**

JFET and its characteristics, Pinch off voltage, Drain saturation current, JFET amplifiers, CS,CD,CG amplifiers ,their analysis using small signal JFET model ,Biasing the FET, The FET as VVR Overview of D-MOSFET, E-MOSFET, n MOSFET, pMOSFET .

**Text Books**

1. J. Millman and Halkias : "Electronic devices and circuits" , TMH Publications
2. Boylestad & Nashelsky : "Electronic Devices & Circuit Theory" , PHI publications.
3. Salivahanan, Suresh Kumar, Vallavaraj:"Electronic devices and circuits" , TMH Publications.

**Reference Book**

1. J. Millman and Halkias: "Integrated Electronics, Analog & Digital Circuits & Systems" TM- 2000.
2. Sedra & Smith: "Micro Electronic Circuits" Oxford University Press, 2000
3. Albert Malvino : " Electronics Principles", TMH Publications.
4. Floyd : "Electronic Devices", Pearson Publications.
5. Schilling & Beloove : " Electronics Circuits Discrete and Integrated", Mc.Graw Hill Publications.

**B. E. Third Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

**ELECTRONICS MEASUREMENT AND INSTRUMENTATION**

**Duration : 2 Hr.**

**College Assessment : 25 Marks**

**University Assessment : 25 Marks**

**Subject Code : BEENE303P/ BEECE303P/ BEETE303P**

**[ 0 – 2 – 0 – 1 ]**

---

**Objectives :** To learn basic measurement concepts and related instrumentation requirement as a vital ingredients of electronics Engineering.

**Outcome :**

After completion the practicals :

1. The students will be able to measure the resistance by various methods.
2. They will be able to use the various measuring instruments such as CRO, Function generator, Spectrum analyzer etc in effective manner.
3. They will be able to measure various physical parameters by using different techniques.

---

**List of Experiments :**

- 1- Measurement of Medium Resistance by using voltmeter ammeter method and Wheatstone bridge method.
- 2- Measurement of Low Resistance by using Kelvin Bridge Method.
- 3- Measurement of Unknown inductance by using Hay's Bridge / Maxwell Bridge Method
- 4- Measurement of Unknown Capacitance by using Schering Bridge Method.
- 5- To determine the frequency of unknown signal using Lissajous Pattern Method
- 6- To Determine DC Voltage, AC voltage and phase by using CRO.
- 7- Temp. Measurement & control using RTD / Thermocouple / Thermistor.
- 8- Displacement measurement using LVDT.
- 9- Level measurement using capacitive / resistive transducer

- 10- Flow measurement using optical transducer
- 11- Measurement of signal parameters using Digital Storage Oscilloscope.
- 12- Study of Data Acquisition system.
- 13- Feature extraction of Some standard signal using Spectrum Analyzer.

**Note :** Minimum 8 Practicals to be conducted.

**B. E. Third Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

**ELECTRONICS MEASUREMENT AND INSTRUMENTATION**

**Duration : 3 Hr.**

**College Assessment : 20 Marks**

**University Assessment : 80 Marks**

**Subject Code : BEENE303T/ BEECE303T/ BEETE303T**

**[ 4 – 0 – 0 – 4 ]**

---

**Objectives** The primary aim of this subject is to acquaint the students with the basic principles of measuring instruments and show how each of them can be exploited for the measurement of large number of variables.

**Outcome :** At the end of this course, students will be able to:

1. Explain basic concepts and definitions in measurement.
2. Explain the operation and design of electronic instruments for parameter measurement and operation of different Transducers
3. Explain the operation of oscilloscopes and the basic circuit blocks in the design of an oscilloscope.
4. Explain the circuitry and design of various function generators.

---

**Unit I : Fundamentals of Electronic Measurement and Instrumentation :**

**(06)**

Necessity of electronic Measurement , Block diagram of electronic measurement system, Types of Measurements, Function of instruments and measurement systems, Applications of measurement system, Elements of measurement system, Types of instruments, Theory of errors, Accuracy and Precision, Types of errors, Statistical analysis , probability of errors, Limiting errors, Standards of measurement.

**Unit II : Electromechanical Instruments :**

**(08)**

Construction of Galvanometer, Suspension Galvanometer, Torque and deflection Galvanometer, PMMC mechanism, DC voltmeter; AC voltmeters; Peak, average and true rms



voltmeters; Digital Multimeters; Ammeters, Ohm-meters and their design' AC indicating instruments, Watt-hour meter; Power factor meter.

**Unit III : AC and DC Bridges :** **(10)**

**DC Bridges :** Wheatstone Bridge, Kelvin Bridge

**AC Bridges and their applications :** Maxwell's Bridge, Hay's Bridge, Schering Bridge, Desauty's Bridge, Wein Bridge, Detectors for AC bridges.

**Unit IV : Transducers :** **(08)**

Static and dynamic characteristics, Classification of transducers, Capacitive transducer, Inductive transducer, Resistive transducer, RVDT, Strain Gauge, RTD, Optical Transducers, Hall effect transducer, Piezoelectric transducers, Transducers for measurement of Pressure, Temperature, Level, Displacement, Flow.

**Unit V : Oscilloscope and Signal Generators :** **(08)**

**CRO :** Types, Dual trace, High frequency, sampling and storage oscilloscopes, Applications of CRO.

**Signal Generators :** Introduction, Sine-wave generator, standard signal generators, Audio frequency signal generation, RF generator, Pulse generator, Function generator.

**Unit VI : Signal Analyzer and Data Acquisition System:** **(08)**

Construction and operation of Signal analyzer, Wave analyzer, Harmonic Distortion analyzer, Spectrum analyzer and Logic analyzer; Signal conditioning and its necessity, process adopted in signal conditioning, Functions of Signal conditioning, AC/DC Conditioning systems, Data conversion: ADC, DAC, Generalized data acquisition system: single channel and multi-channel DAS.

**Text Books:**

1. A.D. Helfrick and W.D. Cooper : “Modern Electronic Instrumentation and Measurement Techniques”, PHI Publications.
2. A.K. Sawhney : “Electrical and Electronic Measurement and Instrumentation”, Dhanpat Rai & Sons Publications.
3. S.S. Kalsi : “Electronics Measurements”, Mc Graw Hill Publications.
4. B.H. Oliver and J.M. Cage : “Electronics Measurement and Instrumentation”, Mc Graw Hill Publications

**Reference Book :**

1. Joseph J. Carr : “Elements of Electronic Instrumentation and Measurement”, Pearson Education Publications.
2. R.K. Rajput : “ Electrical And Electronic Measurement”, PHI Publications.
3. DVS Murthy : “ Transducers and Instrumentation”, PHI Publications.

**B. E. Third Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

**ELECTRONICS MEASUREMENT AND INSTRUMENTATION**

**Duration : 2 Hr.**

**College Assessment : 25 Marks**

**University Assessment : 25 Marks**

**Subject Code : BEENE303P/ BEECE303P/ BEETE303P**

**[ 0 – 2 – 0 – 1 ]**

---

**Objectives :** To learn basic measurement concepts and related instrumentation requirement as a vital ingredients of electronics Engineering.

**Outcome :**

After completion the practicals :

4. The students will be able to measure the resistance by various methods.
5. They will be able to use the various measuring instruments such as CRO, Function generator, Spectrum analyzer etc in effective manner.
6. They will be able to measure various physical parameters by using different techniques.

---

**List of Experiments :**

- 14- Measurement of Medium Resistance by using voltmeter ammeter method and Wheatstone bridge method.
- 15- Measurement of Low Resistance by using Kelvin Bridge Method.
- 16- Measurement of Unknown inductance by using Hay's Bridge / Maxwell Bridge Method
- 17- Measurement of Unknown Capacitance by using Schering Bridge Method.
- 18- To determine the frequency of unknown signal using Lissajous Pattern Method
- 19- To Determine DC Voltage, AC voltage and phase by using CRO.
- 20- Temp. Measurement & control using RTD / Thermocouple / Thermistor.
- 21- Displacement measurement using LVDT.
- 22- Level measurement using capacitive / resistive transducer

- 23- Flow measurement using optical transducer
- 24- Measurement of signal parameters using Digital Storage Oscilloscope.
- 25- Study of Data Acquisition system.
- 26- Feature extraction of Some standard signal using Spectrum Analyzer.

**Note :** Minimum 8 Practicals to be conducted.

**B. E. Third Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

**OBJECT ORIENTED PROGRAMMING & DATA STRUCTURE**

**Duration : 2 Hr.**

**College Assessment : 25 Marks**

**University Assessment : 25 Marks**

**Subject Code : BEENE304P/ BEECE304P/ BEETE304P**

**[ 0 – 2 – 0**

**– 1]**

---

**Objectives :**

1. To understand the concept of object oriented programming and develop skills in C++ Language.
2. Access how the choice of data structures and algorithm design methods impacts the performance of programs.
3. To Choose the appropriate data structure and algorithm design method for a specified application.
4. Write programs using ‘C++ Language’.

**Outcome :**

On successful completion of practicals of this subject the student will be able to:

1. Implement the concept of object oriented programming in any programming language.
  2. Explain the basic data structures and algorithms for manipulating them.
  3. Implement these data structures and algorithms in the C++ language.
  4. Integrate these data structures and algorithms in larger programs.
  5. Code and test well-structured programs of moderate size using the C++ language.
  6. Apply principles of good program design to the C++ language.
- 

**List of Experiments :**

- 1) Write a C++ program to implement the concept of class and object.  
**Given Data:** - class student:-roll number, name and address
- 2) Write a C++ program to find the area of circle and rectangle by using default and parameterized constructor.
- 3) Write a C++ program using following inheritance path: Student -> Marks-> Result & to produce result of each student.
- 4) Write a C++ program, to implement operator overloading. Overload “+” operator so that two string can be concatenated.
- 5) Write a C++ program to implement a following sorting tech. to arrange elements in ascending order.  
1) Bubble sort 2) Insertion sort
- 6) Write a C++ program to implement a stack in which push, pop and display can be performed.
- 7) Write a C++ program to implement a queue in which insertions, deletions and display can be performed.

- 8) Write an interactive C++ program to create a singly linked list and perform following operation.
  - 1) Create
  - 2) Insert
  - 3) Delete
- 9) Write a C++ program to construct a binary tree and perform following traversing techniques.
  - 1) Preorder
  - 2) Inorder
  - 3) Postorder
- 10) Write a C++ program to construct a binary search Tree and perform following Operation.
  - 1) Insert
  - 2) Delete
  - 3) Print leaf node
- 11) Write a C++ Program to implement quick sort.
- 12) Write a C++ Program to implement “this” keyword.

**Note :** Minimum 8 Practicals to be conducted

## B. E. Third Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg.)

### OBJECT ORIENTED PROGRAMMING & DATA STRUCTURE

Duration : 3 Hr.

College Assessment : 20 Marks

University Assessment : 80 Marks

Subject Code : BEENE304T/ BEECE304T/ BEETE304T

[ 4 – 0 – 1

– 5]

---

#### Objectives :

1. To understand the concept of object oriented programming and develop skills in C++ Language.
2. Access how the choice of data structures and algorithm design methods impacts the performance of programs.
3. To Choose the appropriate data structure and algorithm design method for a specified application.
4. Write programs using ‘C++ Language’.

#### Outcomes :

On successful completion of this subject the student will be able to:

1. Be able to implement the concept of object oriented programming in any programming language.
  2. Explain the basic data structures and algorithms for manipulating them.
  3. Implement these data structures and algorithms in the C++ language.
  4. Integrate these data structures and algorithms in larger programs.
  5. Code and test well-structured programs of moderate size using the C++ language.
  6. Apply principles of good program design to the C++ language.
- 

#### Unit I: Introduction to Object Oriented Programming

(12)

Basic concepts of object oriented programming-Benefits of OOP's-Application OOP-Structure of C++ program-Basic Data type-Derived Data type-User defined data type-Operators in C++, Class Members, Access Control, Class Scope, Control Statements, Constructor and Destructor, parameter passing method, inline function, static class members, this pointer, friend function, Dynamic memory allocation and de allocation (new and delete), exception handling.

#### Unit II: Features of Object Oriented Programming

(06)

Function Overloading, Generic Programming- Function and class templates, Defining operator overloading-overloading unary operator, overloading binary operator-rules for operator overloading.

### **Unit III: Inheritance**

(10)

Inheritance- Inheritance basics, base and derived classes, inheritance types:-single inheritance, multilevel inheritance, multiple inheritance, hierarchal inheritance, hybrid inheritance, and virtual base class –run time polymorphism using virtual function, pure virtual function, and abstract classes.

### **Unit IV: Introduction to Data structure**

(10)

Arrays-Introduction-Linear arrays-representation of linear arrays in memory, Sorting-selection sort, Insertion Sort, Bubble Sorting, Quick Sort, Merge Sort, radix sort, linear Search-Binary Search

### **Unit V: Introduction of Stack and Queue**

(10)

Introduction of Stack and Queue, Dynamic memory allocation, Linked list-Introduction-Representation of singly Linked List in memory, Traversing a linked list, Searching a linked list, insertion and deletion in linked list, implementation of stack using linked representation, implementation of queue using linked representation

### **Unit VI: Trees and Terminology**

(12)

**Trees:** Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree, Array and Linked Representation of Binary trees, Traversing Binary trees, Binary search Tree Implementation ,Operations – Searching, Insertion and deletion in binary search trees., Threaded Binary trees, Traversing Threaded Binary trees.

### **Text Book:**

1. E.Balagurusamy , “Object Oriented Programming with C++” , Tata McGraw Hill Publications.
2. Y.Langsam : “Data Structure using C and C++ “, Pearson Education Publications
3. Horowitz and Sahani : “Fundamentals of data Structures”, Galgotia Publication Pvt. Ltd., New Delhi.
4. A. M. Tenenbaum : “Data Structures using C & C++”, PHI Publications.

### **Reference Books:**

1. K.R.Venugopal,B.RajKumar,T.RaviShankar : “ Mastering C++” , Tata McGraw Hill publication.
2. W.Savitch : “Problem solving with C++ The OOP” , , Pearson education.
3. Herbert Scheldt : “ C++, the Complete Reference” Tata McGraw Hill Publications.
4. Robert L. Kruse, Alexander J. Ryba : “Data Structures and Program Design in C++”, PHI Publications.
5. Robert Lafore : “Object Oriented Programming in Microsoft C++”, Galgotia Publications.



**B. E. Third Semester**

**(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg.)**

**NETWORK ANALYSIS AND SYNTHESIS**

**Duration : 3 Hr.**

**College Assessment : 20 Marks**

**University Assessment : 80 Marks**

**Subject Code : BEENE305T/ BEECE305T / BEETE305T**

**[ 4 – 0 – 1 – 5 ]**

**Objectives :**

- To make the students capable of analyzing any given electrical network.
- To make the students learn how to synthesize an electrical network from a given impedance /admittance function.

**Outcomes**

- Students will be able to analyze the various electrical and electronic networks using the techniques they learn.
- Students will be able to construct a circuit to suit the need.

**Unit I: Basic Circuit Analysis and Simplification Techniques**

**(10)**

Source transformation and source shifting, Nodal and mesh analysis, Mutual inductances, Basic equilibrium equations, Matrix approach for complicated networks, Super mesh and super node analysis, Duality.

**Unit II: Network Theorems**

**(12)**

Superposition, Thevenin's, Norton's and Maximum Power Transfer Theorems, Reciprocity Theorem , Compensation Theorem, Millers Theorem and its dual, Tellegen's Theorem as applied to ac circuits.

### **Unit III: Frequency Selective Networks**

**(08)**

Significance of Quality factor. **Series Resonance:** Impedance, Phase angle variations with frequency, Voltage and current variation with frequency, Bandwidth, Selectivity. Effect of  $R_g$  on BW & Selectivity. Magnification factor.

**Parallel resonance:** Resonant frequency and admittance variation with frequency, Bandwidth and selectivity. General case: Resistance present in both branches. Comparison and applications of series and parallel resonant circuits.

### **Unit IV: Filters and Attenuators**

**(12)**

Filters & Attenuators: Filter fundamentals, pass and stop band, constant k prototype, LPF, HPF, BPF, Band stop filter, m-derived filters, composite filter design. Attenuators: Definition and Units of attenuation, Bartlett's bisection theorem, lattice attenuator, symmetrical T,  $\pi$  and bridged attenuator, asymmetrical L-section attenuator, Ladder attenuator

Types of Transmission lines, Transmission Line Equation, Equivalent circuits, Primary and Secondary line constants

### **Unit V: Laplace Transform and Its Applications**

**(08)**

Introduction to complex frequency, Definition of Laplace Transform, Basic Properties of Laplace Transform, Inverse Laplace Transform Techniques, Laplace Transform of Basic R, L and C components, Synthesis of Few typical waveforms & their Laplace Transform, Transient response of simple electrical circuits such as RL & RC to standard inputs and evaluation of initial and final conditions.

### **Unit VI: Two Port Network Parameters and Functions**

**(10)**

Terminal characteristics of network: Z, Y, h, ABCD Parameters; Reciprocity and Symmetry conditions, Applications of the parameters. Network functions for one port and two port networks, Pole-zeros of network functions and network stability,

**Text Books :**

1. M.E. Van Valkenburg : Network Analysis, PHI
2. D. Roy Choudhary : Network and systems, New Age Publication
3. Linear Network Theory : Kelkar and Pandit, Pratibha Publications.

**Reference Books:**

1. Circuit Theory : Chakraborti , Dhanpat Rai
2. Engineering Circuit Analysis : Hayt W.H. & J.E. Kemmerly , TMH
3. Network analysis with Applications : William D Stanley, Pearson Education
4. Network analysis : G.K. Mittal, Khanna Publications

**Applied Mathematics- IV (EN/ET)**  
**Scheme (Theory: 4 hrs, Tutorial :1 hr)**

**UNIT – I: NUMERICAL METHODS (12 Hrs)**

Error Analysis, Solution of Algebraic and Transcendental Equations: Method of False position Newton–Raphson method and their convergence, Solution of system of simultaneous linear equations: Gauss elimination method, Crout's method and Gauss Seidel method, Numerical solution of ordinary differential equation: Taylor's series method, Runge- Kutta 4<sup>th</sup> order method. Euler's modified method. Milne's Predictor- Corrector method, Runge- Kutta method to solve Simultaneous first order differential equations, Largest Eigen value and Eigen vector by Iteration method.

**UNIT – II: Z-TRANSFORM (08Hrs)**

Definition , Convergence of Z-transform and Properties, Inverse Z-transform by Partial Fraction Method, Residue Method (Inversion Integral Method) and Power Series Expansion, Convolution of two sequences. Solutions of Difference Equations with Constant Coefficients by Z- transform.

**UNIT - III: SPECIAL FUNCTIONS AND SERIES SOLUTION(12 Hrs)**

Series Solution of Differential Equation by Frobenius method, Bessel's equation and Bessel's functions, Legendre's polynomials, Recurrence relations, Rodrigue's formula , Generating functions, Orthogonal properties of  $J_n(x)$  and  $P_n(x)$ .

**UNIT – IV: THEORY OF PROBABILITY (10 Hrs)**

Axioms of Probability, Conditional Probability, Baye's Rule, Random variables: Discrete and Continuous random variables, Probability function and Distribution function, Joint distributions, Independent Random Variables, Conditional Distributions.

**UNIT – V: MATHEMATICAL EXPECTATIONS (10 Hrs)**

Definition Mathematical Expectation, Functions of Random Variables, Variance and Standard Deviation, Moments, Moment generating function, Covariance, Correlation Coefficient, Conditional Expectations, Other measures of central tendency and dispersion, Skewness and Kurtosis.

**UNIT – VI: PROBABILITY DISTRIBUTIONS (08 Hrs)**

Binomial distribution, Poisson distribution, Normal distribution, Relation between Binomial, Poisson and Normal distribution, Central Limit theorem, Exponential Distribution.

### Text Books:

1. Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication
2. Theory & Problems of Probability and Statistics by Murray R. Spiegel , Schaum Series, McGraw Hills
3. Advanced Engineering Mathematics by Erwin Kreyszig, 8th Edition, Wiley India

### Reference Books

1. Introductory methods of Numerical Analysis by S.S. Sastry, PHI
2. A Text Book of applied Mathematics, Volume I & II by P.N. Wartikar & J.N. Wartikar, Poona Vidyarthi Griha Prakashan
3. Advanced Mathematics for Engineers by Chandrika Prasad,
4. Digital Signal Processing, by John Proakis and D.G. Manolakis, Pearson (for Z-Transform)
5. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.

**B. E. Fourth Semester**

**(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg.)**

**POWER DEVICES AND MACHINES**

**Duration : 3 Hr.**

**College Assessment : 20 Marks**

**University Assessment : 80 Marks**

**Subject Code : BEENE402T/ BEECE402T/ BEETE402T**

**[ 4 – 0 – 1 – 5 ]**

---

**Objectives :** To teach the basic concepts of power electronics. Also to study the important power devices and machines in detail along with basic applications of SCR as controlled rectifier. To get skill of developing and design related to power electronic circuits.

**Outcomes :**

After learning this subject, the students will

1. Understand the basics of different components used in Power Electronics.
  2. Understand the working and characteristics of different power devices along with their applications in Electronic circuits.
  3. Understand the concept of AC-DC converters, Choppers, Inverters which are widely used in industries.
  4. Understand the different AC/DC machines and their speed control methods.
- 

**Unit I : Thyristors**

**(12)**

**SCR :** Construction, Operation, Transistor analogy, Static & dynamic Characteristics, Switching characteristics, SCR Ratings, Gate characteristics, Triggering requirements, Triggering techniques, Isolation Techniques, Pulse triggering, Burst triggering

**TRIAC :** Construction, Operation, steady state characteristics, Triggering modes, Principle of DIAC, Phase control using TRIAC

**Unit II : Power Devices**

**(10)**

**IGBT :** Construction, operation, Steady stage characteristics, Switching characteristics, Safe operating area, Need for gate/base drive circuits, Isolation techniques, Base drive circuits for Power BJT

**Power MOSFET** : Construction, operation, Static characteristics , Switching characteristics , forward and reverse bias operation, Gate drive circuits for Power MOSFET and IGBT.

**GTO** : Construction, Operation, Turn-off mechanism, Applications.

**Unit III :** (10)

**Phase controlled Rectifiers (AC-DC Converters )** : Single phase half Wave controlled, full wave controlled rectifiers with R and RL load, Bridge Configurations with R and RL load, Effect of Free-wheeling diode, Three phase full wave and half wave controlled with resistive load.

AC-AC Converters : Basic Principle, Operation , Single phase AC voltage controller for R and RL loads, Working of Three phase AC-AC controller with R Load.

**Unit IV : Power Converters** (10)

**DC-DC converters (Chopper)** : Working principle of chopper, Types of chopper : Step-Up & Step-Down chopper for RL Load, Class-A, class-B, Class-C, Class-D and Class-E chopper, Control Strategies

**DC-AC Converters (Inverter)** : Classification of inverter, Working Principle of single phase Half Bridge and Single Phase Full Bridge inverter for R and RL load, Three phase Bridge inverter for Resistive (Star) load.

**Unit V :** (10)

**Three Phase Transformers** : Construction, Different Connections : Star-Star, Delta-Delta, Star-Delta, Delta-Star, Open Delta Connection, Scott Connection, Parallel operation.

**Three Phase Induction Motor** : Principle of operation, Necessity of starters , DOL starter, Autotransformer starter, Star-Delta Starter, Speed control techniques of three-phase induction motor.

**Unit VI :** (08)

**DC Motors** : Principle of Operation, Types of Motor, Speed Control of Shunt Motor : Flux Control, Armature Control and voltage control method, Speed Control of Series : Flux Control, Rheostatic Control method

**Universal Motor** : Construction, Working ,characteristics and applications.

**Text Books :**

1. M.H. Rashid : "Power Electronic circuits devices and applications", PHI Publications.
2. M.D. Singh & Khanchandani : "Power Electronics", TMH Publications, New Delhi.
3. B.L. Theraja : "Electrical Technology" , Volume-2, S.Chand Publications

**Reference:**

1. P.C. Sen : "Modern Power Electronics", S. Chand & Co, New Delhi.
2. P. Bhimra , " Power Electronics", Khanna publications
3. Nagrath Kothari : "Electrical Machines", TMH Publications.



**B. E. Fourth Semester**

**(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg.)**

**POWER DEVICES AND MACHINES**

**Duration : 2 Hr.**

**College Assessment : 25 Marks**

**University Assessment : 25 Marks**

**Subject Code : BEENE402P/ BEECE402P/ BEETE402P**

**[ 0 – 2 – 0 – 1 ]**

---

**Objectives :** To teach the basic concepts of power electronics. Also to study the important power devices and machines in detail along with basic applications of SCR as controlled rectifier. To get skill of developing and design related to power electronic circuits.

**Outcome :**

After completion of practicals, the students will

1. Understand the working and nature of characteristics of different power components used in Power Devices.
  2. Be able to calculate performance parameters for different devices.
  3. Be able to perform different tests on Transformers and motors for calculating the losses, efficiency, regulation etc.
  4. Understand the concept of starters used for starting AC/DC motors.
  5. Understand different speed control methods for motors.
- 

**List of Experiments :**

1. To study and plot V-I Characteristics of SCR.
2. To study and plot V-I Characteristics of TRIAC.
3. To study UJT as a relaxation oscillator.
4. To study and plot IGBT characteristics.
5. To study and plot characteristics of DC Chopper.
6. To study and plot characteristics of Single phase converter.
7. To study Series Inverter.
8. To perform O.C. and S.C. Test on Three Phase Transformer.
9. To study Load test on DC motor.
10. To study speed control of DC shunt motor.
11. To perform No-Load and Block Rotor test on Three Phase Induction Motor.
12. To study Starters of AC and DC motor.
13. To find slip of Three Phase Induction Motor.

**Note :** Minimum 8 practicals to be conducted.

**B. E. Fourth Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

## **ELECTROMAGNETIC FIELDS**

**Duration : 3 Hr.**

**College Assessment : 20 Marks**

**University Assessment : 80 Marks**

**Subject Code : BEENE403T/ BEECE403T/ BEETE403T**

**[ 4 – 0 – 1 – 5 ]**

---

**Objectives :** To provide the students of Engineering with a clear and logical presentation of basic concepts and principles of electromagnetic.

**Outcomes :**

After the completion of this subjects, the students will

1. Understand the concepts of Electric, Magnetic and Electromagnetic fields required to understand the concepts of Electronic Communication.
  2. Understand the different coordinate system for mathematical analysis of Electromagnetic Engineering.
  3. Understand the different theorems and their use in Electromagnetic field.
  4. Understand the use of waveguides for the transmission of electromagnetic waves at higher frequencies.
  5. Understand the basic concepts of Radiation and Elements used for radiation along with the basic terminologies.
- 

**UNIT I : ELECTROSTATICS**

**(12)**

Introduction to Cartesian, Cylindrical and Spherical coordinate systems, Electric field intensity, flux density, Gauss's law, Divergence, Divergence Theorem, Electric potential and potential gradient.

**UNIT II: MAGNETOSTATICS:**

**(10)**

Current density and continuity equation, Biot-Savert's law, Ampere's circuital law and applications, Magnetic flux and Flux density, Scalar and Vector magnetic potentials.

**UNIT III: MAXWELL S EQUATIONS AND BOUNDARY CONDITIONS: (08)**

Maxwell's equations for steady fields. Maxwell's equations for time varying fields. Electric and magnetic boundary conditions.

**UNIT IV :ELECTROMAGNETIC WAVES (10)**

Electromagnetic wave equation, wave propagation in free space, in a perfect dielectric, and perfect conductor, skin effect, Poynting vector and Poynting theorem, reflection and refraction of uniform plane wave at normal incidence plane, reflection at oblique incident angle

**UNIT V: WAVEGUIDES (10)**

Introduction, wave equation in Cartesian coordinates, Rectangular waveguide, TE, TM, TEM waves in rectangular guides, wave impedance, losses in wave guide, introduction to circular waveguide.

**UNIT VI: RADIATION (10)**

Retarded potential, Electric and magnetic fields due to oscillating dipole (alternating current element), power radiated and radiation resistance, application to short monopole and dipole. Antenna Efficiency, Beam-width, Radiation Intensity, Directive Gain Power Gain & Front To Back Ratio. Advance topics on the subject

**TEXT BOOKS:**

1. W.H Hayt. and J.A. Buck : " Engineering Electromagnetics", McGraw Hill Publications.
2. Antenna & wave propogation, by K. D. Prasad, PHI Publication.
3. E.C. Jordan and K.C.Balamin : "Electromagnetic Waves and Radiating System", PHI Publications.

**REFERENCE BOOKS:**

1. Rao : "Elements of Engineering Electromagnetics", Pearson education
2. E J.D Krauss : "Electromagnetics" , Mc-Graw Hill Publications.

3. Fields and Waves in Communication Electronics (3rd edition), by S. Ramo and R. Whinnery, John Wiley and Sons.
4. R.S. Kshetrimayum: "Electromagnetic Field Theory", CENGAGE Learning Publications.
5. John Reitz, F. Milford, R.W. Christy : "Foundations of Electromagnetic Theory", Pearson Publications.

**B. E. Fourth Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

**DIGITAL CIRCUITS AND FUNDAMENTAL OF MICROPROCESSOR**

**Duration : 3 Hr.**

**College Assessment : 20 Marks**

**University Assessment : 80 Marks**

**Subject Code : BEENE404T / BEECE404T/ BEETE404T**

**[ 4 – 0 – 1 – 5]**

---

**Objectives :** To acquaint students with various basic digital gates used in digital system and develop logical circuits using Boolean gates, construction of various logic circuits using basic gates.

---

**Outcomes :** At the end of the course the student will be able to analyze, design, and evaluate digital circuits of medium complexity, that are based on SSIs, MSIs, and programmable logic devices.

---

**Unit I: Combinational Circuits**

**(08)**

Standard representations for logic functions, k map representation of logic functions (SOP & POS forms), minimization of logical functions for min-terms and max-terms (upto 4 variables), don't care conditions, Design Examples: Arithmetic Circuits, BCD - to - 7 segment decoder, Code converters.

**Unit II :Logic Circuit Design**

**(12)**

Adders and their use as subtractor, look ahead carry, ALU, Digital Comparator, Parity generators/checkers, Static and dynamic hazards for combinational logic.

Multiplexers and their use in combinational logic designs, multiplexer trees, Demultiplexers, Encoders & Decoders .

**Unit III: Sequential Logic Design**

**(10)**

1 Bit Memory Cell, Clocked SR, JK, MS J-K flip flop ,D and T flip-flops. Use of preset and clear terminals, Excitation Table for flip flops. Conversion of flip flops.

**Unit IV : Application of Flip flops:** (10)

Registers, Shift registers, Counters (ring counters, twisted ring counters), Sequence Generators, ripple counters, up/down counters, synchronous counters, lock out, Clock

Skew

**Unit V: Digital Logic Families** (08)

**Classification of logic families** , Characteristics of digital ICs-Speed of operation , power dissipation, figure of merit, fan in, fan out, Comparison table of Characteristics of TTL, CMOS, ECL, RTL, I<sup>2</sup>L, DCTL.

**Classification and characteristics of memories:** RAM, ROM, EPROM, EEPROM, NVRAM, SRAM, DRAM, expanding memory size, Synchronous DRAM (SDRAM), Double Data Rate SDRAM, Synchronous SRAM, DDR and QDR SRAM, Content Addressable Memory

**Programmable logic devices:** Detail architecture, Study of PROM, PAL, PLA, Designing combinational circuits using PLDs.

**Unit VI: Fundamental of Microprocessor** (12)

Introduction to microprocessor, Architecture of 8085 microprocessor, Addressing modes, 8085 instruction set, Concept of assembly language programming, Interrupts.

**Text Books:**

1. Morris Mano : “ An approach to digital Design”, Pearson Publications.
2. Ramesh Gaonkar : “ Microprocessor Architecture, Programming and Applications with the 8085”, Penram International Publications.
3. W. Fletcher : “Engg. Approach to Digital Design”, PHI Publications.

**Reference Books**

1. Wakerly Pearson : “Digital Design: Principles and Practices”, Pearson Education Publications.
2. Mark Bach : “Complete Digital Design”, Tata MCGraw Hill Publications
3. R.P. Jain : “Modern digital electronics” , TMH Publications.

**B. E. Fourth Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

**DIGITAL CIRCUITS AND FUNDAMENTAL OF MICROPROCESSOR**

**Duration : 2 Hr.**

**College Assessment : 25 Marks**

**University Assessment : 25 Marks**

**Subject Code : BEENE404P / BEECE404P/ BEETE404P**

**[ 0 – 2 – 0 – 1 ]**

---

**Objectives :** To learn the basic methods for the design of digital circuits and provide the fundamental concepts used in the design of digital systems.

**Outcome :**

After the completion of practicals, the students will

1. Understand the fundamental of basic gates and their use in combinational and sequential circuits.
  2. Understand the use of digital components as a switching elements.
  3. Be able to generate basic arithmetic and logical circuits required in microcomputer systems.
- 

**List of Experiments :**

1. To verify the truth table of different Logic Gates.
2. To study and verify the NAND and NOR gates as a universal gates.
3. To implement any logic function using basic gates.
4. To study and verify truth table of Multiplexer and Demultiplexer.
5. To study and verify the truth table of Half adder and Full Adder.
6. To study and verify the truth table of different types of Flip-flops.
7. To study and verify truth table of Encoder and Decoder.
8. To study and implement ALU.
9. To study the functioning of Shift Register.
10. To study the functioning of Up/Down counter .
11. To study the architecture of 8085 microprocessor.
12. Write and execute an ALP for multiplication of two 8 bit numbers.
13. Write and execute an ALP to count number of 1's in 8 bit number.

**Note :** Minimum 8 Practical to be conducted.

**B. E. Fourth Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

**SIGNALS AND SYSTEMS**

**Duration : 3 Hr.**

**College Assessment : 20 Marks**

**University Assessment : 80 Marks**

**Subject Code : BEENE405T/ BEECE405T/ BEETE405T**

**[ 4 – 0 – 1 – 5 ]**

---

**Objectives :**

The concept of this subject enable you to understand how signals, systems and inference combine in prototypical tasks of communication, control and signal processing.

**Outcomes :**

After completion of this subject, the students will

1. Get knowledge about different types of signals and systems used in communication Electronics.
  2. Understand the concept of probability and its use in communication system.
  3. Be able to embed the use of fourier series and fourier transform for feature extraction of different electronic signals.
  4. Understand different coding schemes and able to apply selective coding scheme for the application needed.
  5. Understand the different analog and digital modulation schemes
- 

**UNIT-I: SIGNAL ANALYSIS**

**(12)**

Analysis of Signals, Representation of signals using a set of orthogonal signals, Fourier series representation of periodic signals. Fourier transform of periodic and non-periodic signals, Properties of Fourier Transform, convolution in time & frequency domain. Sampling theory for band limited signals.

**UNIT-II: PROBABILITY & RANDOM PROCESS**

**(12)**

Probability, random variables and stochastic processes. Review of probability theory, random variables, probability density and distribution function, Random processes, periodic processes,



stationary processes. Auto correlation, cross correlation, applications to signal analysis,. Power density and spectral density function.

**UNIT-III: LINE CODING (08)**

Bandwidth and rate of pulse transmission, Inter symbol Interference, PSD of Digital signals, Line coding, RZ, NRZ, Polar, Manchester coding Schemes. Nyquists's first & second Criterion for zero ISI, Pulse shaping, tapped delay line filters and adaptive equalization.

**UNIT-IV: MODULATION TECHNIQUES (10)**

Introduction of Amplitude Modulation and Frequency modulation in brief, Elementary theory of SSB, DSB and noise calculation, noise calculation in SSBSC, DSB with carrier, Square law Demodulation, Envelope Demodulator, Noise in FM reception, Effect of Transmitter noise, FM threshold Effect

Quantization noise, types of Quantization –Uniform and Non-Uniform, A-Law and  $\mu$  Law, Pulse Code Modulation , Delta modulation, Adaptive Delta modulation,

**UNIT-V: DIGITAL CARRIER SYSTEM (08)**

Digital Carrier Systems: Matched filter detection of binary signals, decision, threshold, error probability, Salient features of ASK, FSK & PSK system DPSK systems including M-ary Communication Systems.

**UNIT-VI: INFORMATION THEORY AND CODING (10)**

Information theory, channel capacity of discrete & continuous channels, Error control coding Hamming distance, Linear block codes, CRC, Convolution Codes.

**Text Books:**

1. B.P.Lathi : " Modern Digital & Analog Communication Systems" .:
2. Simon Haykin, Barry Van Veen : "Signals and Systems", John Wiley and Sons Publications.
3. Oppenheim, Wilsky, Nawab : "Signals and Systems", Person Education Publications
4. A.B. Carlson : " Communication systems",

**Reference Books:**

1. Communication Systems: B.P. Lathi.
2. R.P. Singh, S.D. Sapre : "Communication Systems: Analog and Digital", McGraw Hill Publications.
3. Nagrath I.J., Sharan S.N., Ranjan R., Kumar S. : "Signals and Systems", Tata McGraw Hill Publications.

**B.E. Fourth Semester**

**(Electronics/Electronics & Communication/ Electronics & Telecommunication Engg)**

**ENVIRONMENTAL STUDIES**

**Duration : 3 Hr.**

**College Assessment : Grade**

**University Assessment : 00 Marks**

**Subject Code : BEENE406T/ BEECE406T/ BEETE406T  
– 0]**

**[ 3 – 0 – 0**

---

**Objectives :**

The goals of the Environmental Studies subject are to:

- 1) Increase understanding of how the world as a bio-physical system works, foster awareness of the earth's vital signs, and sharpen the ability of students to understand the nature and results of science.
- 2) Encourage a critical understanding of the various historical, political, economic, ethical, and religious forces that have shaped and continue to shape our world.
- 3) Nurture an ecological frame of mind which is willing and able to see things whole and thus resist the narrow specialization that can blind us to the connections between disciplines and bodies of knowledge.
- 4) Cultivate people who have sufficient knowledge, care, and practical competence to live in an ecologically responsible way.
- 5) Provide opportunities for students to explore the connections between environmental issues and different religious and philosophical traditions, and to encourage students who are Christian to reflect on their faith and its vision of shalom.

**Outcome :**

Through the course sequence in ESS, students will be able to:

1. Recognize major concepts in environmental sciences and demonstrate in-depth understanding of the environment.
  2. Develop analytical skills, critical thinking, and demonstrate problem-solving skills using scientific techniques.
-

**Unit I : Introduction (2)**

Definition, Scope and importance, Need for public awareness – institutions in environment, people in environment.

**Unit II : Natural Resources (2)**

Renewable and non-renewable and associated problems; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

**Unit III : Ecosystems (8)**

**Concept of an ecosystem-** Understanding ecosystems, ecosystem degradation, resource utilization. **Structure and functions of an ecosystem** – producers, consumers and decomposers.

Energy flow in the ecosystem- water, carbon, oxygen, nitrogen and energy cycles, integration of cycles in nature. **Ecological succession**; food chains, food webs and ecological pyramids; ecosystem types – characteristic features, structure and functions of forest, grassland, desert and aquatic ecosystems.

**Unit IV : Bio-diversity (10)**

Introduction – Biodiversity at genetic, species and ecosystem levels

Bio-geographic classification of India

**Value of biodiversity** – Consumptive use value, productive use value, social, ethical, moral, aesthetic and optional value of biodiversity , Threats to bio-diversity nation; hotspots of biodiversity. **Threats to bio-diversity** – habitat loss, poaching of wildlife, man-wild life conflicts. Common endangered and endemic plant and animal species of India.

In situ and Ex situ conservation of biodiversity.

**Unit V : Pollution (6)**

Definition; causes, effects and control measures of air, water, soil, marine, noise and thermal pollutions and nuclear hazards. **Solid waste management** – Causes, effects and control measures of urban and industrial waste. Role of individual and institutions in prevention of pollution.

**Disaster management** – Floods, earthquake, cyclone, landslides

**Unit VI : Social Issues and the Environment (12)**

Unsustainable to sustainable development; Urban problems related to energy; water conservation, rainwater, harvesting, watershed management; problems and concerns of resettlement and rehabilitation of affected people.

Environmental ethics – issues and possible solutions – Resource consumption patterns and need for equitable utilization; equity disparity in Western and Eastern countries; Urban and rural equity issues; need for gender equity.

Preserving resources for future generations. The rights of animals; Ethical basis of environment education and awareness; conservation ethics and traditional value systems of India.

Climate change, global warming, acid rain, Ozone layer depletion, nuclear accidents and holocausts.

Wasteland Reclamation; Consumerism and Waste products.

Environment legislations – The Environment (Protection) Act; The water (Prevention and Control of pollution) Act; The Wildlife protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislations – environment impact assessment (EIA), Citizens actions and action groups.

Public Awareness – Using an environmental calendar of activities, self initiation.

## **Unit VII : Human Population and the Environment (10)**

Global population growth, variation among nations, population explosion; Family Welfare programmes – methods of sterilization; Urbanization.

Environment and human health – Climate and health, infectious diseases, water related diseases, risk due to chemicals in food, cancer and environment.

Human rights – Equity, Nutrition and health rights, Intellectual property rights (IPRS), Community Biodiversity registers (CBRs)

Value education – environmental values, valuing nature, valuing cultures, social justice, human heritage, equitable use of resources, common property resources, ecological degradation.

HIV/AIDS; Woman and Child Welfare; Information technology in environment and human health

### **Text Books :**

1. Erach Bharucha : “A Text Book of Environmental Studies”
2. M. N. Rao and HVN Rao : “ Air Pollution”
3. S.S. Dara : “Environmental Chemistry and Pollution Control”
4. Mahesh Rangarajan : “Environmental Issues in India”
5. D.L. Manjunath : “Environmental Studies”.

## B. E. Fourth Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)

### SOFTWARE WORKSHOP

Duration : 2 Hr.

College Assessment : 25 Marks

University Assessment : 25 Marks

Subject Code : BEENE407P / BEECE407P/ BEETE407P  
– 1]

[ 0 – 2 – 0

---

#### Objectives :

1. To instill in students the ability to formulate and solve engineering problems in electric and electronic circuits involving both steady state and transient conditions using MATLAB and pSpice.
2. Learn to use the pSpice simulation software tool for the analysis of Electrical and Electronic Circuits.
3. Learn to insert simple instructions to MATLAB, to find the solution of a system of linear algebraic equations, with constant (real and complex) coefficients.

#### Outcome :

After the completion of the Practicals , the students will be able to:

- 1) Write MATLAB program for any given problem.
- 2) Plot various functions using different graphical techniques.
- 3) Make mathematical analysis for the given problem.
- 4) Get the complete expert hand on pSpice Software.
- 5) To draw, analyze and plot the electronic circuits using pSpice Software.

---

Practical based on following topics should be conducted

#### SECTION - A

##### 1.Introduction to MATLAB

MATLAB environment, different windows in matlab, getting help, important commands, matlab as scratchpad, different types of files in matlab, complex variables and operations, plot commands

##### 2. Matrices & vectors

Matrix manipulation, matrix and array operations, arithmetic operators, relational operators, logical operators, solution of matrix equation  $Ax=B$ , Gauss elimination, inverse of matrix Eigen values and Eigen vectors, Determinant, least square solutions.

##### 3. Branching statements, loops and programming design

If statements, for loops, while, switch, Break and continue, nesting loops, if else with logical arrays, function programming.

#### **4. Symbolic manipulation**

Calculus – limit, continuity, differential calculus, differential equation, integration, integral transforms & Taylor series.

### **SECTION – B**

#### **5. Signals manipulations**

Plotting standard signals, continuous and discrete such as step, ramp, sine, Generating signals from combination of different, signals and manipulation of signals.

#### **6. Introduction to PSpice**

Introduction to PSpice, different windows in PSpice, tools, libraries, component properties, circuit designing in PSpice.

#### **7. Device characteristics**

Plotting characteristics of semiconductor devices – diode, bipolar junction transistor, field effect transistor, UJT and SCR

#### **8. Circuit Simulation & Introduction to PCB designing**

Simulation of following circuits: half wave & full wave rectifier, Zener shunt regulator, transistorized RC coupled amplifier, clipper and clamper Introduction to PCB design

**TERM WORK:** Minimum five experiments each from MATLAB & PSpice are conducted based on the following list.

### **LIST OF EXPERIMENTS**

#### **MATLAB**

1. Introduction to MATLAB Environment
2. To study simple matrix and array manipulations using Matlab
3. Programming using MATLAB
4. Calculus using MATLAB
5. To plot signals: discrete and continuous using MATLAB
6. Function programming and MATLAB
7. Signal Manipulation using MATLAB

#### **PSpice**

1. Design and simulation of resistive circuit
2. Plotting of VI characteristics of diode
3. Plotting of VI characteristics of BJT/FET
4. Plotting of VI characteristics of UJT/SCR
5. Design and simulation of half wave & full wave rectifier
6. Design and simulation of clipper and clamper circuits
7. Simulation of frequency response of a transistorized RC coupled amplifier

**References:-**

1. Stephen Chapman : “Matlab programming for Engineers” Thomson Learning Publication
2. Rudra Pratap : “Getting started with MATLAB” Oxford University press Publications.
3. Robert Strum and Donald Kirk : “Contemporary linear systems using MATLAB” Thomson Learning Publications.
4. Duane Hanselman & Bruce Little field : “Mastering MATLAB” Pearson Publications
5. Brain R. Hunt, Ronald L. Lipsman & Jonathan M. Rosenberg : “A guide to MATLAB” Cambridge University Press
6. Martin Golubitsky, Michael Dellnitz : “Linear Algebra and differential Equations using MATLAB” , International Thomson Publications.
7. Muhammad Rashid : “SPICE for Circuits and Electronics using PSpice”, PHI Edition
8. Robert Boylestad & Nashelsky : “Electronic Devices & Circuit theory” PHI publications

**Syllabus for**  
**Applied Mathematics- III (EN/ET/EE/Mech)**  
**Scheme (Theory: 4 hrs, Tutorial: 1hr.)**

**UNIT - I: LAPLACE TRANSFORM (15Hrs)**

Definition, Properties, Evaluation of integrals by Laplace Transform, Inverse Laplace Transform and its Properties, Convolution theorem (statement only), Laplace Transform of Periodic Functions (statement only), Unit Step Function and Unit Impulse Function, Applications of Laplace Transform to solve Ordinary Differential Equations, Simultaneous Differential Equations, Integral Equations & Integro-Differential Equations.

**UNIT – II: FOURIER SERIES & FOURIER TRANSFORM (08 Hrs)**

Periodic functions and their Fourier Expansions, Even and Odd functions, Change of interval, Half Range Expansions.

Fourier Transform: Definition and Properties (excluding FFT), Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform to Solve Integral Equation.

**UNIT – III: CALCULUS OF VARIATIONS(05 Hrs)**

Functionals, Maxima and minima of functionals, Euler's equation(statement only), Functionals dependent on First & Second order derivatives, Isoperimetric Problems, Solution of Boundary Value problems by Rayleigh-Ritz method.

**UNIT- IV: FUNCTIONS OF COMPLEX VARIABLE (12 Hrs)**

Analytic function, Cauchy- Riemann Conditions, Harmonic Functions (excluding orthogonal system), Milne-Thomson Method, Cauchy Integral Theorem & Integral Formula (Statement only), Taylor's & Laurent's series (Statement only), Zeros and Singularities of Analytic function, Residue Theorem (Statement only), Contour integration (Evaluation of real definite integral around unit circle and semi-circle).

**UNIT - V: PARTIAL DIFFERENTIAL EQUATIONS(08Hrs)**

Partial Differential Equations of First Order First Degree i.e. Lagrange's form, Linear Homogeneous Equations of higher order with constant coefficients. Method of separations of variables, Simple Applications of Laplace Transform to solve Partial Differential Equations (One dimensional only).



## **UNIT –VI: MATRICES(12Hrs)**

Linear and Orthogonal Transformations, Linear dependence of vectors, Characteristics equation, Eigen values and Eigen vectors, Statement and Verification of Cayley Hamilton Theorem [without proof], Reduction to Diagonal form, Reduction of Quadratic form to Canonical form by Orthogonal transformation, Sylvester's theorem [without proof], Solution of Second Order Linear Differential Equation with Constant Coefficients by Matrix method.

### Text Books

1. Higher Engineering Mathematics by B.S. Grewal, 40<sup>th</sup> Edition, Khanna Publication
2. Advanced Engineering Mathematics by Erwin Kreyszig, 8<sup>th</sup> Edition, Wiley India
3. Applied Mathematics for Engineers & Physicist by L.R. Pipes and Harville,
4. Calculus of variation by Forrey

### Reference Books

1. A Text Book of applied Mathematics, Volume II , by P.N. Wartikar & J.N. Wartikar, Poona Vidyarthi Griha Prakashan
2. Introductory methods of Numerical Analysis, by S.S. Sastry, PHI
3. Mathematics for Engineers by Chandrika Prasad
4. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.

**B. E. Third Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

**ELECTRONIC DEVICES AND CIRCUITS**

**Duration : 2 Hr.**

**College Assessment : 25 Marks**

**University Assessment : 25 Marks**

**Subject Code : BEENE302P / BEECE302P/ BEETE302P**

**[ 0 – 2 – 0**

**– 1]**

---

**Objectives :** To study basic concepts, DC circuits, AC circuits, semiconductors, Semiconductor devices, Power supply, Bipolar and Field effect transistor amplifiers, Frequency response of amplifier.

**Outcome :**

After completion of the practicals:

1. The students will get the basic concepts of different semiconductor components.
  2. They will be able to understand the use of semiconductor devices in different electronic circuits.
  3. They will be able to calculate different performance parameters of transistors.
  4. They will be able to plot and study the characteristics of semiconductor devices.
- 

**List of Experiments :**

1. To Plot V-I Characteristics of Si/Ge Diode.
2. To study Half Wave and Full Wave rectifier with and without Capacitor filter.
3. To study Input-output characteristics of Common Emitter Configuration.
4. To Determine the h-parameter of CE amplifiers.
5. To find Bandwidth of RC coupled Amplifier.
6. To Study RC Oscillator (RC-Phase Shift and Wien Bridge Oscillator).
7. To Study LC Oscillators (Colpitt's and Hartley Oscillator).
8. To study transistorized Astable Multivibrator.
9. To study Cross-over distortion in Class-B power amplifier.
10. To find the operating point of transistor.
11. To study transistor as an amplifier.
12. To study FET characteristics.

**Note :** Minimum 8 Practicals to be conducted.

**B. E. Third Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

**ELECTRONIC DEVICES AND CIRCUITS**

**Duration : 3 Hr.**

**College Assessment : 20 Marks**

**University Assessment : 80 Marks**

**Subject Code : BEENE302T / BEECE302T/ BEETE302T**

**[ 4 – 0 – 1 –**

**5]**

---

**Objectives :**

- (1) To present a clear consistent picture of the internal physical behavior of many electronic devices so that their studies of electronic circuits and system will be meaningful.
- (2) To develop the basic tools with which they can later learn about newly developed devices and applications.

---

**Outcome :**

1. This subject will give an overview of various semiconductor devices.
2. At the end of this course, the students will be able to analyze and design amplifier circuits, oscillators and filter circuits employing BJT, FET devices.

---

**Unit I : Diodes and it's applications**

**(08)**

PN junction diode, Volt-amp characteristics, Temperature dependence, Transition and Diffusion capacitance of PN junction , Zener and Avalanche Breakdown, **Diode Rectifiers:** Half wave, Full wave and Bridge rectifiers, Types of Filters, Ripple factor , Voltage Doublers.

**Unit II : BJT Biasing:**

**(10)**

Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, Necessity of BJT biasing, Transistor biasing methods, Stability factor, Thermal stabilization, Thermal runaway and Compensation circuits, Transistor as an Amplifier

**Unit III : Transistor Small Signal Analysis & Negative feedback amplifier**

**((12)**

h-parameter model, Analysis of Transistor Amplifier circuits using h-parameters, CB,CE and CC Amplifier configurations and performance factors.

**Principle of Negative feedback** in electronic circuits, Voltage series, Voltage shunt, Current series, Current shunt types of Negative feedback, Typical transistor circuits effects of Negative feedback on Input and Output impedance, Voltage and Current gains, Bandwidth, Noise and Distortion.

**Unit IV :****(10)**

**Principle of Positive feedback**, Concept of Stability in electronics circuits, Barkhausen criteria for oscillation, Principle of operation of RC Phase Shift, Wien Bridge, Colpitt's, Hartley, Crystal oscillators.

Principle of operation of Transistorized Astable, Bistable and Monostable multivibrator.

**Unit V : Power Amplifiers:****(10)**

Power dissipations in transistors, Harmonic distortion, Amplifiers Classification,(Class-A, Class-B, Class-C, Class-AB) Efficiency, Push-pull and complementary Push-pull amplifiers, Cross-over distortion.

**Unit VI : Field Effect Transistor and MOSFET:****(10)**

JFET and its characteristics, Pinch off voltage, Drain saturation current, JFET amplifiers, CS,CD,CG amplifiers ,their analysis using small signal JFET model ,Biasing the FET, The FET as VVR Overview of D-MOSFET, E-MOSFET, n MOSFET, pMOSFET .

**Text Books**

1. J. Millman and Halkias : "Electronic devices and circuits" , TMH Publications
2. Boylestad & Nashelsky : "Electronic Devices & Circuit Theory" , PHI publications.
3. Salivahanan, Suresh Kumar, Vallavaraj:"Electronic devices and circuits" , TMH Publications.

**Reference Book**

1. J. Millman and Halkias: "Integrated Electronics, Analog & Digital Circuits & Systems" TM- 2000.
2. Sedra & Smith: "Micro Electronic Circuits" Oxford University Press, 2000
3. Albert Malvino : " Electronics Principles", TMH Publications.
4. Floyd : "Electronic Devices", Pearson Publications.
5. Schilling & Beloove : " Electronics Circuits Discrete and Integrated", Mc.Graw Hill Publications.

**B. E. Third Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

**ELECTRONICS MEASUREMENT AND INSTRUMENTATION**

**Duration : 2 Hr.**

**College Assessment : 25 Marks**

**University Assessment : 25 Marks**

**Subject Code : BEENE303P/ BEECE303P/ BEETE303P**

**[ 0 – 2 – 0 – 1 ]**

---

**Objectives :** To learn basic measurement concepts and related instrumentation requirement as a vital ingredients of electronics Engineering.

**Outcome :**

After completion the practicals :

1. The students will be able to measure the resistance by various methods.
2. They will be able to use the various measuring instruments such as CRO, Function generator, Spectrum analyzer etc in effective manner.
3. They will be able to measure various physical parameters by using different techniques.

---

**List of Experiments :**

- 1- Measurement of Medium Resistance by using voltmeter ammeter method and Wheatstone bridge method.
- 2- Measurement of Low Resistance by using Kelvin Bridge Method.
- 3- Measurement of Unknown inductance by using Hay's Bridge / Maxwell Bridge Method
- 4- Measurement of Unknown Capacitance by using Schering Bridge Method.
- 5- To determine the frequency of unknown signal using Lissajous Pattern Method
- 6- To Determine DC Voltage, AC voltage and phase by using CRO.
- 7- Temp. Measurement & control using RTD / Thermocouple / Thermistor.
- 8- Displacement measurement using LVDT.
- 9- Level measurement using capacitive / resistive transducer

- 10- Flow measurement using optical transducer
- 11- Measurement of signal parameters using Digital Storage Oscilloscope.
- 12- Study of Data Acquisition system.
- 13- Feature extraction of Some standard signal using Spectrum Analyzer.

**Note :** Minimum 8 Practicals to be conducted.

**B. E. Third Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

**ELECTRONICS MEASUREMENT AND INSTRUMENTATION**

**Duration : 3 Hr.**

**College Assessment : 20 Marks**

**University Assessment : 80 Marks**

**Subject Code : BEENE303T/ BEECE303T/ BEETE303T**

**[ 4 – 0 – 0 – 4 ]**

---

**Objectives** The primary aim of this subject is to acquaint the students with the basic principles of measuring instruments and show how each of them can be exploited for the measurement of large number of variables.

**Outcome :** At the end of this course, students will be able to:

1. Explain basic concepts and definitions in measurement.
2. Explain the operation and design of electronic instruments for parameter measurement and operation of different Transducers
3. Explain the operation of oscilloscopes and the basic circuit blocks in the design of an oscilloscope.
4. Explain the circuitry and design of various function generators.

---

**Unit I : Fundamentals of Electronic Measurement and Instrumentation :**

**(06)**

Necessity of electronic Measurement , Block diagram of electronic measurement system, Types of Measurements, Function of instruments and measurement systems, Applications of measurement system, Elements of measurement system, Types of instruments, Theory of errors, Accuracy and Precision, Types of errors, Statistical analysis , probability of errors, Limiting errors, Standards of measurement.

**Unit II : Electromechanical Instruments :**

**(08)**

Construction of Galvanometer, Suspension Galvanometer, Torque and deflection Galvanometer, PMMC mechanism, DC voltmeter; AC voltmeters; Peak, average and true rms

voltmeters; Digital Multimeters; Ammeters, Ohm-meters and their design' AC indicating instruments, Watt-hour meter; Power factor meter.

**Unit III : AC and DC Bridges :** **(10)**

**DC Bridges :** Wheatstone Bridge, Kelvin Bridge

**AC Bridges and their applications :** Maxwell's Bridge, Hay's Bridge, Schering Bridge, Desauty's Bridge, Wein Bridge, Detectors for AC bridges.

**Unit IV : Transducers :** **(08)**

Static and dynamic characteristics, Classification of transducers, Capacitive transducer, Inductive transducer, Resistive transducer, RVDT, Strain Gauge, RTD, Optical Transducers, Hall effect transducer, Piezoelectric transducers, Transducers for measurement of Pressure, Temperature, Level, Displacement, Flow.

**Unit V : Oscilloscope and Signal Generators :** **(08)**

**CRO :** Types, Dual trace, High frequency, sampling and storage oscilloscopes, Applications of CRO.

**Signal Generators :** Introduction, Sine-wave generator, standard signal generators, Audio frequency signal generation, RF generator, Pulse generator, Function generator.

**Unit VI : Signal Analyzer and Data Acquisition System:** **(08)**

Construction and operation of Signal analyzer, Wave analyzer, Harmonic Distortion analyzer, Spectrum analyzer and Logic analyzer; Signal conditioning and its necessity, process adopted in signal conditioning, Functions of Signal conditioning, AC/DC Conditioning systems, Data conversion: ADC, DAC, Generalized data acquisition system: single channel and multi-channel DAS.



**Text Books:**

1. A.D. Helfrick and W.D. Cooper : “Modern Electronic Instrumentation and Measurement Techniques”, PHI Publications.
2. A.K. Sawhney : “Electrical and Electronic Measurement and Instrumentation”, Dhanpat Rai & Sons Publications.
3. S.S. Kalsi : “Electronics Measurements”, Mc Graw Hill Publications.
4. B.H. Oliver and J.M. Cage : “Electronics Measurement and Instrumentation”, Mc Graw Hill Publications

**Reference Book :**

1. Joseph J. Carr : “Elements of Electronic Instrumentation and Measurement”, Pearson Education Publications.
2. R.K. Rajput : “ Electrical And Electronic Measurement”, PHI Publications.
3. DVS Murthy : “ Transducers and Instrumentation”, PHI Publications.

**B. E. Third Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

**ELECTRONICS MEASUREMENT AND INSTRUMENTATION**

**Duration : 2 Hr.**

**College Assessment : 25 Marks**

**University Assessment : 25 Marks**

**Subject Code : BEENE303P/ BEECE303P/ BEETE303P**

**[ 0 – 2 – 0 – 1 ]**

---

**Objectives :** To learn basic measurement concepts and related instrumentation requirement as a vital ingredients of electronics Engineering.

**Outcome :**

After completion the practicals :

4. The students will be able to measure the resistance by various methods.
5. They will be able to use the various measuring instruments such as CRO, Function generator, Spectrum analyzer etc in effective manner.
6. They will be able to measure various physical parameters by using different techniques.

---

**List of Experiments :**

- 14- Measurement of Medium Resistance by using voltmeter ammeter method and Wheatstone bridge method.
- 15- Measurement of Low Resistance by using Kelvin Bridge Method.
- 16- Measurement of Unknown inductance by using Hay's Bridge / Maxwell Bridge Method
- 17- Measurement of Unknown Capacitance by using Schering Bridge Method.
- 18- To determine the frequency of unknown signal using Lissajous Pattern Method
- 19- To Determine DC Voltage, AC voltage and phase by using CRO.
- 20- Temp. Measurement & control using RTD / Thermocouple / Thermistor.
- 21- Displacement measurement using LVDT.
- 22- Level measurement using capacitive / resistive transducer

- 23- Flow measurement using optical transducer
- 24- Measurement of signal parameters using Digital Storage Oscilloscope.
- 25- Study of Data Acquisition system.
- 26- Feature extraction of Some standard signal using Spectrum Analyzer.

**Note :** Minimum 8 Practicals to be conducted.

**B. E. Third Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

**OBJECT ORIENTED PROGRAMMING & DATA STRUCTURE**

**Duration : 2 Hr.**

**College Assessment : 25 Marks**

**University Assessment : 25 Marks**

**Subject Code : BEENE304P/ BEECE304P/ BEETE304P**

**[ 0 – 2 – 0**

**– 1]**

---

**Objectives :**

1. To understand the concept of object oriented programming and develop skills in C++ Language.
2. Access how the choice of data structures and algorithm design methods impacts the performance of programs.
3. To Choose the appropriate data structure and algorithm design method for a specified application.
4. Write programs using ‘C++ Language’.

**Outcome :**

On successful completion of practicals of this subject the student will be able to:

1. Implement the concept of object oriented programming in any programming language.
  2. Explain the basic data structures and algorithms for manipulating them.
  3. Implement these data structures and algorithms in the C++ language.
  4. Integrate these data structures and algorithms in larger programs.
  5. Code and test well-structured programs of moderate size using the C++ language.
  6. Apply principles of good program design to the C++ language.
- 

**List of Experiments :**

- 1) Write a C++ program to implement the concept of class and object.  
**Given Data:** - class student:-roll number, name and address
- 2) Write a C++ program to find the area of circle and rectangle by using default and parameterized constructor.
- 3) Write a C++ program using following inheritance path: Student -> Marks-> Result & to produce result of each student.
- 4) Write a C++ program, to implement operator overloading. Overload “+” operator so that two string can be concatenated.
- 5) Write a C++ program to implement a following sorting tech. to arrange elements in ascending order.  
1) Bubble sort 2) Insertion sort
- 6) Write a C++ program to implement a stack in which push, pop and display can be performed.
- 7) Write a C++ program to implement a queue in which insertions, deletions and display can be performed.

- 8) Write an interactive C++ program to create a singly linked list and perform following operation.
  - 1) Create
  - 2) Insert
  - 3) Delete
- 9) Write a C++ program to construct a binary tree and perform following traversing techniques.
  - 1) Preorder
  - 2) Inorder
  - 3) Postorder
- 10) Write a C++ program to construct a binary search Tree and perform following Operation.
  - 1) Insert
  - 2) Delete
  - 3) Print leaf node
- 11) Write a C++ Program to implement quick sort.
- 12) Write a C++ Program to implement “this” keyword.

**Note :** Minimum 8 Practicals to be conducted

## B. E. Third Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg.)

### OBJECT ORIENTED PROGRAMMING & DATA STRUCTURE

Duration : 3 Hr.

College Assessment : 20 Marks

University Assessment : 80 Marks

Subject Code : BEENE304T/ BEECE304T/ BEETE304T

[ 4 – 0 – 1

– 5]

---

#### Objectives :

1. To understand the concept of object oriented programming and develop skills in C++ Language.
2. Access how the choice of data structures and algorithm design methods impacts the performance of programs.
3. To Choose the appropriate data structure and algorithm design method for a specified application.
4. Write programs using ‘C++ Language’.

#### Outcomes :

On successful completion of this subject the student will be able to:

1. Be able to implement the concept of object oriented programming in any programming language.
  2. Explain the basic data structures and algorithms for manipulating them.
  3. Implement these data structures and algorithms in the C++ language.
  4. Integrate these data structures and algorithms in larger programs.
  5. Code and test well-structured programs of moderate size using the C++ language.
  6. Apply principles of good program design to the C++ language.
- 

#### Unit I: Introduction to Object Oriented Programming

(12)

Basic concepts of object oriented programming-Benefits of OOP's-Application OOP-Structure of C++ program-Basic Data type-Derived Data type-User defined data type-Operators in C++, Class Members, Access Control, Class Scope, Control Statements, Constructor and Destructor, parameter passing method, inline function, static class members, this pointer, friend function, Dynamic memory allocation and de allocation (new and delete), exception handling.

#### Unit II: Features of Object Oriented Programming

(06)

Function Overloading, Generic Programming- Function and class templates, Defining operator overloading-overloading unary operator, overloading binary operator-rules for operator overloading.

### **Unit III: Inheritance**

(10)

Inheritance- Inheritance basics, base and derived classes, inheritance types:-single inheritance, multilevel inheritance, multiple inheritance, hierarchal inheritance, hybrid inheritance, and virtual base class –run time polymorphism using virtual function, pure virtual function, and abstract classes.

### **Unit IV: Introduction to Data structure**

(10)

Arrays-Introduction-Linear arrays-representation of linear arrays in memory, Sorting-selection sort, Insertion Sort, Bubble Sorting, Quick Sort, Merge Sort, radix sort, linear Search-Binary Search

### **Unit V: Introduction of Stack and Queue**

(10)

Introduction of Stack and Queue, Dynamic memory allocation, Linked list-Introduction-Representation of singly Linked List in memory, Traversing a linked list, Searching a linked list, insertion and deletion in linked list, implementation of stack using linked representation, implementation of queue using linked representation

### **Unit VI: Trees and Terminology**

(12)

**Trees:** Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree, Array and Linked Representation of Binary trees, Traversing Binary trees, Binary search Tree Implementation ,Operations – Searching, Insertion and deletion in binary search trees., Threaded Binary trees, Traversing Threaded Binary trees.

### **Text Book:**

1. E.Balagurusamy , “Object Oriented Programming with C++” , Tata McGraw Hill Publications.
2. Y.Langsam : “Data Structure using C and C++ “, Pearson Education Publications
3. Horowitz and Sahani : “Fundamentals of data Structures”, Galgotia Publication Pvt. Ltd., New Delhi.
4. A. M. Tenenbaum : “Data Structures using C & C++”, PHI Publications.

### **Reference Books:**

1. K.R.Venugopal,B.RajKumar,T.RaviShankar : “ Mastering C++” , Tata McGraw Hill publication.
2. W.Savitch : “Problem solving with C++ The OOP” , , Pearson education.
3. Herbert Scheldt : “ C++, the Complete Reference” Tata McGraw Hill Publications.
4. Robert L. Kruse, Alexander J. Ryba : “Data Structures and Program Design in C++”, PHI Publications.
5. Robert Lafore : “Object Oriented Programming in Microsoft C++”, Galgotia Publications.

**B. E. Third Semester**

**(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg.)**

**NETWORK ANALYSIS AND SYNTHESIS**

**Duration : 3 Hr.**

**College Assessment : 20 Marks**

**University Assessment : 80 Marks**

**Subject Code : BEENE305T/ BEECE305T / BEETE305T**

**[ 4 – 0 – 1 – 5 ]**

**Objectives :**

- To make the students capable of analyzing any given electrical network.
- To make the students learn how to synthesize an electrical network from a given impedance /admittance function.

**Outcomes**

- Students will be able to analyze the various electrical and electronic networks using the techniques they learn.
- Students will be able to construct a circuit to suit the need.

**Unit I: Basic Circuit Analysis and Simplification Techniques**

**(10)**

Source transformation and source shifting, Nodal and mesh analysis, Mutual inductances, Basic equilibrium equations, Matrix approach for complicated networks, Super mesh and super mode analysis, Duality.

**Unit II: Network Theorems**

**(12)**

Superposition, Thevenin's, Norton's and Maximum Power Transfer Theorems, Reciprocity Theorem , Compensation Theorem, Millers Theorem and its dual, Tellegen's Theorem as applied to ac circuits.



**Unit III: Frequency Selective Networks****(08)**

Significance of Quality factor. **Series Resonance:** Impedance, Phase angle variations with frequency, Voltage and current variation with frequency, Bandwidth, Selectivity. Effect of  $R_g$  on BW & Selectivity. Magnification factor.

**Parallel resonance:** Resonant frequency and admittance variation with frequency, Bandwidth and selectivity. General case: Resistance present in both branches. Comparison and applications of series and parallel resonant circuits.

**Unit IV: Filters and Attenuators****(12)**

Filters & Attenuators: Filter fundamentals, pass and stop band, constant k prototype, LPF, HPF, BPF, Band stop filter, m-derived filters, composite filter design. Attenuators: Definition and Units of attenuation, Bartlett's bisection theorem, lattice attenuator, symmetrical T,  $\pi$  and bridged attenuator, asymmetrical L-section attenuator, Ladder attenuator

Types of Transmission lines, Transmission Line Equation, Equivalent circuits, Primary and Secondary line constants

**Unit V: Laplace Transform and Its Applications****(08)**

Introduction to complex frequency, Definition of Laplace Transform, Basic Properties of Laplace Transform, Inverse Laplace Transform Techniques, Laplace Transform of Basic R, L and C components, Synthesis of Few typical waveforms & their Laplace Transform, Transient response of simple electrical circuits such as RL & RC to standard inputs and evaluation of initial and final conditions.

**Unit VI: Two Port Network Parameters and Functions****(10)**

Terminal characteristics of network: Z, Y, h, ABCD Parameters; Reciprocity and Symmetry conditions, Applications of the parameters. Network functions for one port and two port networks, Pole-zeros of network functions and network stability,

**Text Books :**

1. M.E. Van Valkenburg : Network Analysis, PHI
2. D. Roy Choudhary : Network and systems, New Age Publication
3. Linear Network Theory : Kelkar and Pandit, Pratibha Publications.

**Reference Books:**

1. Circuit Theory : Chakraborti , Dhanpat Rai
2. Engineering Circuit Analysis : Hayt W.H. & J.E. Kemmerly , TMH
3. Network analysis with Applications : William D Stanley, Pearson Education
4. Network analysis : G.K. Mittal, Khanna Publications

**Applied Mathematics- IV (EN/ET)**  
**Scheme (Theory: 4 hrs, Tutorial :1 hr)**

**UNIT – I: NUMERICAL METHODS (12 Hrs)**

Error Analysis, Solution of Algebraic and Transcendental Equations: Method of False position Newton–Raphson method and their convergence, Solution of system of simultaneous linear equations: Gauss elimination method, Crout's method and Gauss Seidel method, Numerical solution of ordinary differential equation: Taylor's series method, Runge- Kutta 4<sup>th</sup> order method. Euler's modified method. Milne's Predictor- Corrector method, Runge- Kutta method to solve Simultaneous first order differential equations, Largest Eigen value and Eigen vector by Iteration method.

**UNIT – II: Z-TRANSFORM (08Hrs)**

Definition , Convergence of Z-transform and Properties, Inverse Z-transform by Partial Fraction Method, Residue Method (Inversion Integral Method) and Power Series Expansion, Convolution of two sequences. Solutions of Difference Equations with Constant Coefficients by Z- transform.

**UNIT - III: SPECIAL FUNCTIONS AND SERIES SOLUTION(12 Hrs)**

Series Solution of Differential Equation by Frobenius method, Bessel's equation and Bessel's functions, Legendre's polynomials, Recurrence relations, Rodrigue's formula , Generating functions, Orthogonal properties of  $J_n(x)$  and  $P_n(x)$ .

**UNIT – IV: THEORY OF PROBABILITY (10 Hrs)**

Axioms of Probability, Conditional Probability, Baye's Rule, Random variables: Discrete and Continuous random variables, Probability function and Distribution function, Joint distributions, Independent Random Variables, Conditional Distributions.

**UNIT – V: MATHEMATICAL EXPECTATIONS (10 Hrs)**

Definition Mathematical Expectation, Functions of Random Variables, Variance and Standard Deviation, Moments, Moment generating function, Covariance, Correlation Coefficient, Conditional Expectations, Other measures of central tendency and dispersion, Skewness and Kurtosis.

**UNIT – VI: PROBABILITY DISTRIBUTIONS (08 Hrs)**

Binomial distribution, Poisson distribution, Normal distribution, Relation between Binomial, Poisson and Normal distribution, Central Limit theorem, Exponential Distribution.

### Text Books:

1. Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication
2. Theory & Problems of Probability and Statistics by Murray R. Spiegel , Schaum Series, McGraw Hills
3. Advanced Engineering Mathematics by Erwin Kreyszig, 8th Edition, Wiley India

### Reference Books

1. Introductory methods of Numerical Analysis by S.S. Sastry, PHI
2. A Text Book of applied Mathematics, Volume I & II by P.N. Wartikar & J.N. Wartikar, Poona Vidyarthi Griha Prakashan
3. Advanced Mathematics for Engineers by Chandrika Prasad,
4. Digital Signal Processing, by John Proakis and D.G. Manolakis, Pearson (for Z-Transform)
5. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.

**B. E. Fourth Semester**

**(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg.)**

**POWER DEVICES AND MACHINES**

**Duration : 3 Hr.**

**College Assessment : 20 Marks**

**University Assessment : 80 Marks**

**Subject Code : BEENE402T/ BEECE402T/ BEETE402T**

**[ 4 – 0 – 1 – 5 ]**

---

**Objectives :** To teach the basic concepts of power electronics. Also to study the important power devices and machines in detail along with basic applications of SCR as controlled rectifier. To get skill of developing and design related to power electronic circuits.

**Outcomes :**

After learning this subject, the students will

1. Understand the basics of different components used in Power Electronics.
  2. Understand the working and characteristics of different power devices along with their applications in Electronic circuits.
  3. Understand the concept of AC-DC converters, Choppers, Inverters which are widely used in industries.
  4. Understand the different AC/DC machines and their speed control methods.
- 

**Unit I : Thyristors**

**(12)**

**SCR :** Construction, Operation, Transistor analogy, Static & dynamic Characteristics, Switching characteristics, SCR Ratings, Gate characteristics, Triggering requirements, Triggering techniques, Isolation Techniques, Pulse triggering, Burst triggering

**TRIAC :** Construction, Operation, steady state characteristics, Triggering modes, Principle of DIAC, Phase control using TRIAC

**Unit II : Power Devices**

**(10)**

**IGBT :** Construction, operation, Steady stage characteristics, Switching characteristics, Safe operating area, Need for gate/base drive circuits, Isolation techniques, Base drive circuits for Power BJT

**Power MOSFET** : Construction, operation, Static characteristics , Switching characteristics , forward and reverse bias operation, Gate drive circuits for Power MOSFET and IGBT.

**GTO** : Construction, Operation, Turn-off mechanism, Applications.

**Unit III :** (10)

**Phase controlled Rectifiers (AC-DC Converters )** : Single phase half Wave controlled, full wave controlled rectifiers with R and RL load, Bridge Configurations with R and RL load, Effect of Free-wheeling diode, Three phase full wave and half wave controlled with resistive load.

AC-AC Converters : Basic Principle, Operation , Single phase AC voltage controller for R and RL loads, Working of Three phase AC-AC controller with R Load.

**Unit IV : Power Converters** (10)

**DC-DC converters (Chopper)** : Working principle of chopper, Types of chopper : Step-Up & Step-Down chopper for RL Load, Class-A, class-B, Class-C, Class-D and Class-E chopper, Control Strategies

**DC-AC Converters (Inverter)** : Classification of inverter, Working Principle of single phase Half Bridge and Single Phase Full Bridge inverter for R and RL load, Three phase Bridge inverter for Resistive (Star) load.

**Unit V :** (10)

**Three Phase Transformers** : Construction, Different Connections : Star-Star, Delta-Delta, Star-Delta, Delta-Star, Open Delta Connection, Scott Connection, Parallel operation.

**Three Phase Induction Motor** : Principle of operation, Necessity of starters , DOL starter, Autotransformer starter, Star-Delta Starter, Speed control techniques of three-phase induction motor.

**Unit VI :** (08)

**DC Motors** : Principle of Operation, Types of Motor, Speed Control of Shunt Motor : Flux Control, Armature Control and voltage control method, Speed Control of Series : Flux Control, Rheostatic Control method

**Universal Motor** : Construction, Working ,characteristics and applications.

**Text Books :**

1. M.H. Rashid : "Power Electronic circuits devices and applications", PHI Publications.
2. M.D. Singh & Khanchandani : "Power Electronics", TMH Publications, New Delhi.
3. B.L. Theraja : "Electrical Technology" , Volume-2, S.Chand Publications

**Reference:**

1. P.C. Sen : "Modern Power Electronics", S. Chand & Co, New Delhi.
2. P. Bhimra , " Power Electronics", Khanna publications
3. Nagrath Kothari : "Electrical Machines", TMH Publications.

**B. E. Fourth Semester**

**(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg.)**

**POWER DEVICES AND MACHINES**

**Duration : 2 Hr.**

**College Assessment : 25 Marks**

**University Assessment : 25 Marks**

**Subject Code : BEENE402P/ BEECE402P/ BEETE402P**

**[ 0 – 2 – 0 – 1 ]**

---

**Objectives :** To teach the basic concepts of power electronics. Also to study the important power devices and machines in detail along with basic applications of SCR as controlled rectifier. To get skill of developing and design related to power electronic circuits.

**Outcome :**

After completion of practicals, the students will

1. Understand the working and nature of characteristics of different power components used in Power Devices.
  2. Be able to calculate performance parameters for different devices.
  3. Be able to perform different tests on Transformers and motors for calculating the losses, efficiency, regulation etc.
  4. Understand the concept of starters used for starting AC/DC motors.
  5. Understand different speed control methods for motors.
- 

**List of Experiments :**

1. To study and plot V-I Characteristics of SCR.
2. To study and plot V-I Characteristics of TRIAC.
3. To study UJT as a relaxation oscillator.
4. To study and plot IGBT characteristics.
5. To study and plot characteristics of DC Chopper.
6. To study and plot characteristics of Single phase converter.
7. To study Series Inverter.
8. To perform O.C. and S.C. Test on Three Phase Transformer.
9. To study Load test on DC motor.
10. To study speed control of DC shunt motor.
11. To perform No-Load and Block Rotor test on Three Phase Induction Motor.
12. To study Starters of AC and DC motor.
13. To find slip of Three Phase Induction Motor.

**Note :** Minimum 8 practicals to be conducted.



B. E. Fourth Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)

## ELECTROMAGNETIC FIELDS

Duration : 3 Hr.

College Assessment : 20 Marks

University Assessment : 80 Marks

Subject Code : BEENE403T/ BEECE403T/ BEETE403T

[ 4 – 0 – 1 – 5 ]

---

**Objectives :** To provide the students of Engineering with a clear and logical presentation of basic concepts and principles of electromagnetic.

**Outcomes :**

After the completion of this subjects, the students will

1. Understand the concepts of Electric, Magnetic and Electromagnetic fields required to understand the concepts of Electronic Communication.
  2. Understand the different coordinate system for mathematical analysis of Electromagnetic Engineering.
  3. Understand the different theorems and their use in Electromagnetic field.
  4. Understand the use of waveguides for the transmission of electromagnetic waves at higher frequencies.
  5. Understand the basic concepts of Radiation and Elements used for radiation along with the basic terminologies.
- 

**UNIT I : ELECTROSTATICS**

**(12)**

Introduction to Cartesian, Cylindrical and Spherical coordinate systems, Electric field intensity, flux density, Gauss's law, Divergence, Divergence Theorem, Electric potential and potential gradient.

**UNIT II: MAGNETOSTATICS:**

**(10)**

Current density and continuity equation, Biot-Savert's law, Ampere's circuital law and applications, Magnetic flux and Flux density, Scalar and Vector magnetic potentials.

**UNIT III: MAXWELL S EQUATIONS AND BOUNDARY CONDITIONS: (08)**

Maxwell's equations for steady fields. Maxwell's equations for time varying fields. Electric and magnetic boundary conditions.

**UNIT IV :ELECTROMAGNETIC WAVES (10)**

Electromagnetic wave equation, wave propagation in free space, in a perfect dielectric, and perfect conductor, skin effect, Poynting vector and Poynting theorem, reflection and refraction of uniform plane wave at normal incidence plane, reflection at oblique incident angle

**UNIT V: WAVEGUIDES (10)**

Introduction, wave equation in Cartesian coordinates, Rectangular waveguide, TE, TM, TEM waves in rectangular guides, wave impedance, losses in wave guide, introduction to circular waveguide.

**UNIT VI: RADIATION (10)**

Retarded potential, Electric and magnetic fields due to oscillating dipole (alternating current element), power radiated and radiation resistance, application to short monopole and dipole. Antenna Efficiency, Beam-width, Radiation Intensity, Directive Gain Power Gain & Front To Back Ratio. Advance topics on the subject

**TEXT BOOKS:**

1. W.H Hayt. and J.A. Buck : " Engineering Electromagnetics", McGraw Hill Publications.
2. Antenna & wave propogation, by K. D. Prasad, PHI Publication.
3. E.C. Jordan and K.C.Balamin : "Electromagnetic Waves and Radiating System", PHI Publications.

**REFERENCE BOOKS:**

1. Rao : "Elements of Engineering Electromagnetics", Pearson education
2. E J.D Krauss : "Electromagnetics" , Mc-Graw Hill Publications.

3. Fields and Waves in Communication Electronics (3rd edition), by S. Ramo and R. Whinnery, John Wiley and Sons.
4. R.S. Kshetrimayum: "Electromagnetic Field Theory", CENGAGE Learning Publications.
5. John Reitz, F. Milford, R.W. Christy : "Foundations of Electromagnetic Theory", Pearson Publications.

**B. E. Fourth Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

**DIGITAL CIRCUITS AND FUNDAMENTAL OF MICROPROCESSOR**

**Duration : 3 Hr.**

**College Assessment : 20 Marks**

**University Assessment : 80 Marks**

**Subject Code : BEENE404T / BEECE404T/ BEETE404T**

**[ 4 – 0 – 1 – 5]**

---

**Objectives :** To acquaint students with various basic digital gates used in digital system and develop logical circuits using Boolean gates, construction of various logic circuits using basic gates.

---

**Outcomes :** At the end of the course the student will be able to analyze, design, and evaluate digital circuits of medium complexity, that are based on SSIs, MSIs, and programmable logic devices.

---

**Unit I: Combinational Circuits**

**(08)**

Standard representations for logic functions, k map representation of logic functions (SOP & POS forms), minimization of logical functions for min-terms and max-terms (upto 4 variables), don't care conditions, Design Examples: Arithmetic Circuits, BCD - to - 7 segment decoder, Code converters.

**Unit II :Logic Circuit Design**

**(12)**

Adders and their use as subtractor, look ahead carry, ALU, Digital Comparator, Parity generators/checkers, Static and dynamic hazards for combinational logic.

Multiplexers and their use in combinational logic designs, multiplexer trees, Demultiplexers, Encoders & Decoders .

**Unit III: Sequential Logic Design**

**(10)**

1 Bit Memory Cell, Clocked SR, JK, MS J-K flip flop ,D and T flip-flops. Use of preset and clear terminals, Excitation Table for flip flops. Conversion of flip flops.

**Unit IV : Application of Flip flops:** (10)

Registers, Shift registers, Counters (ring counters, twisted ring counters), Sequence Generators, ripple counters, up/down counters, synchronous counters, lock out, Clock

Skew

**Unit V: Digital Logic Families** (08)

**Classification of logic families** , Characteristics of digital ICs-Speed of operation , power dissipation, figure of merit, fan in, fan out, Comparison table of Characteristics of TTL, CMOS, ECL, RTL, I<sup>2</sup>L, DCTL.

**Classification and characteristics of memories:** RAM, ROM, EPROM, EEPROM, NVRAM, SRAM, DRAM, expanding memory size, Synchronous DRAM (SDRAM), Double Data Rate SDRAM, Synchronous SRAM, DDR and QDR SRAM, Content Addressable Memory

**Programmable logic devices:** Detail architecture, Study of PROM, PAL, PLA, Designing combinational circuits using PLDs.

**Unit VI: Fundamental of Microprocessor** (12)

Introduction to microprocessor, Architecture of 8085 microprocessor, Addressing modes, 8085 instruction set, Concept of assembly language programming, Interrupts.

**Text Books:**

1. Morris Mano : “ An approach to digital Design”, Pearson Publications.
2. Ramesh Gaonkar : “ Microprocessor Architecture, Programming and Applications with the 8085”, Penram International Publications.
3. W. Fletcher : “Engg. Approach to Digital Design”, PHI Publications.

**Reference Books**

1. Wakerly Pearson : “Digital Design: Principles and Practices”, Pearson Education Publications.
2. Mark Bach : “Complete Digital Design”, Tata MCGraw Hill Publications
3. R.P. Jain : “Modern digital electronics” , TMH Publications.

**B. E. Fourth Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

**DIGITAL CIRCUITS AND FUNDAMENTAL OF MICROPROCESSOR**

**Duration : 2 Hr.**

**College Assessment : 25 Marks**

**University Assessment : 25 Marks**

**Subject Code : BEENE404P / BEECE404P/ BEETE404P**

**[ 0 – 2 – 0 – 1 ]**

---

**Objectives :** To learn the basic methods for the design of digital circuits and provide the fundamental concepts used in the design of digital systems.

**Outcome :**

After the completion of practicals, the students will

1. Understand the fundamental of basic gates and their use in combinational and sequential circuits.
  2. Understand the use of digital components as a switching elements.
  3. Be able to generate basic arithmetic and logical circuits required in microcomputer systems.
- 

**List of Experiments :**

1. To verify the truth table of different Logic Gates.
2. To study and verify the NAND and NOR gates as a universal gates.
3. To implement any logic function using basic gates.
4. To study and verify truth table of Multiplexer and Demultiplexer.
5. To study and verify the truth table of Half adder and Full Adder.
6. To study and verify the truth table of different types of Flip-flops.
7. To study and verify truth table of Encoder and Decoder.
8. To study and implement ALU.
9. To study the functioning of Shift Register.
10. To study the functioning of Up/Down counter .
11. To study the architecture of 8085 microprocessor.
12. Write and execute an ALP for multiplication of two 8 bit numbers.
13. Write and execute an ALP to count number of 1's in 8 bit number.

**Note :** Minimum 8 Practical to be conducted.

**B. E. Fourth Semester**

**(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)**

**SIGNALS AND SYSTEMS**

**Duration : 3 Hr.**

**College Assessment : 20 Marks**

**University Assessment : 80 Marks**

**Subject Code : BEENE405T/ BEECE405T/ BEETE405T**

**[ 4 – 0 – 1 – 5 ]**

---

**Objectives :**

The concept of this subject enable you to understand how signals, systems and inference combine in prototypical tasks of communication, control and signal processing.

**Outcomes :**

After completion of this subject, the students will

1. Get knowledge about different types of signals and systems used in communication Electronics.
  2. Understand the concept of probability and its use in communication system.
  3. Be able to embed the use of fourier series and fourier transform for feature extraction of different electronic signals.
  4. Understand different coding schemes and able to apply selective coding scheme for the application needed.
  5. Understand the different analog and digital modulation schemes
- 

**UNIT-I: SIGNAL ANALYSIS**

**(12)**

Analysis of Signals, Representation of signals using a set of orthogonal signals, Fourier series representation of periodic signals. Fourier transform of periodic and non-periodic signals, Properties of Fourier Transform, convolution in time & frequency domain. Sampling theory for band limited signals.

**UNIT-II: PROBABILITY & RANDOM PROCESS**

**(12)**

Probability, random variables and stochastic processes. Review of probability theory, random variables, probability density and distribution function, Random processes, periodic processes,

stationary processes. Auto correlation, cross correlation, applications to signal analysis,. Power density and spectral density function.

**UNIT-III: LINE CODING (08)**

Bandwidth and rate of pulse transmission, Inter symbol Interference, PSD of Digital signals, Line coding, RZ, NRZ, Polar, Manchester coding Schemes. Nyquists's first & second Criterion for zero ISI, Pulse shaping, tapped delay line filters and adaptive equalization.

**UNIT-IV: MODULATION TECHNIQUES (10)**

Introduction of Amplitude Modulation and Frequency modulation in brief, Elementary theory of SSB, DSB and noise calculation, noise calculation in SSBSC, DSB with carrier, Square law Demodulation, Envelope Demodulator, Noise in FM reception, Effect of Transmitter noise, FM threshold Effect

Quantization noise, types of Quantization –Uniform and Non-Uniform, A-Law and  $\mu$  Law, Pulse Code Modulation , Delta modulation, Adaptive Delta modulation,

**UNIT-V: DIGITAL CARRIER SYSTEM (08)**

Digital Carrier Systems: Matched filter detection of binary signals, decision, threshold, error probability, Salient features of ASK, FSK & PSK system DPSK systems including M-ary Communication Systems.

**UNIT-VI: INFORMATION THEORY AND CODING (10)**

Information theory, channel capacity of discrete & continuous channels, Error control coding Hamming distance, Linear block codes, CRC, Convolution Codes.

**Text Books:**

1. B.P.Lathi : " Modern Digital & Analog Communication Systems" .:
2. Simon Haykin, Barry Van Veen : "Signals and Systems", John Wiley and Sons Publications.
3. Oppenheim, Wilsky, Nawab : "Signals and Systems", Person Education Publications
4. A.B. Carlson : " Communication systems",

**Reference Books:**

1. Communication Systems: B.P. Lathi.
2. R.P. Singh, S.D. Sapre : "Communication Systems: Analog and Digital", McGraw Hill Publications.
3. Nagrath I.J., Sharan S.N., Ranjan R., Kumar S. : "Signals and Systems", Tata McGraw Hill Publications.



**B.E. Fourth Semester**

**(Electronics/Electronics & Communication/ Electronics & Telecommunication Engg)**

**ENVIRONMENTAL STUDIES**

**Duration : 3 Hr.**

**College Assessment : Grade**

**University Assessment : 00 Marks**

**Subject Code : BEENE406T/ BEECE406T/ BEETE406T  
– 0]**

**[ 3 – 0 – 0**

---

**Objectives :**

The goals of the Environmental Studies subject are to:

- 1) Increase understanding of how the world as a bio-physical system works, foster awareness of the earth's vital signs, and sharpen the ability of students to understand the nature and results of science.
- 2) Encourage a critical understanding of the various historical, political, economic, ethical, and religious forces that have shaped and continue to shape our world.
- 3) Nurture an ecological frame of mind which is willing and able to see things whole and thus resist the narrow specialization that can blind us to the connections between disciplines and bodies of knowledge.
- 4) Cultivate people who have sufficient knowledge, care, and practical competence to live in an ecologically responsible way.
- 5) Provide opportunities for students to explore the connections between environmental issues and different religious and philosophical traditions, and to encourage students who are Christian to reflect on their faith and its vision of shalom.

**Outcome :**

Through the course sequence in ESS, students will be able to:

1. Recognize major concepts in environmental sciences and demonstrate in-depth understanding of the environment.
  2. Develop analytical skills, critical thinking, and demonstrate problem-solving skills using scientific techniques.
-

**Unit I : Introduction (2)**

Definition, Scope and importance, Need for public awareness – institutions in environment, people in environment.

**Unit II : Natural Resources (2)**

Renewable and non-renewable and associated problems; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

**Unit III : Ecosystems (8)**

**Concept of an ecosystem-** Understanding ecosystems, ecosystem degradation, resource utilization. **Structure and functions of an ecosystem** – producers, consumers and decomposers.

Energy flow in the ecosystem- water, carbon, oxygen, nitrogen and energy cycles, integration of cycles in nature. **Ecological succession;** food chains, food webs and ecological pyramids; ecosystem types – characteristic features, structure and functions of forest, grassland, desert and aquatic ecosystems.

**Unit IV : Bio-diversity (10)**

Introduction – Biodiversity at genetic, species and ecosystem levels

Bio-geographic classification of India

**Value of biodiversity** – Consumptive use value, productive use value, social, ethical, moral, aesthetic and optional value of biodiversity , Threats to bio-diversity nation; hotspots of biodiversity. **Threats to bio-diversity** – habitat loss, poaching of wildlife, man-wild life conflicts. Common endangered and endemic plant and animal species of India.

In situ and Ex situ conservation of biodiversity.

**Unit V : Pollution (6)**

Definition; causes, effects and control measures of air, water, soil, marine, noise and thermal pollutions and nuclear hazards. **Solid waste management** – Causes, effects and control measures of urban and industrial waste. Role of individual and institutions in prevention of pollution.

**Disaster management** – Floods, earthquake, cyclone, landslides

**Unit VI : Social Issues and the Environment (12)**

Unsustainable to sustainable development; Urban problems related to energy; water conservation, rainwater, harvesting, watershed management; problems and concerns of resettlement and rehabilitation of affected people.

Environmental ethics – issues and possible solutions – Resource consumption patterns and need for equitable utilization; equity disparity in Western and Eastern countries; Urban and rural equity issues; need for gender equity.

Preserving resources for future generations. The rights of animals; Ethical basis of environment education and awareness; conservation ethics and traditional value systems of India.

Climate change, global warming, acid rain, Ozone layer depletion, nuclear accidents and holocausts.

Wasteland Reclamation; Consumerism and Waste products.

Environment legislations – The Environment (Protection) Act; The water (Prevention and Control of pollution) Act; The Wildlife protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislations – environment impact assessment (EIA), Citizens actions and action groups.

Public Awareness – Using an environmental calendar of activities, self initiation.

### **Unit VII : Human Population and the Environment (10)**

Global population growth, variation among nations, population explosion; Family Welfare programmes – methods of sterilization; Urbanization.

Environment and human health – Climate and health, infectious diseases, water related diseases, risk due to chemicals in food, cancer and environment.

Human rights – Equity, Nutrition and health rights, Intellectual property rights (IPRS), Community Biodiversity registers (CBRs)

Value education – environmental values, valuing nature, valuing cultures, social justice, human heritage, equitable use of resources, common property resources, ecological degradation.

HIV/AIDS; Woman and Child Welfare; Information technology in environment and human health

#### **Text Books :**

1. Erach Bharucha : “A Text Book of Environmental Studies”
2. M. N. Rao and HVN Rao : “ Air Pollution”
3. S.S. Dara : “Environmental Chemistry and Pollution Control”
4. Mahesh Rangarajan : “Environmental Issues in India”
5. D.L. Manjunath : “Environmental Studies”.

## B. E. Fourth Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)

### SOFTWARE WORKSHOP

Duration : 2 Hr.

College Assessment : 25 Marks

University Assessment : 25 Marks

Subject Code : BEENE407P / BEECE407P/ BEETE407P  
– 1]

[ 0 – 2 – 0

---

#### Objectives :

1. To instill in students the ability to formulate and solve engineering problems in electric and electronic circuits involving both steady state and transient conditions using MATLAB and pSpice.
2. Learn to use the pSpice simulation software tool for the analysis of Electrical and Electronic Circuits.
3. Learn to insert simple instructions to MATLAB, to find the solution of a system of linear algebraic equations, with constant (real and complex) coefficients.

#### Outcome :

After the completion of the Practicals , the students will be able to:

- 1) Write MATLAB program for any given problem.
- 2) Plot various functions using different graphical techniques.
- 3) Make mathematical analysis for the given problem.
- 4) Get the complete expert hand on pSpice Software.
- 5) To draw, analyze and plot the electronic circuits using pSpice Software.

---

Practical based on following topics should be conducted

#### SECTION - A

##### 1.Introduction to MATLAB

MATLAB environment, different windows in matlab, getting help, important commands, matlab as scratchpad, different types of files in matlab, complex variables and operations, plot commands

##### 2. Matrices & vectors

Matrix manipulation, matrix and array operations, arithmetic operators, relational operators, logical operators, solution of matrix equation  $Ax=B$ , Gauss elimination, inverse of matrix Eigen values and Eigen vectors, Determinant, least square solutions.

##### 3. Branching statements, loops and programming design

If statements, for loops, while, switch, Break and continue, nesting loops, if else with logical arrays, function programming.

#### **4. Symbolic manipulation**

Calculus – limit, continuity, differential calculus, differential equation, integration, integral transforms & Taylor series.

### **SECTION – B**

#### **5. Signals manipulations**

Plotting standard signals, continuous and discrete such as step, ramp, sine, Generating signals from combination of different, signals and manipulation of signals.

#### **6. Introduction to PSpice**

Introduction to PSpice, different windows in PSpice, tools, libraries, component properties, circuit designing in PSpice.

#### **7. Device characteristics**

Plotting characteristics of semiconductor devices – diode, bipolar junction transistor, field effect transistor, UJT and SCR

#### **8. Circuit Simulation & Introduction to PCB designing**

Simulation of following circuits: half wave & full wave rectifier, Zener shunt regulator, transistorized RC coupled amplifier, clipper and clamper Introduction to PCB design

**TERM WORK:** Minimum five experiments each from MATLAB & PSpice are conducted based on the following list.

### **LIST OF EXPERIMENTS**

#### **MATLAB**

1. Introduction to MATLAB Environment
2. To study simple matrix and array manipulations using Matlab
3. Programming using MATLAB
4. Calculus using MATLAB
5. To plot signals: discrete and continuous using MATLAB
6. Function programming and MATLAB
7. Signal Manipulation using MATLAB

#### **PSpice**

1. Design and simulation of resistive circuit
2. Plotting of VI characteristics of diode
3. Plotting of VI characteristics of BJT/FET
4. Plotting of VI characteristics of UJT/SCR
5. Design and simulation of half wave & full wave rectifier
6. Design and simulation of clipper and clamper circuits
7. Simulation of frequency response of a transistorized RC coupled amplifier

**References:-**

1. Stephen Chapman : “Matlab programming for Engineers” Thomson Learning Publication
2. Rudra Pratap : “Getting started with MATLAB” Oxford University press Publications.
3. Robert Strum and Donald Kirk : “Contemporary linear systems using MATLAB” Thomson Learning Publications.
4. Duane Hanselman & Bruce Little field : “Mastering MATLAB” Pearson Publications
5. Brain R. Hunt, Ronald L. Lipsman & Jonathan M. Rosenberg : “A guide to MATLAB” Cambridge University Press
6. Martin Golubitsky, Michael Dellnitz : “Linear Algebra and differential Equations using MATLAB” , International Thomson Publications.
7. Muhammad Rashid : “SPICE for Circuits and Electronics using PSpice”, PHI Edition
8. Robert Boylestad & Nashelsky : “Electronic Devices & Circuit theory” PHI publications

**Engineering and Technology**  
**Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur**  
**Syllabus for B.E. (Third Semester) Aeronautical Engineering**  
**Applied Mathematics – III (BEAE-301T)**  
**(Total Credits: 04)**

**Teaching Scheme**

**Lectures: 3 Hours/ Week**

**Tutorial: 1 Hours / Week**

**Examination Scheme**

**Theory**

**T (U): 80 Marks T (I): 20 Marks**

**Duration of University Exam: 03 Hours**

**Unit - I: Partial Differential equations.**

**9 hours**

Introduction to PDEs. Types of PDEs. - One dimensional Heat flow equation, One dimensional Wave equation. Solution by separation of variables. Finite Difference methods for solving two point linear boundary value problems. Finite difference techniques for the solutions of two dimensional Laplace's and Poisson's Equations on rectangular domain. Solution of Heat and Wave equations by explicit and implicit (Crank Nicholson) methods.

**Unit –II: Matrices.**

**7 hours**

Inverse of matrix by adjoint methods, rank of matrix, consistency of a system of equations, inverse of matrix by partitioning. The linear dependence, linear and orthogonal transformations. Characteristics equations, Eigen values and Eigen vectors. Reduction to diagonal form, statement and verification of Cayley Hamilton Theorem [without proof.] Sylvester's theorem, solution of second order linear differential equation with constant coefficient by matrix method.

**Unit - III: Laplace Transform.**

**8 hours**

Definition & its properties, transform of derivatives and integrals, evaluation of integrals by L.T. Inverse L. T. and its properties, convolution theorem, Laplace transform of periodic functions and unit step function, applications of Laplace transform to solve ordinary differential equations.

**Unit – IV: Fourier Transform.**

**5 hours**

Fourier Transform Definition and Properties, Inversion, Relation with Laplace transform Applications of Fourier transform.

**Unit – V: Numerical Methods.**

**8 hours**

Error analysis, solutions of algebraic and transcendental equations by False position method. Newton – Raphson method, Newton's Raphson method multiple roots, solution of system of simultaneous linear equations, Gauss elimination method, Gauss Jordan method. Gauss Seidel method, Crout's method.

**Unit – VI: Numerical Methods.**

**8 hours**

Eigen values and Eigen vectors by iteration method, by Jacobi method, Gauss method and Householder's method, solution of ordinary differential equation by Taylor's series method, Runge-Kutta 4<sup>th</sup> order method, Euler modified method. Milne's predictor corrector method.

**Total No of Periods- 45 hours**

**Text Book:**

1. Higher Engineering Mathematics by B.S. Grewal.
2. Higher Engineering Mathematics by H.K.Das
3. Numerical Methods by S. S. Shastri Vol.1 & Vol. 2

**Reference Books:**

1. Grewal,B.S. and Grewal J.S., “Numerical methods in Engineering Sciences” 6<sup>th</sup> Edition, Khanna Publishers, New Delhi,2004.
2. SankaraRao, K. “Numerical methods for Scientists and Engineers”.3<sup>rd</sup> Edition Prentice Hall of India Pvt.,Ltd.,New Delhi,2007.
3. Advanced Engineering Mathematics : Kreyszig



**Engineering and Technology**  
**Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur**  
**Syllabus for B.E. (Third Semester) Aeronautical Engineering**  
**Aero- Thermodynamics (BEAE-302T)**  
**(Total Credits: 04)**

**Teaching Scheme**

**Lectures: 3 Hours/ Week**

**Tutorial: 1 Hours / Week**

**Examination Scheme**

**Theory**

**T (U): 80 Marks**

**T (I): 20 Marks**

**Duration of University Exam: 03 Hours**

**Unit-I: Introduction to Thermodynamics**

**7 hours**

Basic concepts of Thermodynamics, Closed & Open Systems, Forms of energy, Properties of system, State & Equilibrium, Processes & Cycles, Temperature & Zeroth Law of Thermodynamics. Introduction to First Law of Thermodynamics (Law of Conservation of Energy), Heat & Work, Mechanical forms of work, Non-Mechanical forms work (Electrical, Magnetic etc.) The Ideal Gas equation of state, Difference between Gas & Vapor, Compressibility factor, Internal energy & specific heats of gases, Universal Gas Constant.

**Unit - II: First Law of Thermodynamics**

**8 hours**

Closed Systems (Control mass system), Work done, Change in internal energy, Heat transferred during various thermodynamic processes, P-V diagrams. Open systems (Control volume systems), Thermodynamic analysis of control volumes, Conservation of energy principle, Flow work & enthalpy.

**Unit-III: Second Law of Thermodynamics**

**10 hours**

Introduction ( Law of degradation of energy ), Thermal energy reservoirs, Kelvin-Plank & Clausius statements, Heat engines, Refrigerator & Heat pump, Perpetual motion machines, Reversible & Irreversible processes, Carnot cycle, Thermodynamic temperature scale.

Entropy: - The Clausius inequality, Entropy, Principle of increase of entropy, Change in entropy for Closed & Steady flow open systems.

Second law analysis of engineering systems: - Availability, Reversible work, Irreversibility, Temperature-entropy diagram.

**Unit-IV: Properties Of Steam**

**7 hours**

Critical state, Sensible heat, Latent heat, Super heat, Wet steam, Dryness fraction, Internal energy of steam, External work done during evaporation, T-S diagram, Mollier chart, Work & Heat transfer during various thermodynamics processes with steam as working fluid. Determination of dryness fraction using various calorimeters.

**Unit-V: Air Standard Cycles**

**7 hours**

Otto cycle, Diesel cycle, Stirling & Ericsson cycle, Brayton cycle, Vapour cycles :- Simple & Modified Rankine cycle with reheat & regeneration.

**Unit - VI: Application**

**6 hours**

Applications to i) Nozzles & Diffusers ii) Turbine & Compressors iii) Throttle Valves. (Simple systems like charging & discharging of tanks)

**Total No of Periods- 45 hours**

**Text Book:**

1. Thermodynamics An engineering approach by YunusCengal, M.A.Boles
2. Thermodynamics by C. P. Arora, Tata Mc-Graw Hill Publication
3. Fundamentals of classical by Gorden J. V. Wylen, Sonntag
4. Engineering Thermodynamics by P. K. Nag, Tata Mc-Graw Hill Publication
5. Fundamentals of engineering Thermodynamics by R. K. Rajput

**Engineering and Technology**  
**Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur**  
**Syllabus for B.E. (Third Semester) Aeronautical Engineering**  
**Aero- Thermodynamics (BEAE-302P)**  
**(Total Credits: 01)**

**Teaching Scheme**

**Practical: 2 Hours/ Week**

**Examination Scheme**

**Practical**

**T (U): 25 Marks**

**T (I): 25 Marks**

**Duration of University Exam: 03 Hours**

**List of Experiments in Aero- Thermodynamics:**

1. Study of steam turbines.
2. Study of internal combustion engines.
3. Study of various types of compressors.
4. Performance and evaluation of Rotary air Compressor.
5. Performance and evaluation of Reciprocating air Compressor.
6. Visit to thermal power plant .(Case study to be prepared by students)

**Engineering and Technology**  
**Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur**  
**Syllabus for B.E. (Third Semester) Aeronautical Engineering**  
**Fluid Mechanics and Machinery (BEAE-303T)**  
**(Total Credits: 04)**

**Teaching Scheme**

**Lectures: 3 Hours/ Week**

**Tutorial: 1 Hours / Week**

**Examination Scheme**

**Theory**

**T (U): 80 Marks**

**T (I): 20 Marks**

**Duration of University Exam: 03 Hours**

**Unit- I: Introduction to Fluid Mechanics**

**7 hours**

Properties of fluids, Newton's law of viscosity and its applications, Pascal's law, Basic equation of fluid statics, Fluid pressure & its measurement (Manometers & Bourdon's pressure gauge), Pressure variations in compressible & incompressible fluids.

**Unit- II: Kinematics of Fluid Flow**

**8 hours**

Types of flow, Stream line, Path line, Streak line, Stream tube, Continuity equation, One & Two dimensional flow, Velocity & Acceleration at a point, Potential lines, Flow net, Stream function, Velocity potential, Circulation, Vortex motion.

Dynamics of Fluid Flow: One dimensional method for flow analysis, Euler's equation of motion, Derivation of Bernoulli's equation for incompressible flow & its applications.

**Unit - III: Viscous Flow**

**7 hours**

Introduction to laminar and turbulent flow, Reynolds number and its significance, Mach number and its significance, Boundary layer concept, Wall shear and boundary layer thickness, Displacement thickness and Momentum thickness, Separation, Drag and Lift on immersed bodies. Flow of viscous fluids through parallel plates, Pipes, Kinetic energy correction factor.

**Unit- VI: Principles & Classification of Hydraulic Machines**

**8 hours**

Impulse Turbines :- Principle, Constructional features, Installation of Pelton turbine, Velocity diagram & analysis, Working proportions, Design parameters, Performance characteristics, Governing & selection criteria.

**Unit - V: Reaction or Pressure turbine**

**7 hours**

Principles of operation, Degree of reaction, Comparison over pelton turbine, Development of reaction turbines, Classification, Draft tubes, Cavitation in turbines. Francis turbine, Propeller turbine, Kaplan turbine: Types, Constructional features, Installations, Velocity diagram & analysis. Working proportions, Design parameters, Performance characteristics, Governing, Selection of hydraulic turbines

**Unit- VI :HydraulicPumps**

**8hours**

Classification & Applications

Introduction to Centrifugal, axial & mixed flow Pumps, Self priming pumps.

Introduction to Reciprocating Piston / Plunger Pumps.

Rotary Displacement Pumps: - Introduction to gear pumps, Sliding vane pumps, Screw pumps.

**Total No of periods: 45**

**Text Books:**

1. Fluid Mechanics by Frank M. White
2. Fluid Mechanics & Fluid Power Engineering by D.S.Kumar
3. Fluid Mechanics for Engineers by P.N. Chartterjee
4. Fluid Mechanics by J.F.Douglas, J.M. Gasiorek
5. Fluid Mechanics & hydraulic Machines by R.K.Bansal
6. Mechanics of Fluids by B.S.Massey
7. Fluid Mechanics by A.K.Jain
8. Fluid Mechanics with engineering applications by Daugherty &Franizini

**Engineering and Technology**  
**Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur**  
**Syllabus for B.E. (Third Semester) Aeronautical Engineering**  
**Fluid Mechanics and Machinery (BEAE-303P)**  
**(Total Credits: 01)**

**Teaching Scheme**

**Practical: 2 Hours/ Week**

**Examination Scheme**

**Practical**

**T (U): 25 Marks**

**T (I): 25 Marks**

**Duration of University Exam: 03 Hours**

**List of Experiments in Fluid Mechanics and Machinery:**

1. To verify Bernoulli's Theorem
2. To determine the critical velocity of flow by Reynolds's apparatus.
3. Performance characteristics of Pelton Turbine
4. Performance characteristics of Francis Turbine
5. Performance characteristics of Kaplan Turbine
6. To study the Centrifugal Pump
7. To study the Axial Flow Pump
8. To study the Reciprocating Pump

**Engineering and Technology**  
**Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur**  
**Syllabus for B.E. (Third Semester) Aeronautical Engineering**  
**Computer Programming (BEAE-304T)**  
**(Total Credits: 04)**

**Teaching Scheme**

**Lectures: 3 Hours/ Week**

**Tutorial: 1 Hours / Week**

**Examination Scheme**

**Theory**

**T (U): 80 Marks**

**T (I): 20 Marks**

**Duration of University Exam: 03 Hours**

**Unit -I: Introduction**

**8 hours**

Introduction to programming, programming languages, algorithms, flowcharts. C: Data types, Identifiers, Storage class, Constant, Operators, expression, Statements, console I/O statements, Selection statements: if-else, switch, Iteration Statements: for, while, do-while, Jump statements: return, go to, break, continue, comments.

**Unit -II: Functions**

**8 hours**

Function, Call by value, Call by reference, calling functions with arrays, arguments to main (), return statements, recursion, function prototypes, inline keyword, preprocessor directives. Pointers: pointer variables, pointer operator, pointer expression, array of pointers, multiple indirection, pointers to functions, dynamic allocation functions.

**Unit-III: Arrays**

**7 hours**

Arrays: single dimensional arrays, two dimensional arrays, multidimensional arrays, variable length arrays. Strings, array of strings.

**Unit -IV: Structures**

**8 hours**

Structures: array of structures, passing structure to function, structure pointers, structure within structures. Unions, bit-fields, enumerations, sizeof, type def.

**Unit -V: File I/O**

**7 hours**

File I/O: Streams and files, file system basics, fread, fwrite, fseek, random access I/O, fprintf(), fscanf(), standard streams.

**Unit - VI: Advanced Concept in C**

**7 hours**

Advanced Concepts in C: Different types of pointers, ROM-BIOS functions, Elementary TSRs

**Total No of Periods- 45 hours**

**Text Books:**

1. The Complete Reference C ( 4<sup>th</sup> Edition) : Herbert Schildt [ TMH]
2. C How to Program, 4<sup>th</sup> Edition by H. M. Deitel& P. J. Deitel, Pearson Education.
3. Writing TSRs through C : Yashwant Kanetkar ( BPB)

**Reference Books:**

1. The C Programming Language : Dennis Ritchie & Brain Kernighan [Pearson]
2. Programming with C : K.R.Venugopal&S.R.Prasad [TMH]
3. Let Us C : Yashwant Kanetkar [BPB]

**Engineering and Technology**  
**Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur**  
**Syllabus for B.E. (Third Semester) Aeronautical Engineering**  
**Computer Programming (BEAE-304P)**  
**(Total Credits: 01)**

**Teaching Scheme**

**Practical: 2 Hours/ Week**

**Examination Scheme**

**Practical**

**T (U): 25 Marks**

**T (I): 25 Marks**

**Duration of University Exam: 03 Hours**

**List of Experiments in Fluid Computer Programming:**

1. Write a programme to perform swapping of two variables without using third variable.
2. Write a programme to calculate the sum of all digit of a five digit number.
3. Write a programme to check whether the year is a leap year or not.
4. Write a programme to print Armstrong number from 1 to 500.
5. A menu programme for finding the factorial of a number, prime number & odd number or even number.
6. Write a programme to check whether the entered string of number is paleindrome or not.
7. Write a programme to find the biggest number of three numbers.
8. Write a programme to calculate or demonstrate call by value & call by reference



**Engineering and Technology**  
**Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur**  
**Syllabus for B.E. (Third Semester) Aeronautical Engineering**  
**Elements of Aeronautics (BEAE-305P)**  
**(Total Credits: 04)**

**Teaching Scheme**

**Lectures: 4 Hours/ Week**

**Examination Scheme**

**Theory**

**T (U): 80 Marks**

**T (I): 20 Marks**

**Duration of University Exam: 03 Hours**

**Unit - I: Introduction**

**5 hours**

To introduce the basic concepts of aerospace engineering early airplanes, biplanes and monoplanes

**Unit - II: Development**

**5 hours**

Developments in aerodynamics, materials, structures and propulsion over the years

**Unit -III: Aircraft Configurations**

**8 hours**

Components of an airplane and their functions, Different types of flight vehicles, classifications. Conventional control, Powered control, Basic instruments for flying, Typical systems for control actuation.

**Unit -IV: Introduction to Principles of Flight**

**9 hours**

Physical properties and structure of the atmosphere, Temperature, pressure and altitude relationships, Evolution of lift, drag and moment. Aerofoil's, Mach number, Maneuvers.

**Unit - V: Introduction to Airplane Structures and Materials**

**9 hours**

General types of construction, Monocoque, semi-monocoque construction, Typical wing and fuselage structure. Metallic and non-metallic materials, Use of aluminium alloy, titanium, stainless steel and composite materials.

**Unit -VI: Power Plants Used In Airplanes**

**9 hours**

Basic ideas about piston, turboprop and jet engines, Use of propeller and jets for thrust production. Comparative merits, Principles of operation of rocket, types of rockets and typical applications, Exploration into space.

**Total No of periods: 45**

**Text Books:**

1. Anderson, J.D., "Introduction to Flight", McGraw-Hill, 1995.

**Reference Book:**

1. Kermode, A.C., "Flight without Formulae", McGraw-Hill, 1997.

**Engineering and Technology**  
**Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur**  
**Syllabus for B.E. (Fourth Semester) Aeronautical Engineering**  
**Mechanics of Machine (BEAE-401T)**  
**(Total Credits: 04)**

**Teaching Scheme**

**Lectures: 3 Hours/ Week**

**Tutorial: 1 Hours / Week**

**Examination Scheme**

**Theory**

**T (U): 80 Marks**

**T (I): 20 Marks**

**Duration of University Exam: 03 Hours**

**Unit - I**

**8 hours**

Basic concept of mechanism , link , kinematic pairs , kinematic chain , mechanism , machine , simple & compound chain , Degree of freedom , estimation of degree of freedom of mechanism by Grubler's criterion and other methods. Harding's notation , classification of four bar chain ( class -I & class - II ) , inversion of four- bar- chain , Kutzbach theory of multiple drives , energy paths. Various types of mechanism such as Geneva wheel , Pawal and ratchet mechanism , Exact straight line mechanism , Approx. straight line mechanism , steering mechanism, Transport mechanism.

**Unit - II**

**7 hours**

Quantitative kinematic analysis of mechanism :- Displacement , Velocity , and Acceleration analysis of planner mechanism by graphical method as well as analytical method ( complex number method / matrix method ) , Coriolis component of acceleration , Instantaneous center method , Kennedy's theorem.

**Unit - III**

**7 hours**

Concepts of cam mechanism , comparison of cam mechanism with linkages. Types of cams and followers and applications. Synthesis of cam for different types of follower motion like constant velocity , parabolic , SHM , cycloidal etc. Cam dynamics and jump-off phenomenon.

**Unit - IV**

**8 hours**

Static & Dynamic force analysis :- Free body diagram, condition of equilibrium. Analysis of all links of given linkages, cam, gear mechanism and their combinations without friction. Dynamic force analysis of planar linkages such as four bar chain & reciprocating mechanism by graphical method, virtual work method & analytical (complex number ) method.

**Unit - V**

**8 hours**

Rigid body motion in space. Euler's equation of motion, Gyroscope, angular velocity, angular acceleration, simple precession & gyroscopic couple. Gyroscopic effect on airplane. Ship, vehicles. Speed governors, centrifugal & inertia type, Watt, Portal, Proell, Hartnell governors, Operating characteristics of governors.

**Unit - VI**

**7 hours**

Static & Dynamic balancing in rotating machines. Balancing machines & field balancing by vector diagram. Balancing in reciprocating mechanism. Effect of partial balancing in locomotives, secondary balancing. Balancing of inline engine, V - engine, and radial engine.

**Total No of periods: 45**

**TEXT BOOKS:**

1. Theory of mechanisms & machines by Shigley J. E.
2. Theory of mechanisms & machines by Ghosh & Mallik
3. Mechanism & Machine Theory by J. S. Rao & Dukki Patti
4. Theory of Machine by Ratan

**REFERENCE BOOKS:-**

1. Theory of Machines by Thoman Beven CBS publication
2. Theory of Machines by Sandor & Erdman.
3. Mechanical Vibrations by Grover

**Engineering and Technology**  
**Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur**  
**Syllabus for B.E. (Fourth Semester) Aeronautical Engineering**  
**Manufacturing Process- I (BEAE-402T)**  
**(Total Credits: 04)**

**Teaching Scheme**

**Lectures: 4 Hours/ Week**

**Examination Scheme**

**Theory**

**T (U): 80 Marks**

**T (I): 20 Marks**

**Duration of University Exam: 03 Hours**

**Unit- I**

**8 hours**

Casting Process: - Introduction. Pattern making: - Types, materials used, Type of Pattern, allowances, colour codes. Core making: - Types of core, Core materials & its properties.

Moulding: - Types of sand moulds, moulding sand composition, moulding sand properties, moulding machines

**Unit- II**

**9 hours**

Gating design: - Type of gating systems, pouring time, riser design ( Analytical treatment)

Melting furnaces: - Types, Electric furnace, Induction furnace, Cupola - construction & operation.

Cleaning, inspection & casting defects.

Special casting processes such as investment casting, centrifugal casting, shell moulding, Slush casting, Die casting

**Unit - III**

**7 hours**

Mechanics of forming processes: - Rolling - rolling pressure & roll separation force, driving force & torque, power loss in bearing. Forging - forging forces & stresses, equipment ( Hammer / Press ) capacity required. Extrusion & Wire Drawing

**Unit- IV**

**8 hours**

Joining Processes:- Introduction to Welding, Soldering, Brazing Processes. Types of Welding, Arc Welding & Gas Welding Processes, Joints, Electrodes, Weldability of Metals, Defects & Inspection of Welding, Welding equipments of Fixtures.

Soldering, Brazing Processes

**Unit - V**

**6 hours**

Powder Metallurgy:- Powder manufacturing & conditioning, Fabrication methods, Production of Sintered Structural Components. Self lubricating bearing, Cemented Carbides, Ceramics, Sintered Carbide cutting tools

Composite Materials: - Classification, Different types of composite materials and its applications

**Unit- VI**

**7 hours**

Processing of Plastics:- Thermoplastic, Thermosetting plastics, General properties & applications of Thermosetting & Thermoplastics. Extrusion, Injection Moulding, Compression Moulding, Transfer Moulding, Blow Moulding, Calendering, Wire Drawing, Embossing.

**Total No of periods: 45**

**TEXT BOOKS:**

1. Manufacturing Science by Ghosh&Mallik, Affiliate East –West Press – Pvt Ltd.
2. Manufacturing Engineering & technology 4<sup>th</sup>Edn byS. Kalpakjian& SR Schmid, Addison Wesley Longman Pvt.Ltd.
3. Production Technology 8<sup>th</sup>EdnbyR.K.Jain, Khanna Publication , New Delhi

**REFERENCE BOOKS:-**

1. Work Shop Technology, Vol. I - III by WAJ Chapman.
2. Manufacturing Processes by M. Begman
3. Processes & Materials of Manufacture by R. Lindberg.
4. Work Shop Technology ( Volume - I & II ) by Bawa
5. Work Shop Technology ( Volume - I & II ) by B. S. Raghuvanshi

**Engineering and Technology**  
**Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur**  
**Syllabus for B.E. (Fourth Semester) Aeronautical Engineering**  
**Aircraft Materials (BEAE-403T)**  
**(Total Credits: 04)**

**Teaching Scheme**

**Lectures: 4 Hours/ Week**

**Examination Scheme**

**Theory**

**T (U): 80 Marks**

**T (I): 20 Marks**

**Duration of University Exam: 03 Hours**

**Unit – I: Introduction to aerospace materials:**

**10 hours**

Classification, composition, properties, heat treatment & application of plain carbon steels, alloy steels. Stainless steels. Classification, composition, properties, heat treatment & application of aluminium and its alloys. Titanium alloys, Special alloys for high temperature.

**Unit – II: Introduction to composite materials**

**8 hours**

Definition – Classification of Composite materials based on structure – based on matrix. Advantages of composites – application of composites – functional requirements of reinforcement and matrix.

FIBERS: Preparation, properties and applications of glass fibers, carbon fibers, Kevlar fibers and metal fibers – properties and applications of whiskers, particle reinforcements.

**Unit – III: Manufacturing Of Advanced Composites**

**7 hours**

Polymer matrix composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing.

**Unit – IV: Creep**

**5 hours**

Factors influencing functional life of components at elevated temperatures, definition of creep curve, various stages of creep, metallurgical factors influencing various stages, effect of stress, temperature and strain rate.

**Design for Creep Resistance**

Design of transient creep time, hardening, strain hardening, expressions of rupture life of creep, ductile and brittle materials, Monk man-Grant relationship.

**Unit – V: Fracture**

**8 hours**

Various types of fracture, brittle to ductile from low temperature to high temperature, cleavage fracture, ductile fracture due to micro void coalescence-diffusion controlled void growth; fracture maps for different alloys and oxides, Fatigue of aircraft materials

**Oxidation and Hot Corrosion**

Oxidation, Pilling, Bedworth ratio, kinetic laws of oxidation- defect structure and control of oxidation by alloy additions, hot gas corrosion deposit, modified hot gas corrosion, fluxing mechanisms, effect of alloying elements on hot corrosion, interaction of hot corrosion and creep, methods of combat hot corrosion.

**Unit –VI: Superalloys and Other Materials****6 hours**

Iron base, Nickel base and Cobalt base super alloys, composition control, solid solution strengthening, precipitation hardening by gamma prime, grain boundary strengthening, TCP phase, embrittlement, solidification of single crystals, Intermetallics, high temperature ceramics.

**Total No of periods: 45****TEXT BOOKS AND REFERENCE BOOKS:**

1. Material Science and Technology – Vol 13 – Composites by Cahn – VCH, West Germany  
Composite Materials – K.K.Chawla
2. Calcote, L R. “The Analysis of laminated Composite Structures”, Von – Nostrand Reinhold Company, New York 1998.
3. Jones, R.M., “Mechanics of Composite Materials”, McGraw-Hill, Kogakusha Ltd., Tokyo, 1985.
4. Agarwal, B.D., and Broutman, L.J., “Analysis and Performance of Fibre Composites”, John Wiley and sons. Inc., New York, 1995.
5. Lubin, G., “Handbook on Advanced Plastics and Fibre Glass”, Von Nostrand Reinhold Co., New York, 1989.
6. Raj. R., “Flow and Fracture at Elevated Temperatures”, American Society for Metals, USA, 1985.
7. Hertzberg R. W., “Deformation and Fracture Mechanics of Engineering materials”, 4th Edition, John Wiley, USA, 1996.
8. Courtney T.H, “Mechanical Behavior of Materials”, McGraw-Hill, USA, 1990.
9. Boyle J.T, Spencer J, “Stress Analysis for Creep”, Butterworths, UK, 1983.
10. Bressers. J., “Creep and Fatigue in High Temperature Alloys”, Applied Science, 1981.
11. McLean D., “Directionally Solidified Materials for High Temperature Service”, The Metals Society, USA, 1985.

**Engineering and Technology**  
**Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur**  
**Syllabus for B.E. (Fourth Semester) Aeronautical Engineering**  
**Aircraft Structure- I (BEAE-404T)**  
**(Total Credits: 04)**

**Teaching Scheme**

**Lectures: 3 Hours/ Week**

**Tutorial: 1 Hours / Week**

**Examination Scheme**

**Theory**

**T (U): 80 Marks**

**T (I): 20 Marks**

**Duration of University Exam: 03 Hours**

**Unit- I: Concept of simple stresses & strains**

**8 hours**

Concept of simple stresses & strains :- Introduction, stress, strain, types of stresses, stresses & strains with uni-axial loading, stress-strain diagram for brittle & ductile material, elastic limit, Hooks law, Poisson`s ratio, bulk modulus, relation between Young`s modulus & Shear modulus.

Torsion of circular shafts :- Derivation of torsion equation with the assumptions made in it. Torsion, shear stress induced in the shaft, when it is subjected to torque. Strength & rigidity criterion for design of shaft. Torque transmitted by solid & hollow circular shaft.

Thin cylinders and spherical shells subjected to internal pressure

**Unit- II: Shear force & bending moment**

**11 hour**

Shear force & bending moment: - Types of beams ( cantilever beam, simply supported beam, overhung beam etc. ) Types of loads ( Concentrated & UDL ), Shear force & bending moment diagrams for different types of beams subjected to different types of loads, Sign. Conventions for bending moment & shear force, shear force & bending moment diagrams for beams subjected to couple, Relation between load, shear force & bending moment.

Stresses in beams:- Pure bending, theory of simple bending with assumptions & expressions for bending stress, derivation of bending equation, bending stresses in symmetrical sections, section modulus for various shapes of beam sections.

Deflection of beams :- Derivation of differential equation of elastic curve with the assumptions made in it. Deflection & slope of cantilever, simply supported, overhung beams subjected to concentrated load, UDL, Relation between slope, deflection & radius of curvature. Macaulay`s method, area moment method to determining deflection of beams.

Shear stresses in beams :- Concept, derivation of shear stress distribution formula, shear stress distribution diagram for common symmetrical sections, maximum & average shear stress.

**Unit- III: Strain energy & impact loading**

**8 hour**

Strain energy & impact loading :- Definition of strain energy stored in a body when it is subjected to gradually applied load, suddenly applied loads & impact loads. Strain energy under uniaxial tension and compression, bending and torsion. Castigliano`s theorem.

Statically indeterminate beams and frames, Clapeyron's three moment equation method, Moment distribution method.

**Unit- IV: Columns**

**6 hour**

Buckling of columns with various end conditions, column curves, Columns with initial curvature, with eccentric loading, South well plot, short column formulae like Rankine's Johnsons, etc. Energy method. Beam Column.



**Unit- V: Principal stresses & strains****6 hour**

Principal stresses & strains :- Definition of principal planes & principal stresses, analytical method of determining stresses on oblique section when member is subjected to direct stresses in one plane in mutually perpendicular two planes, when member is subjected to shear stress & direct stresses in two mutually perpendicular planes, Mohr's circle for representation of stresses. Derivation of maximum & minimum principle stresses & maximum shear stresses when the member is subjected to different types of stresses simultaneously (i.e. combined stress)

**Unit- VI****6 hour**

Derivation of maximum, minimum principle stresses & maximum shear stress induced in shaft when it is subjected to bending moment, torque & axial load. Theories of failure, modes of failure, compound stresses, eccentric axial loading, variable stresses in machine parts, stress concentration & stress raisers, notch sensitivity, stress concentration factor, methods for reducing stress concentration factor, Factor of safety

**Total No of periods: 45****TEXT BOOKS:**

1. Strength of Material by S. Ramamurtham
2. Strength of Material by R. K. Rajput
3. Strength of Material by F. L. Singer
4. Mechanics of Material by Beer & Johnson
5. Timoshenko, S., "Strength of Materials", Vols, I and II, Princeton D.VonNostrand Co., 1988.
6. Donaldson, B.K., "Analysis of Aircraft Structures - An Introduction", McGraw Hill, 1993.

**REFERENCE BOOKS:**

1. Strength of materials by Timoshenks
2. Machine Design by Black & Adam
3. Machine Design by J. E. Shigley

**Engineering and Technology**  
**Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur**  
**Syllabus for B.E. (Fourth Semester) Aeronautical Engineering**  
**Aircraft Structure- I (BEAE-404P)**  
**(Total Credits: 01)**

**Teaching Scheme**

**Practical: 2 Hours/ Week**

**Examination Scheme**

**Practical**

**T (U): 25 Marks**

**T (I): 25 Marks**

**Duration of University Exam: 03 Hours**

**List of Experiments in Aircraft Structure- I (Minimum any Ten Experiments)**

1. Study of strain measuring instruments mechanical, electrical types.
2. Tension test on metals.
3. Hardness test on metals.
4. Torsion test on metals.
5. Impact test metals.
6. Transverse test on beams including deflections.
7. Notch Bar Test for toughness of metals.
8. Measurement of static strains using electrical resistance gauges.
9. Verification of S.T. in beams.
10. Deflection of springs.
11. Aircraft structure material: Absorption Test, Dimension Test, Crushing strength

**Engineering and Technology**  
**Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur**  
**Syllabus for B.E. (Fourth Semester) Aeronautical Engineering**  
**Aerodynamics- I (BEAE-405T)**  
**(Total Credits: 04)**

**Teaching Scheme**

**Lectures: 3 Hours/ Week**

**Tutorial: 1 Hours / Week**

**Examination Scheme**

**Theory**

**T (U): 80 Marks**

**T (I): 20 Marks**

**Duration of University Exam: 03 Hours**

**Unit-I: Introduction**

**6 Hours**

To understand the behaviour of airflow over bodies with particular emphasis on airfoil sections in the incompressible flow regime.

**CHARACTERISTICS PARAMETERS FOR AIRFOIL AND WING AERODYNAMICS**

Characterizations of Aerodynamic Forces and Moments, Airfoil Geometry Parameters, Wing Geometry Parameters, Aerodynamic Force and Moment Coefficients, Wings of Finite Spans

**Unit-II: Two Dimensional Flows**

**8 Hours**

Basic flows – Source, Sink, Free and Forced vortex, uniform parallel flow. Their combinations, Pressure and velocity distributions on bodies with and without circulation in ideal and real fluid flows. Kutta-Joukowski's theorem.

**Unit-III: Incompressible Flows Around Airfoils**

**11 Hours**

General Comments, Circulation and the Generation of Lift, General Thin- Airfoil Theory, Thin, Flat-Plate Airfoil (Symmetric Airfoil), Thin, Cambered Airfoil, High-Lift Airfoil Sections, Multielement Airfoil Sections for Generating High Lift, High-Lift Military Airfoils.

**Unit-IV: Dynamics of A Compressible Flow Field**

**6 Hours**

Thermodynamic Concepts, Adiabatic Flow in a Variable Area Stream tube, Isentropic Flow in a Variable area stream tube, Characteristic equations and Prandtl-Meyer Flow, Shock Waves.

**Unit-V: Compressible Flow**

**6 Hours**

Stagnation properties, speed of sound wave. Mach number, one dimensional isentropic flow, Stagnation properties, isentropic flow through convergent - divergent nozzles. Normal shock.

**Unit VI: Introduction To Boundary Layer Theory**

**6 Hours**

Concepts of laminar and turbulent boundary layer. Momentum integral equation. Approximate methods for solution of boundary layer for simple cases.

**Total No of periods: 45**

**Engineering and Technology**  
**RashtrasantukdojiMaharaj Nagpur University, Nagpur**  
**Syllabus for B.E. (Fourth Semester) Aeronautical Engineering**  
**Aerodynamics- I (BEAE-405P)**  
**(Total Credits: 01)**

**Teaching Scheme**

**Practical: 2 Hours/ Week**

**Examination Scheme**

**Practical**

**T (U): 25 Marks**

**T (I): 25 Marks**

**Duration of University Exam: 03 Hours**

**List of Experiments in Aerodynamics- I**

Based on above syllabus minimum eight practical's to be performed.

1. To draw the graph for different velocities verses manometer deflection.
2. Analysis of forces (Lift & Drag) over cambered aerofoil symmetrical.
3. Analysis of forces (Lift & Drag) over cambered aerofoil unsymmetrical.
4. Analysis of forces (Lift & Drag) over flat plate.
5. To draw graph of pressure distribution on a symmetrical aerofoil.
6. To draw graph of pressure distribution on a unsymmetrical aerofoil.
7. To draw graph of pressure distribution on flat plate.
8. To draw graph of pressure distribution on a circular cylinder.
9. To visualize the flow patterns over the surface of different model.
10. To study the side force in yawing motion of an aircraft.
11. To study the boundary layer concept over the various models.

**TEXT BOOKS**

1. Anderson, J.D., "Fundamentals of Aerodynamics", McGraw-Hill Book Co., New York, 1985.

**REFERENCES**

1. Houghton, E.L., and Carruthers, N.B., "Aerodynamics for Engineering students", Edward Arnold Publishers Ltd., London, 1989.
2. Milne Thomson, L.H., "Theoretical aerodynamics", Macmillan, 1985.
3. Clancey, L.J., "Aerodynamics", Pitman, 1986

**Engineering and Technology**  
**RashtrasantukdojiMaharaj Nagpur University, Nagpur**  
**Syllabus for B.E. (Fourth Semester) Aeronautical Engineering**  
**Aircraft layout and Component drawing (BEAE-406P)**  
**(Total Credits: 02)**

**Teaching Scheme**

**Practical: 2 Hours/ Week**

**Examination Scheme**

**Practical**

**T (U): 25 Marks**

**T (I): 25 Marks**

**Duration of University Exam: 03 Hours**

**List of Experiments in Aircraft Layout and Component Drawing:**

Study of layout and component parts of different types of aircraft through drawings

**Suggested**

1. Considerations to be taken while lay outing the cockpit of aircraft.
2. Layout of cockpit of civil aircraft.
3. Layout of cockpit of military aircraft.
4. Considerations to be taken while lay outing the fuselage of aircraft
5. Layout of fuselage of jet transport aircraft.
6. Layout of fuselage of jet commercial aircraft.
7. Layout of fuselage of jet fighter aircraft.
8. Considerations to be taken while designing an aircraft.
9. Three Views drawing of commercial aircraft.
10. Three Views drawing of fighter aircraft.
11. Three Views drawing of jet transport aircraft.
12. Physical models of gliders using balsa.

**REFERENCES**

1. Janes all the World's Aircraft
2. Drawings available from Aircraft Manufacturers

## **SYLLABUS: III SEMESTER (Computer Science and Engineering)**

### **Syllabus for**

#### **Applied Mathematics- III (CS/CT)**

**Scheme (Theory: 4 hrs, Tutorial: 1hr.)**

#### **UNIT - I: LAPLACE TRANSFORM(12 Hrs)**

Definition, Properties, Laplace Transform of Derivatives and Integrals, Evaluation of integrals by Laplace Transform, Inverse Laplace Transform and its Properties, Convolution theorem(Statement only), Laplace Transform of Periodic Functions(Statement only) and Unit Step Function, Applications of Laplace Transform to solve Ordinary Differential Equations, Simultaneous Differential Equations, Integral Equations &Integro-Differential Equations.

#### **UNIT – II: FOURIER SERIES & FOURIER TRANSFORM(08 Hrs)**

Periodic Functions and their Fourier Expansions, Even and Odd functions, Change of interval, Half Range Expansions.

Fourier Transform: Definition and Properties (excluding FFT), Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform to Solve Integral Equation.

#### **UNIT – III: Z-TRANSFORM(08 Hrs)**

Definition , Convergence of Z-transform and Properties, Inverse Z-transform by Partial Fraction Method, Residue Method (Inversion Integral Method) and Power Series Expansion, Convolution of two sequences. Solution of Difference Equation with Constant Coefficients by Z-transform method.

#### **UNIT- IV: FUNCTIONS OF COMPLEX VARIABLE(12 Hrs)**

Analytic Function, Cauchy- Riemann Conditions, Harmonic Functions (excluding orthogonal system), Milne-Thomson Method, Cauchy Integral Theorem & Integral Formula (Statement only), Taylor's & Laurent's series (Statement only), Zeros and Singularities of Analytic Function, Residue Theorem (Statement only), Contour Integration (Evaluation of real definite integral around unit circle and semi-circle).

#### **UNIT –V: MATRICES(12 Hrs)**

Linear and Orthogonal Transformations, Linear dependence of vectors, Characteristics equation, Eigen values and Eigen vectors, Statement and Verification of Cayley-Hamilton Theorem [without proof], Reduction to Diagonal form, Reduction of Quadratic form to Canonical form by Orthogonal Transformation, Sylvester's theorem[without proof], Solution of Second Order Linear Differential Equations with Constant Coefficients by Matrix method. Largest Eigen value and Eigen vector by Iteration method.

## **UNIT - VI: THEORY OF PROBABILITY(08 Hrs)**

Axioms of Probability, Conditional Probability, Baye's Rule, Random variables: Discrete and Continuous random variables, Probability function and Distribution function, Mathematical Expectation, Variance, Standard Deviation, Moments, Moment generating function, Binomial, Poisson and Normal Distributions.

### Text Books

1. Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication
2. Advanced Engineering Mathematics by Erwin Kreyszig, 8th Edition, Wiley India
3. Applied Mathematics for Engineers & Physicist by L.R. Pipes and Harville
4. Theory & Problems of Probability and Statistics by M.R. Spiegel , Schaum Series, McGraw Hills

### Reference Books

1. A Text Book of applied Mathematics, Volume II by P.N. Wartikar& J.N. Wartikar, Poona VidyarthiGrihaPrakashan
2. Introductory methods of Numerical Analysis by S.S. Sastry, PHI
3. Mathematics for Engineers by Chandrika Prasad
4. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.

## **BE3S2T: Advanced C Programming and Logic Design**

Load	Credit	Total marks	Sessional marks	University marks	Total
4 hrs (Practical) 1 hr (Tutorial)	5	100	20	80	100

### **Unit-I**

Arrays: single dimensional arrays, two dimensional arrays, multidimensional arrays, variable length arrays. Array operations. Strings, single dimensional array of string, two dimensional

array of string, operations in “string.h”. Structures: array of structures, passing structure to function, structure within structures. Unions, bit-fields, enumerations, sizeof, typedef.

### **Unit II**

Introduction File handling:-File structure, File handling function, File types, Streams, Text, Binary, File system basics, The file pointer, Opening a file, Closing a file, Writing a character, Reading a character, Using fopen(), getc(), putc(), and fclose(), Using feof(). Using fread() and fwrite(), Direct access file, fseek() and random access I/O, fprintf() and fscanf(), getting file name as Command line arguments.

### **Unit III**

Pointers: pointers operators, pointer arithmetic, Pointers and function, Array of pointers, Pointer and Strings, Pointer to structure, Pointers within structure, Introduction of Static and Dynamic memory allocation, The process of Dynamic memory allocation, DMA functions Malloc() function, Sizeof() operator, Function free(), Function realloc()

### **Unit IV**

Graphics: Graphics and Text mode, Video Adapter, Initialize Graphics Mode and resolution, header file graphics.h. Functions used In Graphics – Drawing a Point on Screen, Drawing – lines, rectangle, circles, arcs, polygon. Functions to fill colors. Display Text in Graphics mode, outtext(), outtextxy(), justifying text. Advanced Graphics : various functions used for moving of graphical objects vizmoveRel(), moveTo(), putImage(), putPixel().

### **Unit V**

Introduction to problem solving and programming : Basic model of computation, Notion of Algorithms, Principle of Mathematical Induction, Basics of functional programming, notion of types, Iterative versus recursive style, Correctness and efficiency issues in programming, time and space measures

### **Unit VI**

Introduction to problem solving and programming: Basics of imperative style programming, Assertions and loop invariants, Top down design and examples of step-wise refinement, Programming using structures, introduction to encapsulation and object oriented programming.

### **Text Books**

1. The C Programming Language : Dennis Ritchie & Brain Kernighan [Pearson]
2. Practical “C” Programming: Steve Oualline, O’Reilly Publications
3. Programming with C :K.R.Venugopal&S.R.Prasad [TMH]
3. How to solve it by Computer by R. J. Dromey, Prentice-Hall India EEE Series.

### **Reference Books**

1. The Complete Reference C ( 4<sup>th</sup> Edition) : Herbert Schildt [ TMH]
2. Structure and Interpretation of Computer Programs by Harold Abelson and Gerald Sussman with Julie Sussman, MIT Press, 1985.

### **BE3S2P: Advance “C” & Programming Logic Design: Practical based on above syllabus**

Load	Credit	Total marks	Sessional marks	University marks	Total
2 hrs (Practical)	2	50	25	25	50



## BE3S3T: Digital Circuits & Fundamental of Microprocessor

Load	Credit	Total marks	Sessional marks	University marks	Total
3 hrs (Practical) 1 hr (Tutorial)	4	100	20	80	100

### Unit I:

**Motivation for digital systems:** Logic and Boolean algebra, Number Systems. Logic Gates & Truth Tables, Demorgan's law, Minimization of combinational circuits using Karnaugh maps upto five variable.

### Unit II:

**Design procedure:** Multiplexers, Demultiplexer, Encoders, Decoders, Code Converters, Adders, Subtractor (Half, Full), BCD Adder/ Subtractor, ripple and carry look-ahead adder design and their advantages & drawbacks.

### Unit III:

**Storage elements, Flip-flops and latches:** D, T, J/K, S/R flip-flops. Master Slave FF's Sequential circuit Analysis & Design, Input equations, state table, analysis with J-K Flip flops. Design procedure, designing with D & J-K Flip flop.

### Unit IV:

Applications of Flip Flops: Registers & Shift registers. Counters, asynchronous and synchronous design using state and excitation tables. Conversion of one of type of F/F to another

### Unit V:

**Programmable logic Devices:** Read only Memory ROM, PLA, PAL, Architecture of 8085 MP and its instruction set.

### Unit VI:

Programming of 8085 and interrupt structure and timing diagrams of 8085 and overview of some advanced processors.

### Text Books:

1. Digital Logic Design: 2nd edition by M. Mano
2. Fundamental of Digital Electronics: A. Anand Kumar
3. Modern Digital Electronic: 4th edition by R.P.Jain
4. 8 bit microprocessor & controller: fifth edition – V.J.Vibhute

### Reference books:

1. Fundamental of Digital Electronics: A. Anand Kumar
2. Digital circuit & design: A.P.Godse
3. 8 bit Microprocessor: Ramesh Gaonkar

## BE3S3P: Digital Circuits & Fundamental of Microprocessor: Practical based on above syllabus.

Load	Credit	Total marks	Sessional marks	University marks	Total
2 hrs (Practical)	2	50	25	25	25

## **BE3S4T: Ethics in IT**

Load	Credit	Total marks	Sessional marks	University marks	Total
3 hrs (Theory) 1 hr (Tutorial)	4	100	20	80	100

## BE3S5T: Computer Architecture & Organization

Load	Credit	Total marks	Sessional marks	University marks	Total
3 hrs (Practical) 1 hr (Tutorial)	4	100	20	80	100

### UNIT I

BASIC STRUCTURE OF COMPUTERS: Functional units, Von Neumann Architecture, Basic operational concepts, Bus structures Addressing modes, Subroutines: parameter passing, Instruction formats: Three- address Instructions, Two-address instructions, One- address instructions, Zero-address instructions.

BASIC PROCESSING UNIT: Bus architecture, Execution of a complete instruction, sequencing of control signals, Hardwired control, Micro-programmed Control, microinstruction format.

### UNIT II

ARITHMETIC: Number representations and their operations, Addition and Subtraction with signed-magnitude, Design of Fast Adders, Array multiplier, Signed multiplication: Booth's Algorithm, Bit-pair recoding, Integer Division, Floating-point Arithmetic operations, guard bits and rounding.

### UNIT III

THE MEMORY SYSTEM: Various technologies used in memory design, higher order memory design, Memory hierarchy, Main memory, Auxiliary memory, Cache memory, cache optimization techniques ,Memory interleaving, Virtual memory, Address Space and Memory Space, Associative memory, Page table, Page Replacement

### UNIT IV

INPUT/OUTPUT ORGANIZATION: I/O mapped I/O and memory mapped I/O, Interrupts and Interrupts handling mechanisms, vectored interrupts, Synchronous vs. Asynchronous data transfer, Direct Memory Access COMPUTER PERIPHERALS: I/O devices such as magnetic disk, magnetic tape, CD-ROM systems.

### UNIT V

RISC philosophy, pipelining, basic concepts in pipelining, delayed branch, branch prediction, data dependency, influence of pipelining on instruction set design, multiple execution units, performance considerations,

### UNIT VI. Introduction to multiprocessors:

Basic concepts in parallel processing, classification of parallel architectures. Vector Processing, Array Processor, Literature review of multi-core architecture

### BOOKS:

- V.C.Hamacher,Z.G.Vranesic and S.G.Zaky, Computer Organisation, McGraw Hill,5<sup>th</sup>ed,2002.
- Computer Organization, Design and Architecture (IV Ed), Sajjan G. Shiva, CRC Press
- Computer Architecture & Organization III Ed- J.P.Hayes.

### REFERENCES BOOKS:

- M Mano,“Computer System and Architecture”, PHI, 1993.
- W. Stallings, “Computer Organization & Architecture”, PHI, 2001.

## BE3S6: COMPUTER WORKSHOP LAB

Load	Credit	Total marks	Sessional marks	University marks	Total
2 hrs (Practical)	2	50	25	25	50

### Unit I:

**Basic concepts of HTML:** HTML, Web Pages, World Wide Web, Tags in HTML, HTML As a Markup Language, HTML as a Page Formatting Tool, Structure of an HTML Page, Commands Written In Notepad, the <H> TAG, the basic tags, the <P> TAG, The <PRE>Tag**The text attributes:** The <marquee> tag, Example of Text Styles, the images, the list tag: Ordered List, Unordered List, Nested List **The links:** Links between Two Pages, Links in the Same Page, Images as Links, Attributes of Links, the basic web page, **other formatting tags:** sounds and videos, comments, the <XMP> tag, special characters

### Unit II:

**The tables:** The Table, The Rows, The Columns, Cellspacing, Cellpadding, Alignment of the Text Present inside the Cells, Alignment of Table, Border Attributes in the Table, Merging Of Rows and Columns, Colspan, Rowspan, Table within a Table, Empty Cells inside the Table, Links in the Table, **the frames:** Frames with Column Arrangement, Column Size for Frames, Row Size for Frames, Frame Spacing, Margin Width and Height in Frames,

### Unit I:

**The forms:**The<input> Tag, The <textarea></textarea> Tag, The Dropdown List, The Normal List, HTML 5: New Markup Elements of HTML5, Basic Tags, Images, List and Links, Tables and Forms, Audio and Video, Canvas, XHTML, and CSS, design and deploy a web site

### Unit IV:

**VB script:** Introduction to vbscript, Printing Text Using vbscript, Alert / msgbox in vbscript, Variables in vbscript, Arrays in vbscript, Conditional Statements, Looping Statements, Procedures , Events

### Unit V:

**Java script:** Variables , Array, Comments, Operators, Conditional Statements, Looping Statements,

### Unit VI:

#### Working under UNIX /LINUX Operating Systems:

- Structure: Unix Architecture
- Features of UNIX operating system
- Layered model of UNIX operating system (study of kernel and Shell)
- General file commands and Directory commands
- File structure and Directory structure

#### Text Book:

1. HTML Programming, Freeman and Robson, Oreilly publications

## **BE3S7T: Environmental Engineering**

Load	Credit	Total marks	Sessional marks	University marks	Total
2 hrs (Theory)	0				

# **SYLLABUS IV SEMESTER (Computer Science & Engineering)**

PROPOSED SYLLABUS FOR  
**DISCRETE MATHEMATICS AND GRAPH THEORY**  
**BE IV Semester (CS/CT/CE/IT)**  
Scheme (Theory: 4 hrs. & Tutorial:1 hr.)

## **UNIT-I: Mathematical Logic and Set Theory (08 Hrs)**

Propositions and Logical Operations, Quantifiers, Conditional Statements and Tautologies, Methods of Proof, Principle of Mathematical Induction. Basic concepts of set theory, Operations on Sets, The power set.

## **UNIT-II: Relations and Functions (12 Hrs)**

**Relations:** Ordered pairs and n-tuples, Product Sets and Partitions, Relations and Digraphs, Matrix of Relation, Paths in Relations and Digraphs, Properties of Relations, Equivalence Relations & Partitions, Compatible Relation, Manipulation of Relations, Composition of Relations, Transitive Closure of a relation, Partial order relation, Partially ordered set, Hasse Diagrams. **Functions:** Definition, Composition of functions, Types of Functions, Invertible Function, Permutation Function, Characteristics function of a set with Theorems.

## **UNIT-III: Group Theory (12 Hrs)**

Binary Operations, Properties, Semigroups, Monoids, Subsemigroup, Submonoid, Isomorphism & Homomorphism, Groups (only definitions and examples) Subgroups and Homomorphism, Cosets and Lagrange's Theorem, Normal subgroups.

## **Unit- IV: Rings, Lattices & Boolean Algebra(10 Hrs)**

Rings, Fields, Integral Domain, Ring Homomorphism (definitions & examples), Lattices: Properties, Types of Lattices, Sub lattices, Isomorphic Lattices, Complemented & Modular Lattices (definitions & examples), Boolean Algebra: Definition, Properties, Simplification of Switching Circuits.

## **Unit-V: Graph Theory (12 Hrs)**

Basic concepts of Graph Theory, Digraphs, Basic definitions, Paths and Circuits, Reachability and Connectedness, Matrix representation of graphs, Subgraphs & Quotient Graphs, Isomorphic digraphs & Transitive Closure digraph, Euler's Path & Circuit (only definitions and examples). Trees, Binary Tree, Labeled Trees, Undirected Trees, Spanning Trees of Connected Relations, Prim's Algorithm to

construct Spanning Trees, Weighted Graphs, Minimal Spanning Trees by Prim's Algorithm & Kruskal's Algorithm.

### **Unit-VI: Combinatorics(06 Hrs)**

Generating Functions, Recurrence Relations, Counting: Permutations & Combinations, Pigeonhole Principle with Simple Applications.

#### **Text Books**

1. Discrete Mathematical Structures(3<sup>rd</sup> Edition) by Kolman, Busby & Ross  
PHI.
2. Discrete Mathematical Structures with Applications to Computer Science by  
Tremblay & Manohar, Tata McGraw- Hill.
3. Combinatorial Mathematics, C.L. Liu (McGraw Hill)

#### **Reference Books**

1. Discrete Maths for Computer Scientists & Mathematicians by Mott,  
Kandel, Baker.
2. Elements of Discrete Mathematics by C. L. Liu.
3. Discrete Mathematics by Lipschutz.
4. Discrete Mathematics by R. Johnsonbaugh.
5. Higher Engineering Mathematics by B.S. Grewal, 40<sup>th</sup> Edition, Khanna  
Publication

### **BE4S2T: Data Structures & Program Design**

Load	Credit	Total marks	Sessional marks	University marks	Total
4 hrs (Theory) 1 hr (Tutorial)	5	100	20	80	100

#### **UNIT I**

Introduction to algorithm, Time and space analysis of algorithms, Big oh and theta notations and omega notations, Average, best and worst case analysis, linear and binary search, selection sort,

insertion sort, bubble sort, shell sort, Radix sort. Abstract data structure as an organization of data with specified properties and operations, General concepts of data structures. Representation of Arrays -Single and Multi dimensional.

## UNIT II

List: - representation of ordered list using array and operation on it, sparse matrix, polynomial, Linked Lists, Simply linked list, Implementation of linked list using static and dynamic memory allocation, operations on linked list, polynomial representations and manipulations are using linked list, circular linked list, doubly linked list, Generalized list

## UNIT III

Stack & Queue: Representation of Stack & queue using array and linked list, , Application of stacks, Conversion from infix to post fix and pre-fix expressions, Evaluation of postfix expression using stacks, Multiple stacks, Circular queues, Priority Queues, Dequeue.

## UNIT IV

Trees: General and binary trees, Representations and traversals, Threaded Binary Trees, Binary search trees, Applications, The concept of balancing and its advantages, B-Trees, B+ Trees, AVL Trees.

## UNIT V

Graphs and digraphs: Representations, Breadth and depth first searches, connected component, spanning trees, shortest path–single source & all pairs , activity networks, topological sort, Hamiltonian path.

## UNIT VI

Symbol Tables: static tree tables, dynamic tree tables, hash tables, hash functions, Collision resolution, overflow handling, Applications

### Textbooks:

- Data Structures using C and C++ by Y. Langsam, Pearson Education
- Algorithms in a Nutshell, George H & Garry, O'reilly Publication
- Data Structures using C by Tanenbaum, Pearson Education
- S. Sahani, Data Structures in C,
- Data structures -Robert Kse

**BE4S2P: Data Structures & Program Design Lab: Practical will be based on above syllabus**

Load	Credit	Total marks	Sessional marks	University marks	Total
2 hrs (Practical)	2	50	25	25	50

## BE4S3T: Operating Systems

Load	Credit	Total marks	Sessional marks	University marks	Total
3 hrs (Theory) 1 hr (Tutorial)	4	100	20	80	100

## UNIT-I



Introduction: Evolution of OS, Types of OS, Basic h/w support necessary for modern operating systems, services provided by OS, system programs and system calls, system design and implementation.

#### **UNIT-II**

File systems: File concept, Access methods, Disk space management and space allocation strategies, directory structures, Recovery, Log-structured File System, disk arm scheduling strategies.

#### **UNIT-III**

Scheduling: Process concept, process control block, Types of scheduler, context switch, threads, multithreading model, goals of scheduling and different scheduling algorithms, examples from WINDOWS 2000 & LINUX.

#### **UNIT-IV**

Memory management: Contiguous allocation, Relocation, Paging, Segmentation, Segmentation with paging, demand paging , page faults and instruction restart , page replacement algorithms , working sets , Locality, Thrashing, Garbage Collection .

#### **UNIT-V**

Process cooperation and synchronization: Concurrency conditions, Critical section problem, software and hardware solution, semaphores, conditional critical regions and monitors, classical inter process communication problems.

#### **UNIT-VI**

Deadlocks & Protection: Deadlock definition, Prevention, Avoidance, Detection and recovery, Goals of Protection, access matrix, implementation, Security problem.

#### **BOOKS:**

- Operating System concepts – Silberchatz & Galvin, Addison Wesley, 6th Edn.
- Modern Operating Systems – Tanenbaum, Pearson Edn. 2<sup>nd</sup> edn
- Operating Systems – A. Godbole: TMH Publications

#### **Reference Books:**

- Operating System – Milan Milenkovic
- Operating Systems, 3<sup>rd</sup> Edition by Gary Nutt, Pearson Education

#### **BE4S3T: Operating Systems Lab: Practical will be based on above syllabus**

Load	Credit	Total marks	Sessional marks	University marks	Total
2 hrs (Practical)	2	50	25	25	50

## BE4S4T: Theoretical Foundations of Computer Sciences

Load	Credit	Total marks	Sessional marks	University marks	Total
4 hrs (Theory) 1 hr (Tutorial)	5	100	20	80	100

### UNIT 1

Mathematical preliminaries – Sets, operations, relations, strings, closure of relation, countability and diagonalization, induction and proof methods- pigeon-hole principle, concept of language, formal grammars, Chomsky hierarchy.

### UNIT 2

Finite Automaton, regular languages, deterministic & non deterministic finite automata, E-closures, minimization of automata, equivalence, Moore and Mealy machine.

### UNIT 3

Regular expression, identities, Regular grammar, right linear, left linear, Arden theorem, Pumping lemma for regular sets, closure & decision properties for regular sets, Context free languages, parse trees and ambiguity, reduction of CFGS, Normal forms for CFG.

### UNIT 4

Push down Automata (PDA), non-determinism, acceptance by two methods and their equivalence, conversion of PDA to CFG, CFG to PDAs, closure and decision properties of CFLs, pumping lemma for CFL.

### UNIT 5

Turing machines, TM as acceptor, TM as transducers, Variations of TM, linear bounded automata, TM as computer of function.

### UNIT 6

Recursively enumerable (r.e.) set, recursive sets, Decidability and solvability, Post correspondence Problem (PCP), Introduction to recursive function theory, primitive recursive functions, Ackerman function

#### Text Books:

- Introduction Of Automata Theory, Languages and computation- Hopcroft, Motwani & Ulman
- Introduction to formal languages and automata – Peter Linz.
- Introduction to Theory of Computation – Michael Sipser.

#### Reference Books:

- Theory Of Computer Science – Mishra and Chandrashekharan,
- Theory Of Computation – John C. Martin

## BE4S5T: SYSTEM PROGRAMMING

Load	Credit	Total marks	Sessional marks	University marks	Total
3 hrs (Theory) 1 hr (Tutorial)	4	100	20	80	100

### UNIT 1:

**IBM 360/370 & Assembler** – Introduction to System Programming & its components, M/c Architecture, Instruction Formats, Data Formats & Register Formats, Concept of assembler, design of single pass and two pass assembler.

### UNIT 2:

**Macroprocessor** – Concept of macro, macro call within macro, macro definition within macro, recursive macro calls, design of macro processor.

### UNIT 3:

**Linker and Loader** – Concept of static and dynamic relocation, external symbols, design of linker, design of object file for different loading schemes.

### UNIT 4:

**Common Object files format & System Utilities** – Structure of object file and executable file, section or segment headers, symbol table, concept of storage class, string, various data types, line insert, character, arrays structures. Source code control system), make, link editor, symbolic debugger, GNU debugger.

### UNIT 5:

**Unix Device Drivers** – Definition, Anatomy and Types, Device programming, Installation, Incorporation of driver routines, Basic device operation, Implementation with Line Printer, Comparative study between device drivers for UNIX & Windows.

### UNIT 6:

**Compiler** – Phases of Compilers, Overview of Databases and Algorithms required for all phases. Role of lexical analyzer, recognition of tokens, Study of LEX & YACC.

### Text Books:

1. System Programming- J. J. Donovan, Tata McGraw-Hill Education.
2. UNIX Device Drivers- George Pajari, Pearson Education.
3. UNIX system Utilities manual.
4. UNIX programming Tools LEX and YACC –Levine, Mason and Brown, O'Reilly.

### Reference Books:

1. System Programming and Operating systems- D. M. Dhamdhare, Tata McGraw-Hill Education.
2. UNIX programming Environment- Keringham and Pike, PHI.
3. System Software: An introduction to systems programming- Leland L. Beck, Pearson Education.
4. Principles of Compiler Design-Aho and Ullman, Pearson Education.

### **BE4S6: COMPUTER WORKSHOP – 2 LAB**

Load	Credit	Total marks	Sessional marks	University marks	Total
2 hrs (Practical)	2	50	25	25	50

**The contents will be based on LINUX and LINUX Administration. The contents can be revised as per the current trends in Software Industry.**



## **SYLLABUS: III SEMESTER (Computer Technology)**

### **Syllabus for Applied Mathematics- III (CS/CT) Scheme (Theory: 4 hrs, Tutorial: 1hr.)**

#### **UNIT - I: LAPLACE TRANSFORM(12 Hrs)**

Definition, Properties, Laplace Transform of Derivatives and Integrals, Evaluation of integrals by Laplace Transform, Inverse Laplace Transform and its Properties, Convolution theorem(Statement only), Laplace Transform of Periodic Functions(Statement only) and Unit Step Function, Applications of Laplace Transform to solve Ordinary Differential Equations, Simultaneous Differential Equations, Integral Equations &Integro-Differential Equations.

#### **UNIT – II: FOURIER SERIES & FOURIER TRANSFORM(08 Hrs)**

Periodic Functions and their Fourier Expansions, Even and Odd functions, Change of interval, Half Range Expansions.

Fourier Transform: Definition and Properties (excluding FFT), Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform to Solve Integral Equation.

#### **UNIT – III: Z-TRANSFORM(08 Hrs)**

Definition , Convergence of Z-transform and Properties, Inverse Z-transform by Partial Fraction Method, Residue Method (Inversion Integral Method) and Power Series Expansion, Convolution of two sequences. Solution of Difference Equation with Constant Coefficients by Z-transform method.

#### **UNIT-IV: FUNCTIONS OF COMPLEX VARIABLE(12 Hrs)**

Analytic Function, Cauchy- Riemann Conditions, Harmonic Functions (excluding orthogonal system), Milne-Thomson Method, Cauchy Integral Theorem & Integral Formula (Statement only), Taylor's & Laurent's series (Statement only), Zeros and Singularities of Analytic Function, Residue Theorem (Statement only), Contour Integration (Evaluation of real definite integral around unit circle and semi-circle).

#### **UNIT –V: MATRICES(12 Hrs)**

Linear and Orthogonal Transformations, Linear dependence of vectors, Characteristics equation, Eigen values and Eigen vectors, Statement and Verification of Cayley-Hamilton Theorem [without proof], Reduction to Diagonal form, Reduction of Quadratic form to Canonical form by Orthogonal Transformation, Sylvester's theorem[without proof], Solution of Second Order

Linear Differential Equations with Constant Coefficients by Matrix method.  
Largest Eigen value and Eigen vector by Iteration method.

### **UNIT - VI: THEORY OF PROBABILITY(08 Hrs)**

Axioms of Probability, Conditional Probability, Baye's Rule, Random variables: Discrete and Continuous random variables, Probability function and Distribution function, Mathematical Expectation, Variance, Standard Deviation, Moments, Moment generating function, Binomial, Poisson and Normal Distributions.

#### Text Books

1. Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication
2. Advanced Engineering Mathematics by Erwin Kreyszig, 8th Edition, Wiley India
3. Applied Mathematics for Engineers & Physicist by L.R. Pipes and Harville
4. Theory & Problems of Probability and Statistics by M.R. Spiegel , Schaum Series, McGraw Hills

#### Reference Books

1. A Text Book of applied Mathematics, Volume II by P.N. Wartikar& J.N. Wartikar, Poona VidyarthiGrihaPrakashan
2. Introductory methods of Numerical Analysis by S.S. Sastry, PHI
3. Mathematics for Engineers by Chandrika Prasad
4. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.

## **BECT202T: Program Logic Design in “C”**

Load	Credit	Total marks	Sessional marks	University marks	Total
4 hrs (Practical) 1 hr (Tutorial)	5	100	20	80	100

### **Unit-I**

Arrays: single dimensional arrays, two dimensional arrays, multidimensional arrays, variable length arrays. Array operations. Strings, single dimensional array of string, two dimensional array of string, operations in “string.h”. Structures: array of structures, passing structure to function, structure within structures. Unions, bit-fields, enumerations, sizeof, typedef.

### **Unit II**

Introduction File handling:-File structure, File handling function, File types, Streams, Text, Binary, File system basics, The file pointer, Opening a file, Closing a file, Writing a character, Reading a character, Using fopen(), getc(), putc(), and fclose(), Using feof(). Using fread() and fwrite(), Direct access file, fseek() and random access I/O, fprintf() and fscanf(), getting file name as Command line arguments.

### **Unit III**

Pointers: pointers operators, pointer arithmetic, Pointers and function, Array of pointers, Pointer and Strings, Pointer to structure, Pointers within structure, Introduction of Static and Dynamic memory allocation, The process of Dynamic memory allocation, DMA functions Malloc() function, Sizeof() operator, Function free(), Function realloc()

### **Unit IV**

Graphics: Graphics and Text mode, Video Adapter, Initialize Graphics Mode and resolution, header file graphics.h. Functions used In Graphics – Drawing a Point on Screen, Drawing – lines, rectangle, circles, arcs, polygon. Functions to fill colors. Display Text in Graphics mode, outtext(), outtextxy(), justifying text.

Advanced Graphics: various functions used for moving of graphical objects vizmoverel(), moveto(), putimage(), putpixel().

### **Unit V**

Introduction to problem solving and programming : Basic model of computation, Notion of Algorithms, Principle of Mathematical Induction, Basics of functional programming, notion of types, Iterative versus recursive style, Correctness and efficiency issues in programming, time and space measures

### **Unit VI**

Introduction to problem solving and programming: Basics of imperative style programming, Assertions and loop invariants, Top down design and examples of step-wise refinement, Programming using structures, introduction to encapsulation and object oriented programming.

### **Text Books**

1. The C Programming Language: Dennis Ritchie & Brain Kernighan [Pearson]
2. Practical “C” Programming: Steve Oualline, O’Reilly Publications
3. Programming with C :K.R.Venugopal&S.R.Prasad [TMH]
3. How to solve it by Computer by R. J. Dromey, Prentice-Hall India EEE Series.

### **Reference Books**

1. The Complete Reference C ( 4<sup>th</sup> Edition) : Herbert Schildt [ TMH]
2. Structure and Interpretation of Computer Programs by Harold Abelson and Gerald Sussman with Julie Sussman, MIT Press, 1985.



**BECT202P: Program Logic Design in “C” lab: Practical based on above syllabus**

Load	Credit	Total marks	Sessional marks	University marks	Total
2 hrs (Practical)	1	50	25	25	50

**BECT203T: Digital Circuits & Microprocessor**

Load	Credit	Total marks	Sessional marks	University marks	Total
4 hrs (Theory) 1 hr (Tutorial)	5	100	20	80	100

**Unit I:**

Boolean Algebra, Boolean identities, , Binary, Gray, Octal, Hex and ASCII Codes, Logic Gates & truth Tables, De-Morgan's Law, Sum of Product & Product of Sum, K-Maps, Solution of problems using K-Maps

**Unit II:**

Combinational Circuits: Decoders, Encoders, Multiplexers, De-multiplexers, Code Converters. Introduction to Flip-flops, Latches, Memory organization with Flip Flop as a basic cell, Master Slave Combination & conversion of one type to another type flip flop.

**Unit III:**

Sequential Circuits: Excitation tables, Counters- Synchronous/asynchronous, different modulo counters with reset/clear facility, design of counters of arbitrary modulo with K-maps, Lock Free Counters. Arithmetic Circuits: Adders, Subtractors, BCD adders/Subtractor, Carry Look Ahead Adders

**Unit IV:**

Introduction to Intel's 8085A, Architecture Description, memory and Input/Output, Instruction set.

**Unit V:**

Addressing Modes, Timing Diagrams, Assemblers & Disassemblers (by Hand coding), Flag structure, concept of PSW, Stacks, Subroutines, PUSH & POP instructions & CALL/RETURN instructions, Stack Manipulations. Simple Programs.

**Unit VI:**

Programming Techniques, Looping, Counting, Indexing, Counters & timing delays, interrupt concept & structure in 8085. Interrupt Service routines. Advanced Instructions of 8085.

**TEXT BOOKS:**

1. Digital Circuits & Microprocessors by Herbert Taub
2. Digital circuits by M. Mano
3. Digital Electronics Principles by Malvino.
4. Microprocessors Architecture Programming & Application with 8085 By R. S. Gaonkar  
Microprocessor & Interfacing: D. V. Hall

### **BECT203P: Digital Circuits & Microprocessor lab: Practical based on above syllabus.**

Load	Credit	Total marks	Sessional marks	University marks	Total
2 hrs (Practical)	1	50	25	25	25

### **BECT204T: Social and Ethical aspects of IT**

Load	Credit	Total marks	Sessional marks	University marks	Total
3 hrs (Theory) 1 hr (Tutorial)	4	100	20	80	100

1. An Overview of Ethics.
2. Ethics for IT Professionals and IT Users.
3. Computer and Internet Crime.
4. Privacy.
5. Freedom of Expression.
6. Intellectual Property.
7. Software Development.
8. The Impact of Information Technology on Productivity and Quality of Life.
9. Social Networking.
10. Ethics of IT Organizations.

#### **BOOKS:**

Ethics in Information Technology, 4/e by Reynolds George, Cengage Publisher

### **BECSE205T: Computer Architecture & Organization**

Load	Credit	Total marks	Sessional marks	University marks	Total
4 hrs (Theory) 1 hr (Tutorial)	5	100	20	80	100

#### **Unit I:**

Basic Structure of Computer Hardware and Software: Functional Units, Basic Operational concepts, Bus Structures, Software, Distributed computing, Addressing Methods and Machine Program Sequencing: Memory Locations, Addresses and Encoding of Information, Main Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Assembly Language, Stacks. Subroutines.

#### **Unit II:**

Instruction Sets: Instruction Formats, Limitations of Shortword- length machines, High Level Language considerations, The IBM -370.

The Processing Unit: Some Fundamental Concepts, Execution of a complete Instruction, Sequencing of Control Signals, Concluding Remarks.

#### **Unit III:**

Microprogrammed Control: Microinstructions, Grouping of control signals, Micro program Sequencing, Micro instructions with next address field, Perfecting Microinstructions, Emulation, Bit Slices, Introduction to Microprogramming.

### **Unit IV:**

Arithmetic: Number Representation, Addition of Positive Numbers, Logic Design for Fast Adders, Addition and Subtraction, Arithmetic and Branching Conditions, Multiplications of positive numbers, Signed -Operand Multiplication, Fast Multiplication, Integer Division, Floating Point Numbers and Operations.

### **Unit V:**

The Main Memory: Some Basic Concepts, Semiconductor RAM Memories, Memory System Considerations, Semiconductor ROM Memories, Multiple module Memories and Interleaving, Cache Memories, Virtual Memories, Memory Management requirements.

### **Unit VI:**

Computer peripherals: I/O Devices, Online Storage, File Services. Processors: Families of Microprocessor chips, Introduction to RISC Processors, Array Processors, Loosely coupled, Tightly coupled Systems. Vector Processing, Array Processor, Literature review of multi-core architecture

### **BOOKS:**

- V.C.Hamacher,Z.G.Vranesic and S.G.Zaky, Computer Organisation, McGraw Hill,5<sup>th</sup>ed,2002.
- Computer Organization, Design and Architecture (IV Ed), Sajjan G. Shiva, CRC Press
- Computer Architecture & Organization III Ed- J.P.Hayes.

### **REFERENCES BOOKS:**

- M Mano,“Computer System and Architecture”, PHI, 1993.
- W. Stallings, “Computer Organization & Architecture”, PHI, 2001.

## **BECSE206P: COMPUTER WORKSHOP LAB**

Load	Credit	Total marks	Sessional marks	University marks	Total
2 hrs (Practical)	1	50	25	25	50

### **Unit I:**

**Basic concepts of HTML:** HTML, Web Pages, World Wide Web, Tags in HTML, HTML As a Markup Language, HTML as a Page Formatting Tool, Structure of an HTML Page, Commands Written In Notepad, the <H> TAG, the basic tags, the <P> TAG, The <PRE>Tag**The text attributes:** The <marquee> tag, Example of Text Styles, the images, the list tag: Ordered List, Unordered List, Nested List **The links:** Links between Two Pages, Links in the Same Page, Images as Links, Attributes of Links, the basic web page, **other formatting tags:** sounds and videos, comments, the <XMP> tag, special characters

**Unit II:**

**The tables:** The Table, The Rows, The Columns, Cellspacing, Cellpadding, Alignment of the Text Present inside the Cells, Alignment of Table, Border Attributes in the Table, Merging Of Rows and Columns, Colspan, Rowspan, Table within a Table, Empty Cells inside the Table, Links in the Table,

**the frames:** Frames with Column Arrangement, Column Size for Frames, Row Size for Frames, Frame Spacing, Margin Width and Height in Frames,

**Unit I:**

**The forms:**The<input> Tag, The <textarea></textarea> Tag, The Dropdown List, The Normal List, HTML 5: New Markup Elements of HTML5, Basic Tags, Images, List and Links, Tables and Forms, Audio and Video, Canvas, XHTML, and CSS, design and deploy a web site

**Unit IV:**

**VB script:** Introduction to vbscript, Printing Text Using vbscript, Alert / msgbox in vbscript, Variables in vbscript, Arrays in vbscript, Conditional Statements, Looping Statements, Procedures , Events

**Unit V:**

**Java script:** Variables , Array, Comments, Operators, Conditional Statements, Looping Statements,

**Unit VI:****Working under UNIX /LINUX Operating Systems:**

- a) Structure: Unix Architecture
- b) Features of UNIX operating system
- c) Layered model of UNIX operating system (study of kernel and Shell)
- d) General file commands and Directory commands
- e) File structure and Directory structure

**Text Book:**

1. **HTML Programming, Freeman and Robson, O'Reilly publications**

## **BECSE207T: Environmental Engineering**

Load	Credit	Total marks	Sessional marks	University marks	Total
2 hrs (Theory)	0				

# **SYLLABUS IV SEMESTER (Computer Science & Engineering)**

PROPOSED SYLLABUS FOR  
SYLLABUS FOR

## **DISCRETE MATHEMATICS AND GRAPH THEORY**

**BE IV Semester (CS/CT/CE/IT)**

Scheme (Theory: 4 hrs. & Tutorial:1 hr.)

### **UNIT-I: Mathematical Logic and Set Theory (08 Hrs)**

Propositions and Logical Operations, Quantifiers, Conditional Statements and Tautologies, Methods of Proof, Principle of Mathematical Induction. Basic concepts of set theory, Operations on Sets, The power set.

### **UNIT-II: Relations and Functions (12 Hrs)**

**Relations:** Ordered pairs and n-tuples, Product Sets and Partitions, Relations and Digraphs, Matrix of Relation, Paths in Relations and Digraphs, Properties of Relations, Equivalence Relations & Partitions, Compatible Relation, Manipulation of Relations, Composition of Relations, Transitive Closure of a relation, Partial order relation, Partially ordered set, Hasse Diagrams. **Functions:** Definition, Composition of functions, Types of Functions, Invertible Function, Permutation Function, Characteristics function of a set with Theorems.

### **UNIT-III: Group Theory (12 Hrs)**

Binary Operations, Properties, Semigroups, Monoids, Subsemigroup, Submonoid, Isomorphism & Homomorphism, Groups (only definitions and examples) Subgroups and Homomorphism, Cosets and Lagrange's Theorem, Normal subgroups.

### **Unit- IV: Rings, Lattices & Boolean Algebra (10 Hrs)**

Rings, Fields, Integral Domain, Ring Homomorphism (definitions & examples), Lattices: Properties, Types of Lattices, Sub lattices, Isomorphic Lattices, Complemented & Modular Lattices (definitions & examples), Boolean Algebra: Definition, Properties, Simplification of Switching Circuits.

### **Unit-V: Graph Theory (12 Hrs)**

Basic concepts of Graph Theory, Digraphs, Basic definitions, Paths and Circuits, Reachability and Connectedness, Matrix representation of graphs, Subgraphs & Quotient Graphs, Isomorphic digraphs & Transitive Closure digraph, Euler's Path & Circuit (only definitions and examples). Trees, Binary Tree, Labeled Trees, Undirected Trees, Spanning Trees of Connected Relations, Prim's Algorithm to

construct Spanning Trees, Weighted Graphs, Minimal Spanning Trees by Prim's Algorithm & Kruskal's Algorithm.

### **Unit-VI: Combinatorics(06 Hrs)**

Generating Functions, Recurrence Relations, Counting: Permutations & Combinations, Pigeonhole Principle with Simple Applications.

#### **Text Books**

1. Discrete Mathematical Structures(3<sup>rd</sup> Edition) by Kolman, Busby & Ross PHI.
2. Discrete Mathematical Structures with Applications to Computer Science by Tremblay & Manohar, Tata McGraw- Hill.
3. Combinatorial Mathematics, C.L. Liu (McGraw Hill)

#### **Reference Books**

1. Discrete Maths for Computer Scientists & Mathematicians by Mott, Kandel, Baker.
2. Elements of Discrete Mathematics by C. L. Liu.
3. Discrete Mathematics by Lipschutz.
4. Discrete Mathematics by R. Johnsonbaugh.
5. Higher Engineering Mathematics by B.S. Grewal, 40<sup>th</sup> Edition, Khanna Publication

### **BECT209T: Data Structures & Program Design**

Load	Credit	Total marks	Sessional marks	University marks	Total
4 hrs (Theory) 1 hr (Tutorial)	5	100	20	80	100

#### **Unit I:**

Introduction to Data Structures: Basic Concepts of Data, How to Create programs.

Arrays: Ordered Lists, Sparse Matrices, Quick Sort, Merge Sort, Heap Sort, selection & Bubble Sort, Linear Search, Binary Search.

#### **Unit II:**

Stacks & Queues: Fundamentals, Evaluation of expressions, Polish expressions & their compilation, Application of stacks, Multiple stacks & Queues, priority queues.

#### **Unit III:**

Linked Lists: Singly Linked List, Linked Stacks & Queues, the polynomial addition, Examples on linked list, circular linked list, doubly linked list & dynamic Storage management, Generalized list.

### **Unit IV:**

Trees: Basic Terminology, Basic trees, Binary tree representations, threaded storage representation, binary tree traversals, binary search trees, Application of trees. Preliminary treatment of AVL Trees, B-Trees.

### **Unit V:**

Graphs: Definition & terminology, Graph representation: matrix representation of Graph, List of structure, other representation of graphs, Breadth First Search, Depth First Search, Spanning trees, Shortest path algorithm, topological sorting, Critical path.

### **Unit VI:**

Files: Storage structures on tapes & disks, sorting with disks & Tapes, sequential files, indexed sequential files, Direct Access files, and Hashing techniques.

#### **Textbooks:**

- Fundamentals of Data Structures: Horowitz and Sahani
- Algorithms in a Nutshell, George H & Garry, O'reilly Publication
- Data Structures using C by Tanenbaum, Pearson Education
- S. Sahani, Data Structures in C,
- Data structures -Robert Kruse

**BECT209P: Data Structures & Program Design Lab: Practical will be based on above syllabus using “C” language and relevant tools of MATLAB.**

Load	Credit	Total marks	Sessional marks	University marks	Total
2 hrs (Practical)	1	50	25	25	50

### **BECT210T: Advance Microprocessor and Interfacing**

Load	Credit	Total marks	Sessional marks	University marks	Total
4 hrs (Theory) 1 hr (Tutorial)	5	100	20	80	100

#### **UNIT I**

Architecture of 8086, Pin configuration of 8086, Physical address formation, addressing modes, Segmentation of memory, Instruction set & programming, 8086 minimum mode and maximum mode, Memory interfacing, static RAM interfacing, dynamic RAM interfacing.

#### **UNIT II**

Different input/output techniques, interfacing with latches, buffers, interfacing of keyboard matrix, Seven-segment display, DAC, ADC 0809 pin diagram, interfacing ADC with 8086, interfacing of 8253.

#### **UNIT III**

Interrupts of 8086, CRT controller 6845 and Hard disk controller. 8255 PPI, pin diagram, modes of operation, strobe modes, interrupt driven mode, BSR mode, Programmable Interrupt Controller 8259, pin diagram, ICWs, OCWs, modes of operation and interfacing details, cascaded mode, SFNM, polled



mode, SMM, USART 8251, pin diagram, internal architecture, modes of operation synchronous and asynchronous modes and interfacing details, DMA controller 8237, pin diagram, transfer modes and interfacing details.

#### **UNIT IV**

Maximum mode of 8086, PDMAC 8237, Interfacing with 8086, 8279A, interfacing with 8086, bus controller 8288, bus arbiter 8289, IOB mode, resident bus mode, co-processor configuration, ESC prefix, system bus mode, semaphores and LOCK prefix, loosely coupled and closely coupled configuration, priority resolution, NDP architecture.

#### **UNIT V**

Introduction to 8 bit microcontroller 8051, architecture, instruction set and programming, using 32 bit addressing in real mode, introduction to protected mode operation, segmentation, segment descriptors, selectors, privilege levels, paging.

#### **UNIT VI**

Pentium super scalar architecture, CPU pin description, bus operation, RISC concepts, pipe lining, branch prediction, instruction and data cache, floating point unit, software programming model, registers, data organization, protection, protecting segmented access, page level protection, multitasking, TSS descriptors, task switching, exceptions and interrupts, IDT descriptors, input/output, IOPL, ALP implementation of data structures : linked list, Queue, stacks.

#### **Reference**

1. Microprocessor and interfacing : Douglas Hall
2. Advanced Microprocessors And Peripherals A.K.Ray ,K.M.Bhuchandi
3. John P Uffenbeck, 8086/8088 Families: Designing, Programming and interfacing Prentice Hall
4. James Antonokos, The Pentium Processor, Pearson Education

#### **BECT210P:Advance Microprocessor and Interfacing**

Load	Credit	Total marks	Sessional marks	University marks	Total
2 hrs (Practical)	1	50	25	25	50

## **BECSE211T: Theory of Computation**

Load	Credit	Total marks	Sessional marks	University marks	Total
4 hrs (Theory) 1 hr (Tutorial)	5	100	20	80	100

### **UNIT 1**

Mathematical preliminaries – Sets, operations, relations, strings, closure of relation, countability and diagonalization, induction and proof methods- pigeon-hole principle, concept of language, formal grammars, Chomsky hierarchy.

### **UNIT 2**

Finite Automaton, regular languages, deterministic & non deterministic finite automata, E-closures, minimization of automata, equivalence, Moore and Mealy machine.

### **UNIT 3**

Regular expression, identities, Regular grammar, right linear, left linear, Arden theorem, Pumping lemma for regular sets, closure & decision properties for regular sets, Context free languages, parse trees and ambiguity, reduction of CFGS, Normal forms for CFG .

### **UNIT 4**

Push down Automata (PDA), non-determinism, acceptance by two methods and their equivalence, conversion of PDA to CFG, CFG to PDAs, closure and decision properties of CFLs, pumping lemma for CFL

### **UNIT 5**

Turing machines, TM as acceptor, TM as transducers, Variations of TM, linear bounded automata, TM as computer of function.

### **UNIT 6**

Recursively enumerable (r.e.) set, recursive sets, Decidability and solvability, Post correspondence Problem (PCP), Introduction to recursive function theory, primitive recursive functions, Ackerman function

#### **Text Books:**

- Introduction Of Automata Theory, Languages and computation- Hopcroft, Motwani&Ulman
- Introduction to formal languages and automata – Peter Linz.
- Introduction to Theory of Computation –Michael Sipser.

#### **Reference Books:**

- Theory Of Computer Science –Mishra and Chandrashekharan,
- Theory Of Computation –John C. Martin

## **BECT212T: Introduction to Main-Frame Languages**

Load	Credit	Total marks	Sessional marks	University marks	Total
3 hrs (Theory) 1 hr (Tutorial)	5	100	20	80	100

### **Unit I: Evolution of Mainframe hardware**

- Overview of Computer Architecture -Classification of Computers - micro, mini, mainframes and super computer - Mainframe computer - key features - benefits - Evolution of Mainframes - Different hardware systems
- Operating systems on mainframes, Batch processing vs. online processing - mainframe operating system. - evolution - concepts of Address space, Buffer management - Virtual storage - paging - swapping - Dataset management in mainframes

### **Unit II: z/OS and its features**

- Z-operating system (Z/OS) - Virtual storage - Paging process - storage Managers - Program execution modes - Address space - Multiple virtual system(MVS) , MVS address space, Z/OS address space - Dataset - sequential and partial dataset - Direct access storage device(DASD) -Access methods - Record formats - Introduction to virtual storage access methods(VSAM) - Catalog - VTOC

### **Unit III: Introduction to JCL**

- Introduction to Job Control language - Job processing - structure of JCL statements - Various statements in JCL - JOB statement - EXEC statement - DD statement - JCL procedures and IBM utility programs.

### **Unit IV: COBOL Programming 1**

- Introduction – History, evolution and Features, COBOL program Structure, steps in executing COBOL
- Language Fundamentals – Divisions, sections, paragraphs, sections, sentences and statements, character set, literals, words, figurative constants, rules for forming user defined words, COBOL coding sheet.
- Data division – Data names, level numbers, PIC and VALUE clause, REDEIFNES, RENAMES and USAGE clause
- Procedure Division – Input / Output verbs, INITIALIZE verb, data movement verbs, arithmetic verbs, sequence control verbs.

### **Unit V: COBOL Programming 2**

- File processing – Field, physical / logical records, file, file organization (sequential, indexed and relative) and access mode, FILE-CONTROL paragraph, FILE SECTION, file operations.
- File handling verbs – OPEN, READ, WRITE, REWRITE, CLOSE.
- Table processing – Definition, declaration, accessing elements, subscript and index, SET statement, SEARCH verb, SEARCH ALL verb, comparison.
- Miscellaneous verbs – COPY, CALL, SORT, MERGE, STRING, UNSTRING verbs.

## Unit VI: Mainframe Application Development guidelines

- COBOL coding standards, relation between a COBOL file handling program and JCL, Different types of ABEND codes, COBOL-DB2 program pre-compilation, DBRM (Database Request Module), Application plan/packages, program execution methods (EDIT JCL, foreground and background modes).

### Books and Reference Text:

- 1. MVS JCL, Doug Lowe, Mike Murach and Associates
- 2. Gary DeWard Brown, JCL Programming Bible (with z/OS) fifth edition, Wiley India Dream Tech, 2002.
- 3. z/OS V1R4.0 MVS JCL Reference found online at <http://www-1.ibm.com/support/docview.wss?uid=pub1sa22759706>
- 4. COBOL - Language Reference, Ver 3, Release 2, IBM Redbook.
- 5. COBOL - Programming Guide, Ver 3, Release 2, IBM Redbook.
- 6. Nancy Stern & Robert A Stern, “Structured Cobol Programming”, John Wiley & Sons, New York, 1973.
- 7. M.K. Roy and D. GhoshDastidar, “Cobol Programming”, Tata McGraw Hill, New York, 1973.
- 8. Newcomer and Lawrence, Programming with Structured COBOL, McGraw Hill Books, New York, 1973.
- Study material from INFOSYS-PUNE

### BECT213P: COMPUTER WORKSHOP – 2 LAB

Load	Credit	Total marks	Sessional marks	University marks	Total
2 hrs (Practical)	1	50	25	25	50

**The contents may be based on LINUX and LINUX Administration. The contents can be revised as per the current trends in Software Industry.**

**Syllabus for**  
**Applied Mathematics- III (EN/ET/EE/Mech)**  
**Scheme (Theory: 4 hrs, Tutorial: 1hr.)**

**UNIT - I: LAPLACE TRANSFORM (15Hrs)**

Definition, Properties, Evaluation of integrals by Laplace Transform, Inverse Laplace Transform and its Properties, Convolution theorem (statement only), Laplace Transform of Periodic Functions (statement only), Unit Step Function and Unit Impulse Function, Applications of Laplace Transform to solve Ordinary Differential Equations, Simultaneous Differential Equations, Integral Equations & Integro-Differential Equations.

**UNIT – II: FOURIER SERIES & FOURIER TRANSFORM (08 Hrs)**

Periodic functions and their Fourier Expansions, Even and Odd functions, Change of interval, Half Range Expansions.

Fourier Transform: Definition and Properties (excluding FFT), Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform to Solve Integral Equation.

**UNIT – III: CALCULUS OF VARIATIONS(05 Hrs)**

Functionals, Maxima and minima of functionals, Euler's equation(statement only), Functionals dependent on First & Second order derivatives, Isoperimetric Problems, Solution of Boundary Value problems by Rayleigh-Ritz method.

**UNIT- IV: FUNCTIONS OF COMPLEX VARIABLE (12 Hrs)**

Analytic function, Cauchy- Riemann Conditions, Harmonic Functions (excluding orthogonal system), Milne-Thomson Method, Cauchy Integral Theorem & Integral Formula (Statement only), Taylor's & Laurent's series (Statement only), Zeros and Singularities of Analytic function, Residue Theorem (Statement only), Contour integration (Evaluation of real definite integral around unit circle and semi-circle).

**UNIT - V: PARTIAL DIFFERENTIAL EQUATIONS(08Hrs)**

Partial Differential Equations of First Order First Degree i.e. Lagrange's form, Linear Homogeneous Equations of higher order with constant coefficients. Method of separations of variables, Simple Applications of Laplace Transform to solve Partial Differential Equations (One dimensional only).

## **UNIT –VI: MATRICES(12Hrs)**

Linear and Orthogonal Transformations, Linear dependence of vectors, Characteristics equation, Eigen values and Eigen vectors, Statement and Verification of Cayley Hamilton Theorem [without proof], Reduction to Diagonal form, Reduction of Quadratic form to Canonical form by Orthogonal transformation, Sylvester's theorem [without proof], Solution of Second Order Linear Differential Equation with Constant Coefficients by Matrix method.

### Text Books

1. Higher Engineering Mathematics by B.S. Grewal, 40<sup>th</sup> Edition, Khanna Publication
2. Advanced Engineering Mathematics by Erwin Kreyszig, 8<sup>th</sup> Edition, Wiley India
3. Applied Mathematics for Engineers & Physicist by L.R. Pipes and Harville,
4. Calculus of variation by Forrey

### Reference Books

1. A Text Book of applied Mathematics, Volume II , by P.N. Wartikar & J.N. Wartikar, Poona Vidyarthi Griha Prakashan
2. Introductory methods of Numerical Analysis, by S.S. Sastry, PHI
3. Mathematics for Engineers by Chandrika Prasad
4. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.

\

BEELE302T	<b>NON CONVENTIONAL ENERGY SOURCES</b>	<b>L = 4</b>	<b>T = 0</b>	<b>P = 0</b>	<b>Credits = 4</b>
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	Learning Outcomes
<ul style="list-style-type: none"> <li>Students will introduce with various sources of Non-conventional energy such as solar wind, small hydro, ocean &amp; wave energy.</li> </ul>	<p>A student will be able to</p> <ul style="list-style-type: none"> <li>Learn fundamentals of solar radiation geometry, application of solar energy</li> <li>Selection of sites for wind farm, different types of wind generators.</li> <li>Understand the basic of small hydro, ocean &amp; wave energy.</li> </ul>

#### UNIT-I

**Solar Radiation & its Measurement:** Solar Constant, Solar radiation at earth's surface, solar radiation geometry, solar radiation measurement, estimation of average solar radiation, solar radiation on tilted surfaces.

#### UNIT -II

**Solar Energy Collectors:** Physical Principles of the conversion of solar radiation into heat, flat plate collectors, transitivity of cover systems, energy balance equation and collector efficiency, concentrating collectors, comparison of concentrating and flat plate collectors, selective absorber coatings.

#### **Solar Energy Storage :**

Solar Energy Storage system (Thermal, Electrical, Chemical, Mechanical), Solar ponds.

#### UNIT-III

**Application of Solar Energy:** Solar water heating, space heating, space cooling, solar thermal heat conversion, solar photovoltaic energy conversion, solar pumping, solar cooking, online grid connected solar photovoltaic generation system.

#### UNIT - IV

**WIND ENERGY:** Basic principles of wind energy conversion, wind energy conversion system, wind data & energy estimation, site selection consideration, basic components of wind energy conversion system (WECS), classification of WEC system, generating system, energy storage, application of wind energy.

#### UNIT-V

**ENERGY from OCEANS:** Ocean thermal electric conversation (OTEC), Claude & Anderson cycles, evaporators, Bio-fouling, Hybrid cycle, components of OTEC for power generation.

**Energy from Tides:** Introduction, basic principles of Tidal power, components of Tidal Power Plants, operation methods of utilization of Tidal Energy; Estimation of Energy & Power in simple single basin Tidal system, Advantages & limitations of Tidal Power Generations, energy & power from waves, wave energy conversions devices.

#### UNIT- VI

**OTHER NONCONVENTIONAL, ENERGY SOURCE:** Brief Introduction to operating principles only): small scale hydro electric power generation, Energy from Bio –Mass, Geothermal Energy, MHD power generation, fuel cell etc.

Text Books		
Title of Book	Name of Author/s	Edition & Publisher
Non Conventional Energy Sources	G.D. Rai	Khanna publishers
Non Conventional Energy Resources	B. H. Khan	2 <sup>nd</sup> , The McGraw Hill Companies
Energy Technology : Nonconventional, Renewable and Conventional	S. Rao & B. B. Parulekar	1 <sup>st</sup> , Khanna Publisher
Solar Energy: Principles of thermal collection and storage	S. P. Sukhatme	2 <sup>nd</sup> edition, Tata McGraw Hill Publishing Company Ltd.
Solar Photovoltaics : Fundamental, Technologies and Applications	Chetan Singh Solanki	PHI Learning Pvt. Ltd.

BEELE303T	ELECTRICAL MEASUREMENT AND INSTRUMENTATION	L = 4	T = 1	P = 2	Credits = 6
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	Learning Outcomes
Students will learn the details of different electrical instrument used for electrical measurement and Instrumentation, different types of Bridges & different types of potentiometers, CT and PT, various transducers, analog to digital conversions, data acquisition.	<ul style="list-style-type: none"> <li>• Student has understood the details of different electrical instrument used for electrical measurement And Instrumentation.</li> <li>• Students has understood the details of different Bridges used for measurement of R,L,C</li> <li>• Students have understood the details of different types of potentiometers and CT and PT.</li> <li>• The basic idea about transducer and Measurement of acceleration, velocity Measurement of angular velocity, Torque and Power measurement Torque meter.</li> <li>• the basic idea about Measurement of temperature using thermistor ,RTD and thermocouple and Two color pyrometers, Optical pyrometer.</li> </ul>

### Unit 1: Measurement of RLC Elements

Loading effect of instruments, Measurement of Resistance: classification, measurements by voltage drop method, Measurement of medium resistance :- Wheatstone Bridge. Low resistance: - Kelvin's Double Bridge. High resistance: - Ohmmeter, Megger & loss of charge method. Earth resistance: - Earth tester, Measurement of inductance using Maxwell's inductance-capacitance bridge, Measurement of Capacitance using Schering's & Hays bridge, LCR meter.



**Unit 2: Analog Instruments :**

Principle & operation of moving iron, PMMC and dynamometer type instruments.

Special Instruments : Power factor meter, frequency meter, synchroscope.

**Unit 3: Measurement of Power & Energy**

True RMS Measurement, Principle of Measurement of active, reactive and apparent power in polyphase circuits. Measurement of Energy in single and polyphase circuits. General theory & extension of range using C.T. & P.T., errors in instrument transformers, applications of instrument transformers for metering.

**Unit 4: Generalised instrumentation systems**

Active and passive transducers, Digital and analogue mode of operation, Static and Dynamic characteristics and performance of instruments. combination of errors. Introduction to Data Acquisition Systems. Elementary Idea of Microprocessor based instrumentation.

**Unit 5: Measurement of Force Torque, Velocity & Acceleration**

Different types of load cells – strain gauge load cell, Different methods of torque measurement,– stroboscope. Accelerometers – LVDT, piezo-electric strain gauge and variable reluctance type accelerometers – mechanical type vibration instruments – seismic instrument as an accelerometer and vibrometer

**Unit 6: Temperature, Pressure and Flow measurement**

Bimetallic thermometers – Electrical methods of temperature measurement, Resistance Temperature Dedectors (RTD) and their characteristics, thermistor, Thermocouples, law of thermocouple, special techniques for measuring high temperature using thermocouples. Units of pressure, Bourdon type bellows, Diaphragms, Electrical methods, elastic elements with LVDT and strain gauges, capacitive type pressure gauge, piezo resistive pressure sensor, measurement of vacuum, McLeod gauge, thermal conductivity gauges, Ionization gauge,

Introduction to flow meters, types and principles, Orifice plate, Venturi tube. Different types of ultrasonic flow meters, pitot tube, electromagnetic flow meter, hot wire anemometer.

<b>Text Books</b>		
<b>Title of Book</b>	<b>Name of Author/s</b>	<b>Edition &amp; Publisher</b>
Electronic Instrumentation & Measurement Technique	W.D. Cooper	Prentice Hall
Electrical & Electronics Measurements & Instrumentation	A. K. Sawhney	DHANPAT RAI & SONS, 5 <sup>th</sup> REVISE
Instrumentation Devices & Systemes	Rangan	Tata McGraw Hill
Mechanical and Industrial Measurements	R.K.Jain	Khanna Publishers
<b>Reference Books</b>		
Measurement System Application and Design	E.O. Doebelin	McGraw Hill
Instrumentation for Engineering Measurements	Dalley Railey, Mc Connel	John Wiley & Sons
Electrical Instrumentation	H. S. Kalsi	TATA MCGRAW-HILL EDUCATION PVT. LTD. 2 <sup>nd</sup> revised

BEELE304T	NETWORK ANALYSIS	L = 4	T = 1	P = 2	Credits = 6
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

<b>Learning Objective</b>	<b>Learning Outcomes</b>
The course objective is to impart knowledge of <ul style="list-style-type: none"> <li>Behavior of basic circuit elements.</li> <li>Fundamental concepts and methods used for analysis of dc, single-phase and three-phase circuits.</li> </ul>	students should be able to: <ul style="list-style-type: none"> <li>Apply node and loop (mesh) analysis</li> <li>Apply phasor analysis to AC circuits in sinusoidal steady state.</li> </ul>

<ul style="list-style-type: none"> <li>• various mathematical tools/transformations used in circuit analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Use various network theorems for analysis and design of electric circuits.</li> <li>• Analyze periodic inputs to electric circuits using Fourier series and their response.</li> <li>• Compute initial and final conditions for current and voltage in first and second order circuits.</li> <li>• Determine the response of a circuit excited by a waveform composed of various step and ramp components.</li> <li>• Characterize two – port networks by z, y, t and h parameters.</li> </ul>
---	---

#### UNIT –1

Voltage current sources, source transformation mesh basis equilibrium equation, matrix approach  
For complicated network containing independent sources and reactances.

#### UNIT-2

Nodal basis equilibrium equation matrix for electrical network containing independent sources  
And reactances, Duality

#### UNIT-3

NETWORK THEOREM: Superposition, Reciprocity, Thevenin's, Norton's, maximum power transfer, compensation, Tellegen's theorem as applied to A.C. & DC circuits.

#### UNIT-4

Laplace transform and properties, partial fractions, singularity functions, waveforms, synthesis. Analysis of RC, RL and RLC network with and without initial conditions with Laplace transforms, evaluation of initial condition.

#### UNIT-5

Transient behaviors concept of complex frequency, Driving points and transfer functions, poles, zeros  
Of transfer function, their properties.

#### UNIT-6

Two port network parameters and inter connections, study of series and parallel resonance in a.c. Three phase balanced and unbalanced circuit and power calculations.

<b>Text Books</b>		
<b>Title of Book</b>	<b>Name of Author/s</b>	<b>Edition &amp; Publisher</b>
Network Analysis	Van Valkenburg	PEARSON EDUCATION 3 <sup>rd</sup> ,ed.
Linear Network Theory	Kelkar and Pandit	PRATIBHA PUBLICATION 39Ed.
Circuit and Network	A. Sudhakar and S.P. Shyam Mohan	TATA MCGRAW-HILL EDUCATION PVT. LTD. 2 REVISE
<b>Reference Books</b>		
Network and System	D.P. Roy choudhary	NEW AGE INTERNATIONAL PVT. LTD. 3re ed.
Electrical circuit	Del Toro	Prentice Hall
Electric Circuits & Network	K. Sureshkumar	Pearson Publication

BEELE305T	<b>ELECTRONIC DEVICES &amp; CIRCUITS</b>	<b>L = 4</b>	<b>T = 1</b>	<b>P = 2</b>	<b>Credits = 6</b>
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	Learning Outcomes
<ul style="list-style-type: none"> <li>The course objective is to impart knowledge of basic semiconductor devices, transistors, amplifiers, FET &amp; MOSFETS. Students also learn digital circuits with Boolean Algebra, logic gates etc.</li> </ul>	students will be able to understand <ul style="list-style-type: none"> <li>principle &amp; working of basic semiconductor devices, transistors, amplifiers, FET &amp; MOSFETS.</li> <li>Conversion of numbers from one code to other code.</li> <li>Logic gates and truth tables of digital circuits.</li> </ul>

Unit 1: Theory of PN-junction diodes, operation and characteristics, Zener diodes and voltage regulators, Half and Full Wave Rectifiers, Filters, Ripple factor, Voltage doublers.

Unit 2: BJT, Theory of operation, characteristics, Biasing arrangements, Stability factor, Small signal analysis of CE, CB, CC amplifiers and their comparison, Power Transistors, Transistor as a switch.

Unit 3: Power amplifiers- classification as A,B, AB, C, Push pull amplifiers, Cross over distortion, Positive and Negative amplifiers- classification, feedback amplifiers, advantages and applications.

Unit 4: Oscillators- Barkhausen's criterion, RC and Crystal oscillators. Field effect transistors and MOSFETs- Principle of operation and characteristics, biasing arrangements.

Unit 5: Differential amplifier circuits and their stages, current source, biasing, level Shifting techniques, Common mode and differential mode gain, Impedance of different stages.

Unit 6: Boolean Identities, Binary, Gray, Octal, Hex & ASCII, Codes, Logic gates and their truth tables, De Morgan's Laws, Concept of Sum of Products and Product of Sums.

Text Books		
Title of Book	Name of Author/s	Edition & Publisher
Electronic Devices and Circuits	Millman and Halkias	McGraw Hill
Integrated Electronics	Millman and Halkias	McGraw Hill
Digital Integrated Electronics	H. Taub	McGraw Hill
Introduction to Operation Amplifiers	Wait	Tata McGraw Hill
Reference Books		

## IV SEM. ELECTRICAL ENGINEERING

### Applied Mathematics- IV (Electrical Engg.)

Scheme (Theory: 4 hrs, Tutorial :1 hr)

#### UNIT-I : MATHEMATICAL MODELING AND TRANSFER FUNCTION

(12 Hrs)

Mathematical Modeling of physical systems and Differential equations (Mechanical systems, basic translational and rotational systems, basic R-L-C series and parallel circuits), Concept of transfer function, Transfer function for elementary R-L-C circuits, Elementary block diagram single input single output closed loop system and its reduction. Laplace transform of step, ramp & parabolic signals, Time response of first order systems and second order systems for unit step input, Concept of characteristic equation  $q(s) = 0$  vs time response.

#### UNIT – II: Z-TRANSFORM (10Hrs)

Definition , Convergence of Z-transform and Properties, Inverse Z-transform by Partial Fraction Method, Residue Method (Inversion Integral Method) and Power Series Expansion, Convolution of two sequences. Solutions of Difference Equations with Constant Coefficients by Z- transform.

#### UNIT – III: FUZZY SETS AND FUZZY LOGIC(12 Hrs)

Fuzzy sets and systems, Crisp sets, Overview of Fuzzy logic and classical logic, Fuzzy compliment, fuzzy union and intersection and combinations of these Fuzzy sets operation, Crisp and Fuzzy relations.

#### UNIT – IV: NUMERICAL METHODS (08 Hrs)

Error Analysis, Solution of Algebraic and Transcendental Equations: Method of False position, Newton –Raphson method and their convergence, Solution of system of simultaneous linear equations: Gauss elimination method, Crout's method and Gauss-Seidel method

#### UNIT – V: NUMERICAL METHODS (08 Hrs)

Numerical solution of ordinary differential equations :Taylor's series method, Runge-Kutta 4<sup>th</sup> order method, Euler's modified method. Milne's Predictor- Corrector method, Solution Of Second Order Differential Equations and Simultaneous Differential Equations by Runge- Kutta method.

## **UNIT – VI: THEORY OF PROBABILITY (10 Hrs)**

Axioms of Probability, Conditional Probability, Baye's Rule, Random variables: Discrete and Continuous random variables, Probability function and Distribution function, Mathematical Expectation, Functions of random variable, Variance & Standard Deviation, Moments, Moment generating function, Measures of central tendency and Dispersion, Skewness and Kurtosis. Binomial distribution, Poisson distribution, Normal distribution.

### Text Books

1. Control Systems Engineering by Nagrath & Gopal, New Age International Publishers.
2. Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication.
3. Theory & Problems of Probability and Statistics by Murray R. Spiegel , Schaum Series, McGraw Hills.
4. Fuzzy Sets Uncertainty and Information by George, J. Klir and Tina A. Folger.

### Reference Books

1. Introductory methods of Numerical Analysis by S.S. Sastry, PHI.
2. Advanced Engineering Mathematics by Erwin Kreyszig, 8th Edition, Wiley India.
3. Neural Networks & Fuzzy Systems by Bart Kosko, PHI.
4. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.
5. Digital Signal Processing, by John Proakis and D.G. Manolakis, Pearson (for Z-Transform)

## 4S-EE-02T – ELEMENTS OF ELECTROMAGNETICS

BEELE402T	<b>ELEMENTS OF ELECTROMAGNETICS</b>	<b>L = 4</b>	<b>T = 1</b>	<b>P = 0</b>	<b>Credits = 5</b>
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	Learning Outcomes
<ul style="list-style-type: none"> <li>• To become knowledgeable in static electric and magnetic fields.</li> <li>• To learn various laws of electromagnetic &amp; electrostatic fields.</li> </ul>	<p>Students will be able to</p> <ul style="list-style-type: none"> <li>• Apply various laws in the analysis of electromagnetic systems.</li> <li>• Understand the physical basis for the functioning of circuit elements</li> <li>• Apply Electromagnetic boundary conditions.</li> <li>• Be familiar with the four Maxwell's equations used to study time varying electromagnetic or dynamic fields.</li> <li>• Understand the concept of uniform plane-wave propagation and electromagnetic power density flow in lossless medium.</li> </ul>

UNIT-1: VECTOR ANALYSIS : Idea of vector & scalars, Vector Algebra, vector addition, vector subtraction, dot product, scalar product in Cartesian coordinates system, conversion of variables from Cartesian to cylindrical system and vice versa. Spherical co-ordinate system, transformation of Cartesian to spherical and vice versa.

UNIT-2:

Coulomb's law, Electrical field intensity and electric, flux density: Coulomb's law, electric field intensity, field of 'n' point charges, field due to continuous volume charge distribution, field of line charge, field of sheet charges, concept of flux density.

UNIT-3:

Gauss's law, Energy and potential of charge system : Gauss's law, application of gauss law, divergence theorem, definition of potential difference and potential, potential of a point charges, potential field of system of charge, potential gradient, Energy density in Electrostatic field.

UNIT-4:

Conductors, Dielectric and Capacitance and poisson's and Laplace Equations : current and current density, continuity of current, metallic conductors, conductor properties and Boundary conditions, Nature of Dielectric materials capacitance and capacitances, Capacitance of parallel plate capacitor, capacitance of two wire line, poisons and Laplace Equation.

UNIT-5:

The steady Magnetic Field and Magnetic forces: Biot Savarts law, Ampere's Circuital law, Strokes theorem, magnetic flux density, scalar and vector magnetic potentials, force on moving charge, force

between differential current elements nature of magnetic material. Magnetization and permeability, magnetic circuits, potential energy and forces on magnetic materials, Inductance and mutual inductance.

UNIT-6:

Maxwell's equations & boundary conditions. Elementary idea of Electromagnetic waves, uniform plane wave.

Text Books		
Title of Book	Name of Author/s	Edition & Publisher
Engineering Electromagnetics	W.H. Hayt	7 <sup>th</sup> , Tata McGraw Hill Publication.
Schaum's Outline Series: Theory and Problems of Electromagnetics	Joseph A. Edminister	2 <sup>nd</sup> , McGraw Hill Publication.
Principles of Electromagnetics	Matthew N.O.Sadiku	4 <sup>th</sup> , Oxford University Press
Reference Books		
Applied Electromagnetic	Plonus	McGraw Hill Publication
Electromagnetics	Kraus	McGraw Hill Publication
Fundamentals of Electromagnetics with MATLAB	Karl E. Lonngren, Sava V. Savov, Randy J. Jost	PHI Learning Private Limited

BEELE403T	<b>DIGITAL AND LINEAR ELECTRONIC CIRCUITS</b>	<b>L = 3</b>	<b>T = 1</b>	<b>P = 2</b>	<b>Credits = 5</b>
Examination Scheme	College Assessment	University Examination	Total		Univ. Exam. Duration
	20	80	100		3 Hrs

Learning Objective	Learning Outcomes
To introduce the basics of logic families, multiplexers, Flip flops, timers. Students will introduce with operational amplifiers, Linear IC's and multivibrators used in digital electronics.	students will be able to understand <ul style="list-style-type: none"> <li>● Basic fundamentals of logic gates, , Flip flops, timers.</li> <li>● Basic Operational amplifier circuits:</li> <li>● Simple linear circuit</li> <li>● Applications of Operational amplifier</li> <li>● Study of Linear ICS</li> </ul>

Unit 1:

TTL, CMOS Logic Families, Combinational Logic concepts, Decoders, Encoders, Multiplexers, Demultiplexers, Code converters, Karnaugh map Principle.

Unit 2:

Introduction to Flip-flop, Latch, Concept of Clock, Overview of RAM, ROM, EPROM & EEPROM, Master slave Flip-flop and conversion of one type to another.

Unit 3:

Introduction to sequential circuits, Synchronous and Asynchronous Counters, Different module counters with reset/ clear facility, Adders, Subtractors, Concept of ALU.

Unit 4:

Basics of Operational Amplifiers, Ideal and non-ideal OPAMPs, Inverting & non-inverting OPAMPs, Integrators, Differentiators, Summer and Averaging circuits, Instrumentation amplifiers, Grounding & Shielding Problems in opamps

Unit 5:

Precision rectifiers, Constant Current & Constant Voltage sources, Introduction to Active filters, Butterworth 2<sup>nd</sup> order filter – Design & operation, Clipping, clamping and comparator circuits, Sample & Hold circuits, A/D & D/A converters, Phase locked loops.

Unit 6:

Study of Linear ICs : LM 741, LM 555, LM 339, LM 723, LM 78xx & 79xx series, Astable, monostable and bistable multivibrators using IC LM 555.

<b>Text Books</b>		
<b>Title of Book</b>	<b>Name of Author/s</b>	<b>Edition &amp; Publisher</b>
Digital Integrated Electronics	Herbert Taub	McGraw Hill
Introduction to Operation Amplifiers	Wait	Tata McGraw Hill
Operational Amplifiers- Design and applications	Tobey Grahame-Huelsman	TMH
<b>Reference Books</b>		
Operational Amplifiers and applications	R. Gaikwad	
Linear ICs Manual I, II, III	National Semiconductors	



BEELE404T	<b>ELECTRICAL MACHINES-I</b>	<b>L = 4</b>	<b>T = 1</b>	<b>P = 2</b>	<b>Credits = 6</b>
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	Learning Outcomes
<p>Student will learn</p> <ul style="list-style-type: none"> <li>• The basic principle of transfer of electrical power, operation, construction of 3-phase transformers, their classification, connections and phasor diagrams.</li> <li>• The basic principle, construction, operation, performance characteristics, steady state analysis and applications of electrical motors and induction generator.</li> </ul>	<p>The student will be able to understand</p> <ul style="list-style-type: none"> <li>• Principle, construction, connections, vector grouping, operation and testing of 3-phase transformer</li> <li>• conversion of 3-phase supply to 2-phase supply, parallel operation of 3-ph. Transformers.</li> <li>• Principle, armature and field construction, types, operation characteristics, armature reaction, commutation, methods to improve commutation in dc generators.</li> <li>• Principle, types, voltage build up, performance characteristics, torque evaluation in dc motors</li> <li>• Principle, construction, types, torque development, performance characteristics, tests to determine performance indices &amp; parameters of equivalent circuit of 3-phase and double cage induction motors, methods of starting, speed control and braking of induction motors.</li> <li>• Revolving and cross field theories, operation, characteristics, types, equivalent circuit &amp; tests.</li> </ul>

#### UNIT-1

SINGLE PHASE TRANSFORMER :- Transformer phasor diagram, equivalent circuit diagram. Transformer equivalent circuit parameter calculation using O.C. & S.C. test. Polarity test and parallel operation of single phase transformer.

3-PHASE TRANSFORMER: principle and operation of three phase transformer and, O.C. & S.C. test on three phase transformer, determination of equivalent circuit parameters, Regulation, Efficiency, Magnetizing current and harmonics, winding identifications, various connections with vector group.

#### UNIT-2

Three phase to two conversion, parallel operation of three phase transformer, methods of cooling, back to back test, maintenance of transformer, insulation of transformer.

#### UNIT-3

D.C. MACHINES: - Basis principle & operation, Armature reaction & commutation, Compensating winding, interpoles. Type of excitation. Characteristics of shunt series & compound motor and generator speed control of d.c. shunt & series motor, constant horse power & constant torque drive of d.c. motor.

#### UNIT-4

**THREE PHASE INDUCTION MOTOR:** - Types of induction motor and production of torque. Torque-slip characteristics, No load blocked rotor test, circle diagram, losses, efficiency, double cage motor, operating characteristics & influence of machine parameter on the performance of motor. Induction motor as a induction generator.

**UNIT-5**

Starting of 3 phase I.M. speed control of I.M. by pole changing, frequency control, rotor resistance by varying supply voltage, braking regenerative braking, plugging, dynamic braking Crawling & cogging.

**UNIT-6**

**SINGLE PHASE I.M.:** - Double field revolving and cross field theory split phase motor shaded pole motor, equivalent circuit, Torque-slip characteristics.

Text Books		
Title of Book	Name of Author/s	Edition & Publisher
Electrical Machines	P.K. Mukherjee & S. Chakraborty	Dhanpat Rai Publication (P) Ltd.
Electrical Machines	I. J. Nagrath & Dr. D.P. Kothari	3 <sup>rd</sup> , Tata McGraw Hill
Electrical Machines	P. S. Bhimbra	Tata McGraw Hill
Reference Books		
Performance & Design of A.C. M/C	M.G. Say	CBS PUBLISHERS AND DISTRIBUTORS PVT. LTD. 3 <sup>rd</sup> ed. Rev.

BEELE405T	COMPUTER PROGRAMMING	L = 4	T = 1	P = 2	Credits = 6
Examination Scheme	College Assessment	University Examination	Total		Univ. Exam. Duration
	20	80	100		3 Hrs

Learning Objective	Learning Outcomes
The student will learn the concept of programming and topics using C & C++ language and apply it in the field of engineering and technology. Similarly student will know about the Matrix operation and use of graphic tools for representation.	The student on completion has understood <ul style="list-style-type: none"> <li>• General information of computers and operating systems</li> <li>• Structure of “C” program, Data types, Storage class, variables, expressions and Operators</li> <li>• Use of arrays and sorting techniques</li> <li>• Pointers and structures.</li> <li>• Basics of strings and arrays</li> <li>• C++ concepts</li> <li>• Matrix operation using programming.</li> <li>• Use of graphic tools for presentation.</li> </ul>

Unit-I: Structure of ‘C’ program, Data types, Variables, Input/output statements, Storage class, operators, Program control statements, Concept of function & Recursion.

Unit-II: Arrays, Searching (Linear & Binary), Sorting (Bubble & Selection).

Unit III: Structure (Arrays of Structures, Copying elements of one structure into another, Nested Structure, Structure Pointer) Pointer, File Handling (File open, close, read, write, Copy).

Unit IV: Introduction to C++ concepts.

Unit-V: Introduction to MATLAB Programming

Import/export data, Program and run simple scripts (M-files), Use graphics tools to display data, Conditional Statements (If-else, if-elseif), and Iterative statements (While, For loop).

Unit -VI: Matrix operation (Transpose, determinant, Inverse), Plotting of graphs (Basic plot, generating waveforms) using Matlab Programming. Manipulating text (Writing to a text file, Reading from a text file, Randomising and sorting a list, Searching a list), Programming using MATLAB functions.

Text Books		
Title of Book	Name of Author/s	Edition & Publisher
A text book on Programming languages C& C++	Kakade & Deshpande	DREAMTECH PRESS 2 <sup>nd</sup> . Ed.
Pascal & C Programming	Venugopal	TATA MCGRAW-HILL EDUCATION PVT. LTD.
Let us C	Y. Kanetkar	8 <sup>th</sup> BPB PUBLICATIONS
Computer Programming in C	Balguru Swami	
Reference Books		
C Programming languages	B.W. Kernighan and D.M. Ritchie	2 <sup>nd</sup> EDITION PEARSON EDUCATION
METLAB-A Practical introduction to programming problem Solving	Stormy Attaway	Elsevier
Mastering METLAB 7	Duane Hansselman Bruce Littlefield	Pearson

BEELE406T	ENVIRONMENTAL STUDIES	L = 3	T = 0	P = 0	Credits = 0
Examination Scheme	College Assessment	University Examination	Total		Univ. Exam. Duration
	20	80	100		3 Hrs

Learning Objective	Learning Outcomes
<ul style="list-style-type: none"> <li>• Student will be able to learn the natural sources available.</li> <li>• Students will also learn about ecosystem, biodiversity, pollution.</li> <li>• Student will also learn the effect on environment on social aspects and Human population.</li> </ul>	<p>The student on completion of course will understand the</p> <ul style="list-style-type: none"> <li>• Ecosystem</li> <li>• Environmental issues related with social and human population.</li> <li>• Biodiversity and its conversion</li> </ul>

### Unit 1 : Multidisciplinary nature of environmental studies

Definition, scope and importance

(2 lectures)

Need for public awareness.

III

### Unit 2 : Natural Resources :

#### Renewable and non-renewable resources :

Natural resources and associated problems.

a) Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.

b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources : Growing energy needs, renewable and non renewable, energy sources, use of alternate energy sources. Case studies.

f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. (8 lectures)

### **Unit 3 : Ecosystems**

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem :-

a. Forest ecosystem

b. Grassland ecosystem

c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) (6 lectures)

### **Unit 4 : Biodiversity and its conservation**

- Introduction – Definition : genetic, species and ecosystem diversity.
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation

V

- Hot-spots of biodiversity.
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity. (8 lectures)

### **Unit 5 : Environmental Pollution**

Definition

- Cause, effects and control measures of :-

a. Air pollution

b. Water pollution

c. Soil pollution

d. Marine pollution

e. Noise pollution

f. Thermal pollution

g. Nuclear hazards

- Solid waste Management : Causes, effects and control measures of urban and industrial wastes.

- Role of an individual in prevention of pollution.

- Pollution case studies.

- Disaster management : floods, earthquake, cyclone and landslides. (8 lectures)

## VI

### **Unit 6 : Social Issues and the Environment**

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case Studies
- Environmental ethics : Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation.
- Public awareness.

(7 lectures)

### **Unit 7 : Human Population and the Environment**

- Population growth, variation among nations.
- Population explosion – Family Welfare Programme.

## VII

- Environment and human health.
- Human Rights.
- Value Education.
- HIV/AIDS.
- Women and Child Welfare.
- Role of Information Technology in Environment and human health.
- Case Studies.

(6 lectures)

### **Unit 8 : Field work**

- Visit to a local area to document environmental assetsriver/forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

(Field work Equal to 5 lecture hours)

**Syllabus for**  
**Applied Mathematics- III (EN/ET/EE/Mech)**  
**Scheme (Theory: 4 hrs, Tutorial: 1hr.)**

**UNIT - I: LAPLACE TRANSFORM (15Hrs)**

Definition, Properties, Evaluation of integrals by Laplace Transform, Inverse Laplace Transform and its Properties, Convolution theorem (statement only), Laplace Transform of Periodic Functions (statement only), Unit Step Function and Unit Impulse Function, Applications of Laplace Transform to solve Ordinary Differential Equations, Simultaneous Differential Equations, Integral Equations & Integro-Differential Equations.

**UNIT – II: FOURIER SERIES & FOURIER TRANSFORM (08 Hrs)**

Periodic functions and their Fourier Expansions, Even and Odd functions, Change of interval, Half Range Expansions.

Fourier Transform: Definition and Properties (excluding FFT), Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform to Solve Integral Equation.

**UNIT – III: CALCULUS OF VARIATIONS(05 Hrs)**

Functionals, Maxima and minima of functionals, Euler's equation(statement only), Functionals dependent on First & Second order derivatives, Isoperimetric Problems, Solution of Boundary Value problems by Rayleigh-Ritz method.

**UNIT- IV: FUNCTIONS OF COMPLEX VARIABLE (12 Hrs)**

Analytic function, Cauchy- Riemann Conditions, Harmonic Functions (excluding orthogonal system), Milne-Thomson Method, Cauchy Integral Theorem & Integral Formula (Statement only), Taylor's & Laurent's series (Statement only), Zeros and Singularities of Analytic function, Residue Theorem (Statement only), Contour integration (Evaluation of real definite integral around unit circle and semi-circle).

**UNIT - V: PARTIAL DIFFERENTIAL EQUATIONS(08Hrs)**

Partial Differential Equations of First Order First Degree i.e. Lagrange's form, Linear Homogeneous Equations of higher order with constant coefficients. Method of separations of variables, Simple Applications of Laplace Transform to solve Partial Differential Equations (One dimensional only).

## **UNIT –VI: MATRICES(12Hrs)**

Linear and Orthogonal Transformations, Linear dependence of vectors, Characteristics equation, Eigen values and Eigen vectors, Statement and Verification of Cayley Hamilton Theorem [without proof], Reduction to Diagonal form, Reduction of Quadratic form to Canonical form by Orthogonal transformation, Sylvester's theorem [without proof], Solution of Second Order Linear Differential Equation with Constant Coefficients by Matrix method.

### Text Books

1. Higher Engineering Mathematics by B.S. Grewal, 40<sup>th</sup> Edition, Khanna Publication
2. Advanced Engineering Mathematics by Erwin Kreyszig, 8<sup>th</sup> Edition, Wiley India
3. Applied Mathematics for Engineers & Physicist by L.R. Pipes and Harville,
4. Calculus of variation by Forrey

### Reference Books

1. A Text Book of applied Mathematics, Volume II , by P.N. Wartikar & J.N. Wartikar, Poona Vidyarthi Griha Prakashan
2. Introductory methods of Numerical Analysis, by S.S. Sastry, PHI
3. Mathematics for Engineers by Chandrika Prasad
4. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.

**B.E. (MECHANICAL ENGINEERING): THIRD SEMESTER**

**BEME302T: KINEMATICS OF MACHINE (Theory)**

**CREDITS: 04**

**Teaching Scheme**

Lectures: 3 Hours/Week

Tutorial: 1 Hour/Week

**Examination Scheme**

Duration of Paper: 03 Hours

University Assessment: 80 Marks

College Assessment: 20 Marks

**Course Objectives and Expected Outcomes:** The study of kinematics is concerned with understanding of relationships between the geometry and the motions of the parts of a machine. The overall objective of this course is to learn how to analyze the motions of mechanisms, design mechanisms to give desired motions. This course includes relative motion analysis, design of gears, gear trains, cams and linkages, graphical and analytical analysis of position, velocity and acceleration, clutches, brakes & dynamometers. Students will be able to understand the concepts of displacement, velocity and acceleration of simple mechanism, drawing the profile of cams and its analysis, gear kinematics with gear train calculations, theory of friction, clutches, brakes & dynamometers.

---

**UNIT – I**

**[ 8 Hrs.]**

Basic concept of mechanism, link, kinematics pairs, kinematics chain, mechanism, Difference between machine and mechanism, Inversions, machine, simple & compound chain, Degrees of freedom, Estimation of degree of freedom of mechanism by Grubber's criterion and other methods. Harding's notations, Classification of four bar chain, Class-I & Class-II, Kutzbach theory, Various types of mechanism such as Geneva wheel, Pawl and ratchet mechanism, Exact straight line mechanism, Approx. straight line mechanism, Transport mechanism.

**UNIT – II**

**[ 8 Hrs.]**

Quantitative kinematics analysis of mechanisms: - Displacement, Velocity and Acceleration analysis of planer mechanism by graphical method as well as analytical method. Coriolis component of acceleration, Instantaneous center method, Kennedy's theorem.

**UNIT – III**

**[ 8 Hrs.]**

Concepts of cam mechanism, Comparison of cam mechanisms with linkages. Types of cams and followers and their applications. Synthesis of cam for different types of follower motion like constant velocity, parabolic, SHM, cycloid etc.

**UNIT – IV**

**[ 8 Hrs.]**

Concept of motion transmission by toothed wheels, comparison with cams and linkages, various tooth profiles, their advantages and limitations, gear tooth terminologies, concept of conjugate action, law of conjugate action, kinematics of involute gear tooth pair during the contact duration,



highlighting locus of the point of contact, arc of contact, numbers of pairs of teeth in contact, path of approach and path of recess, interference, undercutting for involute profile teeth.

Kinematics of Spiral and helical gears, Kinematic analysis and torque analysis of simple epicyclic gear train.

#### **UNIT – V**

[ 8 Hrs.]

Synthesis of Mechanism:- Introduction to type, Number and dimensional synthesis, Synthesis of Mechanism by graphical method, Transmission angle, Freudenstein's equation, Roberts Cognate Linkage.

#### **UNIT – VI**

[ 8 Hrs.]

Laws of friction, Friction of inclined plane, Efficiency of inclined plane, Friction in journal bearing-friction circle, Pivots and collar friction-uniform pressure and uniform wear. Clutches, Brakes & Dynamometers: Single, multiple and cone clutch, Shoe brake, Band brake, Band and Block brake, Absorption and transmission type dynamometers (Numerical are expected on clutches and brakes only).

#### **LIST OF TUTORIALS:**

- 1) Drawing sheets on Inversion of
  - i) Class I & Class II four bar chain
  - ii) Single slider crank chain
  - iii) Double slider crank chain
- 2) Problem on degree of freedom of mechanisms
- 3) Problems on kinematic analysis i) Graphical method ii) Analytical method
- 4) Cam constructions
- 5) Problem on gears
- 6) Analysis of epicyclic gear train with torque analysis
- 7) Problems on synthesis
  - i) Graphical method
  - ii) Analytical method
- 8) Study of construction and working with neat sketch of
  - i) Clutches
  - ii) Brakes
  - iii) Dynamometers

#### **TEXT BOOKS:**

1. Theory of Machine, S. S. Rattan, Tata McGraw Hill.
2. Mechanism and Machine Theory, J.S. Rao & Dukki Patti, New Age International (P) Ltd, Publishers.
3. Theory of Machines, P L Ballaney, Khanna Publications.

**REFERENCE BOOKS:**

1. Theory of Machines and Mechanisms, J. E. Shigley and J. J. Uicker, Oxford University Press.
2. Theory of Machines and Mechanism, Ghosh & Mallik, Affiliated East- West Press, New Delhi.
3. Theory of Machine , Thomas Bevan, Pearson publication
4. Advanced Mechanism Design–Analysis and Synthesis, A.G.Erdman and G.N.Sandor, Vol. I and II, Prentice – Hall
5. Theory of Machines, Sadhu Singh, Pearson publications.

## **BEME303T: FLUID MECHANICS (Theory)**

**CREDITS: 04**

### **Teaching Scheme**

Lectures: 3 Hours/Week

Tutorial: 1 Hour/Week

### **Examination Scheme**

Duration of Paper: 03 Hours

University Assessment: 80 Marks

College Assessment: 20 Marks

**Course Objectives and Expected Outcomes:** This course is designed to develop an understanding of the behavior of fluids at rest or in motion and the subsequent effects of the fluids on the boundaries as the mechanical engineers has to deal with fluids in various applications. This course will also develop analytical abilities related to fluid flow. It is expected that students will gain conceptual understanding of fluids and their properties and will be able to apply the analytical tools to solve different types of problems related to fluid & fluid flow.

---

### **UNIT – I**

**[ 8 Hrs.]**

Fluid Properties :- Types of fluids, Mass Density, Specific Weight, Specific Gravity, Newton's Law of Viscosity, Dynamic Viscosity, Stoke's Theorem, Surface Tension, Capillarity, Compressibility, Vapour pressure.

Fluid Kinematics :- Types of Flow- steady, unsteady, uniform, non-uniform, laminar, turbulent, one, two and three dimensional, compressible, incompressible, rotational, irrotational, stream lines, path lines, streak lines, velocity components, convective and local acceleration, velocity potential, stream function, continuity equation in Cartesian co-ordinates.

### **UNIT – II**

**[ 8 Hrs.]**

Fluid Statics :- Pressure, Measurement of pressure using manometers, Hydrostatic law, Pascal's law, Pressure at a point, Total pressure, Centre of pressure, Pressure on a plane (Horizontal, vertical, Inclined) and Curved Surfaces, Archimedes's principle, Buoyancy and stability of floating and submerged bodies, Metacentric height.

### **UNIT – III**

**[ 8 Hrs.]**

Fluid Dynamics :- Introduction to Navier-Stroke's Equation, Euler equation of motion along a stream line, Bernoulli's equation, application of Bernoulli's equation to pitot tube, venturi meter, orifices, orifice meter.

### **UNIT – IV**

**[ 8 Hrs.]**

Laminar And Turbulent Flow :- Definition, Relation between pressure and shear stresses, Laminar flow through round pipe, Fixed parallel plates, Turbulent flow and velocity distribution.

Dimensional Analysis: - Dimensional Analysis, Dimensional Homogeneity, Rayleigh method & Buckingham's pi Theorem.

### **UNIT – V**

**[ 8 Hrs.]**

Flow Through Pipes :- TEL, HGL, Energy losses through pipe, Darcy-Weisbach equation, Minor losses in pipes, TEL, HGL, Moody diagram, pipes in series and parallel, Siphons, Transmission of power.

## **UNIT – VI**

[ 8 Hrs.]

Boundary Layer Theory :- Development of Boundary Layer on a flat plate, Laminar and Turbulent Boundary Layers, Laminar Sub Layer, Separation of Boundary Layer.

Flow around Immersed Bodies: - Lift and Drag, Classification of Drag, Flow around circular cylinder and Aerofoil, Development of lift on Aerofoil.

### **LIST OF TUTORIALS:**

- 1) Applications based on fluid properties such as block sliding over an inclined plane, capillary phenomenon etc.
- 2) Study of Manometers
- 3) Study of stability of floating bodies and submerged bodies
- 4) Determination of coefficient of discharge of flow meters
- 5) Verification of Bernoulli's equation
- 6) Stokes Law
- 7) Case study of pipe network
- 8) Reynold number & its significance
- 9) Losses in pipes (Hagen Pois. Equation)

### **TEXT BOOKS:**

1. Fluid Mechanics, Dr. R.K. Bansal, Laxmi Publication (P) Ltd. New Delhi
2. Engineering Fluid Mechanics, Kumar K.L., S. Chand & company Ltd. Eurasia Publication House
3. Fluid Mechanics & Hydraulic Machines, R.K. Rajput, S. Chand & Company Ltd.
4. Hydraulic and Fluid Mechanics, Modi P.N. and Seth S.M., Standard Book House.

### **REFERENCE BOOKS:**

1. Introduction to Fluid Mechanics, James E.A., John and Haberm W.A., Prentice Hall of India
2. Fluid Mechanics, Jain A.K., Khanna Publication
3. Engineering Fluid Mechanics, Garde R.J. and Miraj Goankar, Nem chand & Bros, Roorkee, SCITECH, Publication (India) Pvt. Ltd.
4. Fluid Mechanics and Fluid Power Engineering, Dr. D.S. Kumar, S.K. Kataria & sons
5. Fluid Mechanics, Frank M. White, McGraw Hill Publication
6. Introduction to Fluid Mechanics, James A. Fay
7. Fluid Mechanics, Cengel & Cimbala, Tata McGraw Hill
8. Fundamentals of CFD, Anderson, McGraw Hill, International Edition, Mechanical Engineering series
9. Fluid Mechanics, Streeter V.L. and Wylie E.B., McGraw Hill International Book co.

## **BEME304T: MANUFACTURING PROCESSES (Theory)**

**CREDITS: 04**

### **Teaching Scheme**

Lectures: 3 Hours/Week

Tutorial: 1 Hour/Week

### **Examination Scheme**

Duration of Paper: 03 Hours

University Assessment: 80 Marks

College Assessment: 20 Marks

**Course Objectives and Expected Outcomes:** This course is designed to provide students with an overview of a wide variety of manufacturing processes for processing of engineering materials. Students will learn principles, operations and capabilities of various moulding, metal casting, metal forming, press working, metal joining processes & also processing on plastics. Upon completion of this course, students shall understand the importance of manufacturing processes and be able to select and apply suitable processes for an engineering product.

---

### **UNIT – I**

**[ 8 Hrs.]**

Pattern Making & Moulding: - Pattern making: Types, materials used, Pattern making allowances, color codes. Core making: - Types, core material & its properties. Moulding: Types of sand moulds, moulding sand composition. moulding sand properties, moulding machines. Shell moulding, CO<sub>2</sub> moulding.

### **UNIT – II**

**[ 8 Hrs.]**

Gating System & Casting Processes: - Gating design -Elements of gating systems, pouring equipments, riser design Melting furnaces -Types, Electric furnace, Induction furnace, Cupola-construction & operation. Cleaning, inspection & casting defects. Foundry mechanizing Special casting processes such as investment Casting, Centrifugal Casting, Slush Casting and Die Casting.

### **UNIT – III**

**[ 8 Hrs.]**

Joining Processes: - Introduction to metal Joining- Types of Welding. Arc Welding & Gas Welding Processes, Defects & Inspection of Welding Joints, Electrodes, weldability of Metals, Welding equipments. Fixtures, TIG Welding, MIG Welding, Spot Welding.

### **UNIT – IV**

**[ 8 Hrs.]**

Forming Process for metals:- Rolling, Forging, Extrusion, Drawing, Mechanics of forming process, Determination of Rolling pressure and roll specification force, drive force and torque, power loss in bearing, Determination of forging forces and stresses, Equipment (hammer/press) capacity required. (No analytical treatment)

### **UNIT – V**

**[ 8 Hrs.]**

Press Working: - Classification, types of presses, press terminology, Force analysis in press working, Die cutting operation, types of dies, Die and punch allowance, introduction to shaping operations, bending, forming and drawing.

### **UNIT – VI**

**[ 8 Hrs.]**

Introduction to Plastics, Properties & types, applications, Forming & Shaping of plastics – Extrusion, injection moulding, Blow moulding, wire drawing, Compression moulding, Transfer moulding, Embossing, Calendaring.

Introduction to Joining of Plastics- Mechanical Fastening, Spin Welding, Solvent Bonding, Ultrasonic welding, Induction welding, Dielectric welding, Hot Plate welding, Vibration welding, Hot gas welding.

**TEXT BOOKS:**

1. Workshop Practice, H. S. Bawa, Tata Mc-Graw Hill
2. Manufacturing Engineering & Technology, Kalpakjian, Pearson
3. Modern Materials and Manufacturing Process, R. Gregg Bruce, John E. Neely, Pearson Education
4. Workshop Technology (Volume I), Hajra Chaudhary, Media Promoters & Publishers
5. Workshop Technology (Vol. I & II), B. S. Raghuwanshi, Dhanpat Rai & Co.
6. Manufacturing technology (Vol. I), P. N. Rao, Tata Mc-Graw Hill
7. Manufacturing Science, Ghosh & Malik, East West Press.
8. Textbook of Production Engineering, P.C. Sharma, S. Chand & Co.

**REFERENCE BOOKS:**

1. Workshop Technology, Vol I & II, WAJ Chapman, Elsevier Butterworth-Heinemann.
2. Manufacturing Processes, M. Begman.
3. Processes & Materials of Manufacturing, R. Lindberg, Allyn & Bacon.

## **BEME304P: MANUFACTURING PROCESSES (Practical)**

**CREDITS: 01**

### **Teaching Scheme**

Practical: 2 Hours/Week

### **Examination Scheme**

University Assessment: 25 Marks

College Assessment: 25 Marks

---

### **LIST OF PRACTICALS:**

Minimum Eight out of the following shall be performed:

1. Study of Cupola Furnace
2. Study of Moulding Techniques
3. Study of Casting Process
4. Study of Pattern Making
5. Study of Joining Processes
6. Study of Forming Processes
7. Study of Drawing Processes
8. One Job – Pattern Making
9. One Job – Casting
10. One Job – Welding

## **BEME305T: ENGINEERING METALLURGY (Theory)**

**CREDITS: 04**

### **Teaching Scheme**

Lectures: 3 Hours/Week

Tutorial: 1 Hour/Week

### **Examination Scheme**

Duration of Paper: 03 Hours

University Assessment: 80 Marks

College Assessment: 20 Marks

**Course Objectives and Expected Outcomes:** This course is designed to develop fundamental concepts of crystallography, phase transformation and heat treatment processes. Students will learn the atomic structure of metals, imperfections, diffusion mechanisms and mechanism of plastic deformation, various ferrous & non ferrous metals & their alloys. They will also understand equilibrium diagrams, time-temperature transformation curves and heat treatment processes. Upon completion of this course, students will be able to understand the concepts of crystal structure, microstructure and deformation. They will also acquire the knowledge of phase diagrams which are useful for design and control of heat treating processes, various ferrous & non ferrous metals & alloys with engineering applications, non-destructive tests & powder metallurgy with applications.

---

### **UNIT – I**

**[ 8 Hrs.]**

Introduction to engineering materials their classification, properties & application. Difference between metals & non metals, Mechanical properties of metal, Study of crystal structure, Polymorphism & allotropy, Macroscopic & microscopic examination; Imperfections in crystal, Miller indices, Mechanism of plastic deformation, slip, dislocation & twinning.

### **UNIT – II**

**[ 8 Hrs.]**

Solidification of pure metal, nucleation & grain growth, directional & progressive solidification, Ingot structure, Dendritic solidification, Solid solution & their types, Alloy & their formation, Mechanical Mixture, Hume Rothery Rule, grain shape & size, its effect on the properties. Binary equilibrium diagrams, Isomorphous system, Study of Fe-Fe-C diagram - uses & limitations, Invariant reactions.

### **UNIT – III**

**[ 8 Hrs.]**

TTT Curve – Construction & limitations, Heat treatment – Principle, purpose, Annealing & its types, Normalizing, Tempering, Austempering, Martempering, Hardening, Retained austenite & its elimination, Maraging, Patenting; Surface hardening such as Carburising, Nitriding, Induction hardening, Jomini End quench test for hardenability

### **UNIT-IV**

**[ 8 Hrs.]**

Plain carbon steel, Classification based on Carbon Percent & application; Limitations, Effect of impurities; Alloy steel, Effects of various alloying elements, Tool steel & its classification, Red hardness; Stainless steel – Classification, composition & application; Hadfield Manganese steel, Maraging Steel, O.H.N.S. Steel, Selection of steel for various applications.

### **UNIT-V**

**[ 8 Hrs.]**

Cast iron – Classification, gray cast iron, white cast iron, nodular cast iron, malleable cast iron, Mottled cast iron, Ni – hard & Ni – Resistant cast iron, Meehanite Alloy;



Study of non-ferrous alloys – Brasses, its types, Cu-Zn diagram; Bronzes, its types, Cu-Sn diagram; Al-Si diagram.

#### **UNIT-VI**

[ 8 Hrs.]

Principles of hardness measurement, Hardness Test – Brinell, Rockwell, Vicker

Non-destructive tests – Ultrasound Test, Die Penetration Test, radiography test

Powder metallurgy – Introduction, metal powder & its production, blending & mixing, compaction, sintering, Hot Isostatic Pressing, Secondary processes, Advantages, limitations & application of powder metallurgy, few products such as self Lubricating Bearing, Gears & Pump Rotors, Electric Contacts & Electrodes, Magnets, Diamond Impregnated Tools etc.

#### **TEXT BOOKS:**

1. Introduction to Physical Metallurgy, Sidney H. Avner, Tata McGraw-Hill
2. Introduction to Engineering Materials, B.K.Agrawal, Tata McGraw-Hill
3. Heat Treatment – Principles & Techniques, T.V.Rajan, C.P. Sharma, Ashok Sharma, Prentice – Hall India
4. Materials Science & Metallurgy, Dr. V.D.Kotgire, Everest Publishing House
5. Text Book of Materials Science & Metallurgy, O.P.Khanna, Dhanpat Rai Publication
6. Engineering Materials & Metallurgy, Srinivasan, Tata Mc-Graw Hill

#### **REFERENCE BOOKS:**

1. Materials Science, William Callister, John Wiley & Sons
2. Material Science, Narula & Gupta, Tata Mc-Graw Hill
3. Material Science & Metallurgy, Parashivamurthy, Pearson
4. A First course on Material Science, Raghavan, PHI Learning
5. Introduction to Material Science for Engineers, Shakeford & Murlidhara, Pearson
6. Engineering Physical Metallurgy and Heat Treatment, Yu M Lakhtin, CBS Publisher
7. Metallurgy for Engineers, E C Rollason, ButterWorth & Heineman Ltd.
8. Engineering Metallurgy, R A Higgins, Viva Books
9. Fundamentals of Solidification, W Kurtz and D J Fisher, Springer
10. Physical Metallurgy, Clark, CBS Publisher

## **BEME305P: ENGINEERING METALLURGY (Practical)**

**CREDITS: 01**

### **Teaching Scheme**

Practical: 2 Hours/Week

### **Examination Scheme**

University Assessment: 25 Marks

College Assessment: 25 Marks

---

### **LIST OF PRACTICALS:**

Minimum Eight out of following shall be performed:

1. Study of crystal structure
2. Study of metallurgical Microscope
3. Specimen Preparation
4. Metallography ( Study & drawing of microstructure ) of plain carbon steel
5. Metallography of cast iron
6. Metallography of non-ferrous metals.
7. Metallography of heat-treated specimen.
8. Effect of annealing & normalizing on microstructure & hardness of steel.
9. Hardenability Test
10. Hardness Test by i) Brinell ii) Rockwell test.

# **BEME306P: MACHINE DRAWING (Practical)**

**CREDITS: 04**

## **Teaching Scheme**

Practical: 2 Hours/Week

Tutorial: 2 Hour/Week

## **Examination Scheme**

University Assessment: 50 Marks

College Assessment: 50 Marks

**Course Objectives and Expected Outcomes:** The objective of this course is to make students understand the principles and requirements of machine & production drawings. This course will provide a way to learn how to assemble and disassemble important parts used in major mechanical engineering applications. After going through this course, students shall be able to draw & understand the drawings of mechanical components and their assemblies.

---

## **UNIT – I**

Drawing Standards for following

Drawing Sheets, Name Blocks, Lines, Sections Dimensioning. Dimensioning of Tolerances, Standard Components, Standard Features, Machining Symbols, Welding Symbols, Surface Finish Symbols, Heat Treatment Manufacturing Instructions, Allowances, Materials

## **UNIT – II**

Orthographic Projections of Elements, Orthographic Projections, Sectional Views, Multiple Views, Missing Views, Profiles, Cross sections, References, Alignments, Dimensioning

## **UNIT – III**

Study, qualitative selection of type / size (excluding design calculations) and standard practices for following elements Threads, Bolts, Nuts, Washers , Rivets, Welds, Keys & Keyways, Splines, Couplings

## **UNIT – IV**

Assembly and Dismantling: Principles, Fits and Tolerances (Standards, types, application and selection) Tolerance Charting, Surfaces finish requirement for assembly, Geometries suitable for assembly, Assembly / Dismantling Tools, Bearing Assemblies, Assemblies by fastening

## **UNIT – V**

### **Study of Some standard Assemblies**

Assembly Drawings, Principles, techniques and standards for preparing components drawings Subassembly, Drawings, Full assembly Drawing, Exploded Views

## **UNIT – VI**

Production Drawing Name Plates, Part List, Revisions etc.

Essential Parts / Formats required for production drawing, Process Sheet

## **LIST OF PRACTICALS (Based on above Syllabus):**

Minimum Eight Practicals shall be performed consisting of the following:

1. Conventional representation of Symbols.
2. Pencil Drawings of sectional views of machine components.
3. Pencil Drawings of some standard components. ( e.g. Screw Fasteners)
4. Pencil Drawings of standard assemblies with components.( e.g. Couplings)
5. Pencil Drawing of a small assembly with components (e.g. Screw Jack)
6. Pencil Drawings of detailed drawings of Assembly
7. Pencil Drawings of a large assembly with component drawings, subassembly drawings and assembly drawing using all standard formats ( e.g. Spring Loaded Safety Valve)
8. Sheet on Blue Print Reading.
9. Sheet on Preparation and explanation on Production Drawing.
10. Process Sheets for one component having maximum five operations.
11. Computer Print out on Three Dimension Modeling using CAD software.

### **Note:**

1. Pencil drawings shall be in Full Imperial Sheet. Computer Printouts shall be on a Laser printer in A3 size. All drawings shall be submitted in one folder.
2. During University practical examination of 50 marks, students are expected to solve TWO problems of 30 marks of two hours duration on,
  - Sectional View / Missing View
  - Assembly Drawing/ Sub assembly Drawing
  - Prepare and explain production drawingOral of 20 marks shall be conducted during University practical examination.

### **TEXT BOOKS:**

1. Machine Drawing, K. L. Narayana , New Age International Publishers
2. Machine Drawing, N. D. Bhatt & V M Panchal, Charoter Publications
3. Engineering Graphics with AutoCAD, D. M.Kulkarni, A.P.Rastogi, A.K.Sarkar, PHI Learning Pvt. Ltd
4. PSG Data book
5. CMTI Data Book
6. Jadaan Data Book, I.K. International.
7. Relevant IS Codes.

**REFERENCE BOOKS:**

1. Machine Drawing - N.Sidheshwar, Shastry , Kanhaiah, Tata Mcgraw Hill
2. Fundamentals of Machine Drawing, Sadhu Singh, P. L. Shah, PHI Learning Pvt. Ltd

## **BEME307P: TECHNICAL REPORT & SEMINAR**

**CREDITS: 02**

### **Teaching Scheme**

Practical: 02 Hour/Week

### **Examination Scheme**

College Assessment: 50 Marks

**Course Objectives and Expected Outcomes:** To inculcate the habit of independent learning among students, this course includes identification of a technical topic beyond curriculum, collection of existing literature and report preparation with seminar delivery. Students will be able to familiarize themselves with new technical topics and can participate in technical seminars and paper contests.

---

Technical report & Seminar shall be based on any relevant technical topic with independent topic for each student. Report shall be based on information collected from Books, Handbooks, Journals, Periodicals, Internet etc. Student is expected to submit the report and shall give a presentation on it.

A teacher shall be allotted for each batch (Max 09 & Min. 05 Students) and the workload shall be 1 hour per batch per week.

**Syllabus for**  
**Applied Mathematics- IV (Mech. Engg.)**  
**Scheme (Theory: 4 hrs., Tutorial :1 hr)**

**UNIT – I: NUMERICAL METHODS (08Hrs)**

Error Analysis, Solution of Algebraic and Transcendental Equations: Method of False position, Newton–Raphson method and their convergence, Newton–Raphson method for multiple roots, Solution of system of simultaneous linear equations: Gauss elimination method, Gauss Jordan method, Crout’s method and Gauss-Seidel method.

**UNIT – II: NUMERICAL METHODS (08Hrs)**

Numerical solution of ordinary differential equations: Taylor's series method, Runge- Kutta 4<sup>th</sup> order method, Euler’s Modified Method, Milne’s Predictor-Corrector method, Runge- Kutta method to solve Simultaneous first order differential equations. Largest Eigen value and Eigen vector by Iteration method.

**UNIT – III: Z-TRANSFORM (10Hrs)**

Definition , Convergence of Z-transform and Properties, Inverse Z-transform by Partial Fraction Method, Residue Method (Inversion Integral Method) and Power Series Expansion, Convolution of two sequences. Solutions of Difference Equations with Constant Coefficients by Z- transform.

**UNIT - IV: SPECIAL FUNCTIONS AND SERIES SOLUTION(12Hrs)**

Series solution of differential equation by Frobenius method, Bessel’s functions, Legendre’s polynomials, Recurrence relations, Rodrigue’s formula , Generating functions, Orthogonal properties of  $J_n(x)$  and  $P_n(x)$ .

**UNIT – V: RANDOM VARIABLES & PROBABILITY DISTRIBUTIONS (12Hrs)**

Random variables: Discrete and Continuous random variables, Probability function and Distribution function, Joint distributions. Independent Random variables, Conditional Distribution, Mathematical Expectation, Functions of random variables, Variance & Standard Deviation, Moments, Moment generating function, Characteristic function.

## **UNIT – VI: SPECIAL PROBABILITY DISTRIBUTIONS AND RANDOM PROCESS (10Hrs)**

Geometric, Binomial, Poisson, Normal, Exponential, Uniform and Weibull probability distributions.

Random Processes: Ensemble average and time average, Auto correlation and cross-correlation, Stationary random processes, Power spectrum and Ergodic random processes.

### Text Books:

1. Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication
2. Theory & Problems of Probability and Statistics by Murray R. Spiegel , Schaum Series, McGraw Hills
3. Advanced Engineering Mathematics by Erwin Kreyszig, 8th Edition, Wiley India
4. Probability, Statistics and Random Processes by T. Veerarajan..

### Reference Books

1. Introductory methods of Numerical Analysis by S.S. Sastry, PHI.
2. A Text Book of applied Mathematics, Volume I & II by P.N. Wartikar & J.N. Wartikar, Poona Vidyarthi Griha Prakashan.
3. Advanced Mathematics for Engineers by Chandrika Prasad.
4. Probability and Statistics for Engineers 4<sup>th</sup> Ed. By Miller, Freund and Johnson.
5. Probability, Statistics with Reliability, Queuing and Computer Science Applications by K. S. Trivedi.
6. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.



**B.E. (MECHANICAL ENGINEERING): FOURTH SEMESTER**

**BEME402T: ENGINEERING THERMODYNAMICS (Theory)**

**CREDITS: 04**

**Teaching Scheme**

Lectures: 3 Hours/Week

Tutorial: 1 Hour/Week

**Examination Scheme**

Duration of Paper: 03 Hours

University Assessment: 80 Marks

College Assessment: 20 Marks

**Course Objectives and Expected Outcomes:** This course provides the basic knowledge about Thermodynamic laws and relations, their application to various processes. At the end of this course, student will be able to understand the thermodynamic laws and their applications, the concept of entropy and availability, thermodynamic relations, and shall understand the various thermodynamic processes & cycles.

---

**UNIT – I**

**[ 8 Hrs.]**

Introduction to Thermodynamics: Basic concepts of Thermodynamics, Systems and its forms, Property, State, Process, Cycles, Thermodynamics equilibrium, temperature, Zeroth law of thermodynamics, Introduction to First law of thermodynamics, Energy transfer, Heat and Work, Mechanical form of work, Non-mechanical form of work.

Ideal Gas: Gas laws-Boyle's law, Charles's law, Avagadro's law, Equation of state, Specific Heat, Universal gas constant, Constant pressure, Constant volume, Isothermal, Isentropic and Polytropic process on P-V Diagram.

Calculation of Heat transfer, Work done, Change in Internal Energy and Enthalpy.

**UNIT – II**

**[ 8 Hrs.]**

First law of Thermodynamics for Closed System undergoing a process and cycle (Control Mass System) and Open System (Control Volume System), Steady Flow process apply to Nozzle, Turbine, Compressor, Pump, Boiler, Throttling Device, Heat Exchanger. (Analytical treatment on First law applied to closed and open system is expected).

**UNIT – III**

**[ 8 Hrs.]**

Second Law of Thermodynamics:- Introduction, Thermal Energy Reservoirs, Kelvin-Planck and Clausius Statements, Heat Engine, Refrigerator, Heat Pump, Perpetual Motion Machine I and II, Carnot Cycle, Thermodynamic Temperature scale.

Entropy: Clausius Inequality, Entropy, Principle of increase of Entropy, Change in Entropy for different Thermodynamics Processes with T-S Diagram, Reversible and Irreversible Processes, Availability.(Simple analytical treatment is expected)

**UNIT – IV**

**[ 8 Hrs.]**

Properties of Steam: - Sensible Heat, Latent Heat, Critical State, Triple Point, Wet Steam, Dry Steam, Superheated Steam, Dryness Fraction, Internal Energy of Steam, External Work Done during Evaporation, T-S Diagram, Mollier Chart, Work and Heat Transfer during various

Thermodynamic Processes with steam as working fluid, Determination of Dryness Fraction using various Calorimeter. (Analytical Treatment using steam table and Mollier chart is expected)

**UNIT – V**

**[ 8 Hrs.]**

Vapour Power Cycle:- Introduction, Vapour Carnot Cycle, Rankine Cycle, Method to increase Thermal Efficiency, Reheat-Rankine Cycle, Regenerative Rankine Cycle with opened and closed feed water heaters.

**UNIT – VI**

**[ 8 Hrs.]**

Air Standard Cycles: - Otto Cycle, Diesel Cycle, Dual Cycle, Brayton Cycle, Stirling Cycle, Ericsson Cycle (Work done & efficiency analysis is expected)

**TEXT BOOKS:**

1. Engineering Thermodynamics, P. K. Nag, Tata McGraw-Hill Publications
2. Thermal Engineering, P. L. Ballani, Khanna Publications
3. Engineering Thermodynamics, S.S. Khandare, Charotar Publication House

**REFERENCE BOOKS:**

1. Thermodynamics and Engineering approach, Yunus A. Cengel, Michael A. Boles, Tata McGraw-Hill Publications
2. Engineering Thermodynamics, D. P. Mishra, Cengage Learning Publications
3. Engineering Thermodynamics, Gordon Rogers, Pearson Publications
4. Thermodynamics, S. C. Gupta, Pearson Publications

## **BEME403T: HYDRAULIC MACHINES (Theory)**

**CREDITS: 04**

### **Teaching Scheme**

Lectures: 3 Hours/Week

Tutorial: 1 Hour/Week

### **Examination Scheme**

Duration of Paper: 03 Hours

University Assessment: 80 Marks

College Assessment: 20 Marks

**Course Objectives and Expected Outcomes:** This course includes hydraulic turbines, centrifugal pumps, positive displacement pumps and miscellaneous water lifting devices. At the end of this course, students will understand practical applications of fluid; based on momentum and angular momentum principles involved in hydraulic machines. They will also understand design parameters and performance characteristics of various hydraulic machines & devices.

---

### **UNIT – I**

**[ 8 Hrs.]**

Compressible Flow:- Speed of Sound and the Mach Number, Isentropic Nozzle Flow, Normal Shock Wave, Shock Wave in Convergent-Divergent Nozzle, Vapour flow through Nozzle, Oblique Shock Wave, Isentropic Expansion. Introduction to impact of jet.

### **UNIT – II**

**[ 8 Hrs.]**

Theory of turbo machines and their classification, Elements of hydro-electric power plant, Impulse Turbine:- principle, constructional features, Installation of Pelton Turbine, Velocity Diagram and Analysis, Working proportions, Design parameters, Performance characteristics, Governing.

### **UNIT – III**

**[ 8 Hrs.]**

Reaction or pressure Turbine:- principles of operation, Degree of reaction, comparison over Pelton Turbine, Development of reaction turbine, Classification, Draft tube, Cavitation in Turbine, Francis Turbine, Propeller Turbine, Kaplan Turbine:- Types, Constructional features, Installations, Velocity Diagram and analysis, Working proportions, Design parameters, Performance characteristics, Governing, selection of turbines.

### **UNIT – IV**

**[ 8 Hrs.]**

Hydrodynamic pumps:- Classification and Applications, Centrifugal pumps:- Principle of operation, Classification, Component of Centrifugal Pump installation, Priming methods, Fundamental equation, Various heads, Velocity heads, Velocity triangles and their analysis, slip factor, Effect of outlet blade angle, Vane shapes, Losses and Efficiencies of pumps, Multi staging of pumps, Design Consideration, Working proportions, N.P.S.H., Cavitations in pumps, Installation and operation, Performance characteristics, Pump and system matching and Introduction to self priming pumps.

### **UNIT – V**

**[ 8 Hrs.]**

Positive Displacement Pumps:- Basic principle, Classification, Reciprocating Piston / Plunger Pumps:- Types, Main Components, Slip, Work Done, Indicator Diagram, Cavitations, Air vessels, Gear pump, Screw pump, Vane pump.

## **UNIT – VI**

**[ 8 Hrs.]**

Similitude: - Types of similarities, Dimensionless number and their significance, Unit and Specific Quantities, Model Testing: - Application to hydraulic turbine and hydrodynamic pumps, Miscellaneous Water Lifting Device: - Air lift pumps, Hydraulic Ram, Submersible pump, Regenerative pumps.

### **LIST OF TUTORIALS:**

- 1) Selection of Turbine
- 2) Design of centrifugal Pumps
- 3) Design of Francis Turbine
- 4) Design of reciprocating Pumps
- 5) Governing of Turbines
- 6) Study of Hydro-Kinetic System

### **TEXT BOOKS:**

1. Fluid Mechanics & Fluid Power Engineering – D. S. Kumar, S.K. Kataria & Sons Publications
2. Fluid Mechanics & Machines – R. K. Bansal, Laxmi Publications

### **REFERENCE BOOKS:**

1. Fluid Mechanics with Engineering Applications, E. Finnemore & Franzini, Tata Mc-Graw Hill
2. Hydraulic Machines-Theory and Design, V. P. Vasandani, Khanna Publishers
3. Fluid Mechanics, A. K. Jain, Khanna Publishers
4. Hydraulic & Compressible Flow Turbo-machines, A. T. Sayers, Mc-Graw Hill
5. Mechanics of Fluids, Merle C. Potter, CL-Engineering
6. Fluid Mechanics, John F. Douglas, Pearson

## **BEME403P: HYDRAULIC MACHINES (Practical)**

**CREDITS: 01**

### **Teaching Scheme**

Practical: 2 Hours/Week

### **Examination Scheme**

University Assessment: 25 Marks

College Assessment: 25 Marks

---

### **LIST OF PRACTICALS:**

Minimum Eight out of following shall be performed:

1. To determine the metacentric height of given floating vessel.
2. To verify Bernoulli's theorem.
3. To find the value of co-efficient of given venture meter fitted in a pipe.
4. To find the value of co-efficient of Discharge for a given orifice meter.
5. Performance characteristics of Pelton wheel.
6. Performance characteristic of Francis Turbine.
7. Performance characteristic of Kaplan Turbine.
8. Performance characteristic of Reciprocating pump.
9. Performance characteristic of Variable speed pump.
10. Performance characteristic of Axial Flow Pump.
11. To find friction losses in pipe.
12. To determine co-efficient of discharge in pipes.

## **BEME404T: MACHINING PROCESSES (Theory)**

**CREDITS: 04**

### **Teaching Scheme**

Lectures: 3 Hours/Week

Tutorial: 1 Hour/Week

### **Examination Scheme**

Duration of Paper: 03 Hours

University Assessment: 80 Marks

College Assessment: 20 Marks

**Course Objectives and Expected Outcomes:** The study of machine tools & metal cutting is fundamental to mechanical engineering. This course includes the working of mechanisms of various machine tools and machining principles. The learning outcomes include concept of theory of metal cutting & force analysis, understanding the objectives of the various machine tools, constructional details and mechanisms involved in various machine tools. This course is aimed also to identify the machining parameters, different types of cutting tool materials, cutting fluids and their properties. Upon completion of this course, students shall understand the importance of machining processes and be able to apply the suitable machining processes for an engineering product.

---

### **UNIT – I**

**[ 8 Hrs.]**

Introduction to Machining Parameters: Introduction to machining, Tool materials, nomenclature and tool geometry of single point cutting tool, tool materials properties, classification, HSS, carbide tool, coated tools, diamond coated tool.

Theory of Metal Cutting: Introduction. Orthogonal and Oblique cutting. Mechanics of Metal Cutting, shear plane, Stress, Strain and cutting forces. Merchant's circle, Chip formation, cutting force calculations, Determination of Torque and power required for turning Drilling and Milling. Influence of tool angle, cutting fluids, cutting speed, feed and depth of cut on power requirement, Estimation of tool life.

### **UNIT – II**

**[ 8 Hrs.]**

Lathe: Introduction. type, construction of simple lathe mechanism and attachments for various operations, machine specifications, basis for selection of cutting speed. feed and depth of cut, time estimation for turning operations such as facing, step turning, taper turning, threading, knurling. Introduction to Capstan & Turret Lathe.

### **UNIT – III**

**[ 8 Hrs.]**

Shaper: Introduction, type, specification, description of machines, hydraulic drives in shapers, cutting parameters. Mechanism of shaper: Quick return mechanism, Crank & slotted link mechanism, Table feed mechanism, attachments for shaper, work holding devices, shaper operations, time estimation for shaping operations.

Slotter : Introduction, specifications, description, type of drives for slotter, types of slotting machines -production slotter, puncher slotter, tool room slotter, slotter tools. Planer: Introduction, specifications, description. type of planner, open side planner, pit planner Mechanism for planner: Driving mechanism, feeding mechanism, planner cutting tools, cutting parameters.

**UNIT – IV****[ 8 Hrs.]**

Milling: Introduction. Specification, types, column & knee type milling machine, fixed bed type milling machines, production milling machines, special purpose milling machines such as thread milling Machines, profile milling machine, Gear Milling/Hobbing machines. Mechanisms & Attachments for Milling. Cutting, parameters, Types of milling operations, Types of milling cutters, Tool geometry & their specifications. Indexing- simple, compound and differential.

**UNIT – V****[ 8 Hrs.]**

Grinding operations, grinding wheel, specifications & selection, cylindrical & centreless grinding operation, surface grinding, tool & cutter grinding, time estimation for grinding operations. Super finishing process: Honing, Lapping, super finishing, polishing, buffing, 'metal spraying, galvanizing and electroplating. Process parameters and attainable grades of surface finish, surface measurement.

**UNIT – VI****[ 8 Hrs.]**

Drilling: introduction, tools for drilling, classification of drills, twist drills, drill size and specifications, tipped drills, type of drilling machines-portable drilling machine. bench drilling machine, right drilling machine, radial drilling machine, universal drilling machine, multisided drilling machine. Drilling machines operations, time estimation for drilling. Reaming: Introduction, description of reamer, type of reaming operations. Boring: Introduction, types of boring machine, horizontal boring machine, vertical boring machine, jig machine, micro boring. boring operations. Broaching: Introduction, type of broaches, nomenclature of broaches. types of broaching machines.

**TEXT BOOKS:**

1. Workshop technology (Vol. II), V. S. Raghuvanshi, Dhanpat Rai & Sons
2. Manufacturing Science, Ghosh & Mallik, East West Press
3. Manufacturing technology (Metal cutting & Machine tools) Vol. II, P. N. Rao, Tata Mc-Graw Hill
4. Workshop technology, H. S. Bawa, Tata Mc-Graw Hill
5. Introduction to Manufacturing Processes, J. A. Schey, Tata Mc-Graw Hill
6. Workshop Technology (Volume II), Hajra Chaudhary, Media Promoters & Publishers

**REFERENCE BOOKS:**

1. Manufacturing Engineering & Technology, S. Kalpakjian & S.R. Schmid
2. Technology of Machine Tools, Krar & Oswald
3. Manufacturing Processes, M. Begman
4. Processes & Materials of Manufacture, R. Lindberg
5. Production Technology, HMT

## **BEME404P: MACHINING PROCESSES (Practical)**

**CREDITS: 01**

### **Teaching Scheme**

Practical: 2 Hours/Week

### **Examination Scheme**

University Assessment: 25 Marks

College Assessment: 25 Marks

---

### **LIST OF PRACTICALS:**

Minimum Eight out of following shall be performed:

1. Study of Single Point Cutting Tool.
2. Study of Various forces on single point cutting tools.
3. Study of multiple point cutting tools (milling, drilling)
4. Study of Lathe Machine.
5. Study of Shaper mechanisms.
6. Study of Broaching machines.
7. One Job on Milling.
8. One Job on Drilling, Boring
9. One Job on Thread Cutting, Taper Turning.
10. One Job on Surface Grinding.
11. One Job on Shaper.



# **BEME405T: MECHANICS OF MATERIAL (Theory)**

**CREDITS: 04**

## **Teaching Scheme**

Lectures: 3 Hours/Week

Tutorial: 1 Hour/Week

## **Examination Scheme**

Duration of Paper: 03 Hours

University Assessment: 80 Marks

College Assessment: 20 Marks

**Course Objectives and Expected Outcomes:** This course is designed to understand the basic concepts of stress, strain and their variations under different types of loading. It includes the basic concepts involved in mechanics of materials, bending moment, shear force, stresses in beams, slope and deflection in beams under different loading and support conditions, understanding of torsional shear stress in shaft, crippling load in struts and columns. At the end of this course, students will be able to analyze different stresses, strains and deflections in a simple mechanical element under various loading and support conditions.

---

## **UNIT – I**

**[ 8 Hrs.]**

Concept of simple stresses and strains: Introduction, stress, strain, types of stresses, stress and strain diagram for brittle & ductile material, elastic limit, Hooks law, modulus of elasticity, modulus of rigidity, factor of safety, analysis of tapered rod, analysis of composite section, thermal stress and strain.

Longitudinal strain & stress, lateral stresses and strains, Poisson's ratio, volumetric stresses and strain with uni-axial, bi-axial & tri-axial loading, bulk modulus, relation between Young's modulus and modulus of rigidity, Poisson's ratio and bulk modulus.

## **UNIT – II**

**[ 8 Hrs.]**

Shear force and bending moment: - Types of beam (cantilever beam, simply supported beam, overhung beam etc.), Types of loads (Concentrated and UDL), shear force and bending moment diagrams for different types of beams subjected to different types of loads, sign conventions for bending moment and shear force, shear force and bending moment diagrams for beams subjected to couple, Relation between load, shear force and bending moment.

Stresses in beams: - Pure bending, theory of simple bending with assumptions & expressions for bending stress, derivation of bending equation, bending stresses in symmetrical sections, section modulus for various shapes of beam sections.

Shear stresses in beams: - Concept, derivation of shear stress distribution formula , shear stress distribution diagram for common symmetrical sections, maximum and average shear stress.

## **UNIT – III**

**[ 8 Hrs.]**

Deflection of beams:- Deflection & slope of cantilever, simply supported, overhung beams subjected to concentrated load, UDL, Relation between slope, deflection & radius curvature Macaulay's method to determine deflection of beam.

Principal stresses and strains:- Definition of principal planes & principal stresses, analytical method of determining stresses on oblique section when member is subjected to direct stresses in one plane in mutually perpendicular two planes, when member is subjected to shear stress and direct stresses in two mutually perpendicular planes, Mohr's circle for representation of principal stresses.

## **UNIT-IV**

[ 8 Hrs.]

Torsion of circular shafts: - Derivation of torsion equation with the assumptions made in it. Torsion shear stress induced in the shaft, when it is subjected to torque. Strength and rigidity criterion for design of shaft. Torque transmitted by solid & hollow circular shaft. Equivalent twisting and bending moment in shaft when it is subjected to bending moment, torque & axial load. Column & Struts: - Failure of long & short column, slenderness ratio, assumptions made in Euler's column theory, end conditions for column. Expression for crippling load for various end conditions of column and derivation on column with both ends hinged. Effective length of column, limitations of Euler's formula, Rankine formula.

## **UNIT-V**

[ 8 Hrs.]

Introduction to fracture mechanics: - Modes of fracture, stress intensity factors, crack propagation, creep phenomenon.

Strain energy & impact loading: - Definition of strain energy stored in a body when it is subjected to gradually applied load, suddenly applied loads & impact loads. Strain energy stored in bending & torsion.

## **UNIT-VI**

[ 8 Hrs.]

Factor of safety, Statistical methods in determining factor of safety. Theories of failure, modes of failure, compound stresses, eccentric axial loading, variable stresses in machine parts, Endurance, S-N Curve, stress concentration & stress raisers, notch sensitivity, stress concentration factor, methods for reducing stress concentration. Goodmans criteria, Soderberg criteria, Gerber's criteria, fatigue design for finite and infinite life of the parts subjected to variable loads with uniform cross section.

### **LIST OF TUTORIALS:**

- 1) Two problems on principle stresses
- 2) Two problems on Mohr's circle
- 3) Two problems on Thermal stresses with heat flow
- 4) Three problems on S.F. & B.M. diagrams
- 5) Two problems on Stresses in beam bending
- 6) Two problems on shear stresses
- 7) Two problems on Macaulay's methods
- 8) Two problems on area moment method
- 9) Two problems on shafts
- 10) Two problems on columns & struts
- 11) Two problems on compound loading
- 12) Two problems on fatigue & variable loads

### **TEXT BOOKS:**

1. Elements of Strength of Materials, S. Timoshenko and O.H.Young, East West Press Private Ltd.
2. Strength of Materials, R K Bansal, Laxmi Publications
3. Strength of Materials, Ramamurtham, Dhanapat Rai Publication.
4. PSG Data Book.
5. Design Data for Machine Elements, B.D. Shiwalkar, Denett & Company
6. Strength of Material, R.K. Rajput, S.Chand Publication

**REFERENCE BOOKS:**

1. Strength of Material, Ferdinand L. Singer, Harper and Row, New York
2. Elements of Strength of Materials, V. Natarajan, Oxford & IBH Publishing Company
3. Strength of Materials, S S Rattan, Tata McGraw-Hill
4. Mechanics of Material, Beer & Johnson, Tata Mc-Graw Hill

## **BEME405P: MECHANICS OF MATERIAL (Practical)**

**CREDITS: 01**

### **Teaching Scheme**

Practical: 2 Hours/Week

### **Examination Scheme**

University Assessment: 25 Marks

College Assessment: 25 Marks

---

### **LIST OF PRACTICALS:**

Minimum Eight Practicals out of following areas shall be performed:

1. Study of Universal Testing Machine

1. Tension test on metals.

2. Compression test on materials.

3. Shear test on metals.

4. Impact test on metals.

5. Hardness test on metals.

6. Torsion test on metals.

7. Deflection of beams.

8. Modulus of rupture test.

9. Buckling of columns.

10. Deflection of springs.

## **BEME406T: ENVIRONMENTAL STUDIES (Theory)**

**CREDITS:** Nil (College Assessment in Grades)

### **Teaching Scheme**

Lectures: 3 Hours/Week

### **Examination Scheme**

College Assessment: Grades  
(Grades: O, A, B, C)

**Course Objectives and Expected Outcomes:** This course provides an integrated and interdisciplinary approach to the study of environment and solutions to environmental problems. This course will spread awareness among the students about environmental issues and shall alert them to find solutions for sustainable development.

---

### **UNIT – I**

[ 6 Hrs.]

#### **Introduction:**

Definition, scope and importance; Need for public awareness -Institutions in environment, people in environment.

#### **Natural Resources:**

Renewable and non-renewable and associated problems; Role of an individual in conservation of natural resources; equitable use of resources for sustainable lifestyles.

### **UNIT – II**

[ 6 Hrs.]

#### **Ecosystems:**

Concept of an ecosystem - understanding ecosystems, ecosystem degradation, resource utilization, Structure and functions of an ecosystem- (producers, consumers) and decomposers.

Energy flow in the ecosystem - water, carbon, oxygen, nitrogen; and energy cycles, integration of cycles in nature.

Ecological succession; Food chains, food webs and ecological pyramids; Ecosystem types - characteristic features, structure:, and functions of forest, grassland, desert and aquatic ecosystems.

### **UNIT – III**

[ 6 Hrs.]

#### **Bio-diversity:**

Introduction - biodiversity; at genetic, species and ecosystem levels Bio-geographic classification of India

Value of biodiversity - Consumptive use value, productive use .value, social, ethical, moral, aesthetic and optional value of biodiversity.

India as a mega-diversity nation; hotspots of biodiversity

Threats to bio-diversity - habitat loss, poaching of wildlife, man-wild life conflicts. Common endangered and endemic plant and animal species of India. Insitu and Exsitu conservation of biodiversity

#### **UNIT – IV**

[ 6 Hrs.]

##### **Pollution :**

Definition; Causes, effects and control measures of air, water, soil, marine, noise and thermal pollutions and nuclear hazards.

Solid waste management - Causes, effects and control measures of urban and industrial waste. Role of individual and institutions in prevention of pollution.

Disaster management Floods, Earth quacks, Cyclone and land slides.

#### **UNIT – V**

[ 6 Hrs.]

##### **Social Issues and the Environment:**

Unsustainable to sustainable development; Urban problems, related to energy; Water conservation, rainwater harvesting, watershed management; Problems and concerns of resettlement and rehabilitation of affected people.

Environmental ethics - issues and possible solutions – Resource consumption patterns and need for equitable utilization; Equity disparity in Western and Eastern countries; Urban and rural equity issues; need for gender-equity.

Preserving Resources for future generations. The rights of animals; Ethical basis of environment education and awareness; Conservation ethics and traditional value systems of India.

Climate change, global warming, acid-, rain, Ozone layer depletion, nuclear accidents and holocausts. Wasteland Reclamation; Consumerism and Waste products.

Environment legislations - The Environment (protection) Act; The water (Prevention and Control of Pollution) Act; The Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislations - environment impact assessment (EIA), Citizens actions and action groups.

Public awareness — Using an environmental calendar of activities, self initiation.

#### **UNIT – VI**

[ 6 Hrs.]

##### **Human Population and the Environment:**

Global population growth, variation among nations, population explosion; Family Welfare Programmes.- methods of. sterilization; Urbanization.

Environment and human health - Climate and health, Infectious diseases, water-related diseases, risk due to chemicals in food, Cancer and environment.

Human rights — Equity, Nutrition and health rights, intellectual property rights (IPRS), Community Biodiversity registers (CBRs).

Value education - environmental values, valuing nature, valuing cultures, social justice, human heritage, equitable use of resources, common property resources, ecological degradation.

HIY/AIDS; Women and Child Welfare; Information technology in environment and human health.

**GUIDELINES FOR EVALUATION OF ENVIRONMENTAL STUDIES SUBJECT (As per Ordinance No. 2 of 2012):**

At the end of the course, the student shall be evaluated for 100 marks with distribution as below:

Field note book	-	25 Marks
Objective Questions	-	50 Marks (50 questions, each of one mark)
Essay type question	-	25 Marks
Passing marks	-	40 Marks

OR

In view of the above entire course the students in terms of batches of 20 students each may be assigned a project work encompassing People's Bio-diversity Register (PBR) of any Gram Panchayat as per the format of Bio-diversity Authority of India under the guidance of a teacher. The PBR should be evaluated for 100 marks.

The result shall be declared in grades as follows:

Grade O: above 75 Marks; Grade A: 61–75 Marks; Grade B: 51-60 Marks; Grade C: 40-50 Marks

**TEXT BOOKS:**

A Text Book of Environmental Studies for Undergraduate Courses, Erach Bharucha, University Press (India) Pvt. Ltd., Hyderabad

## **BEME407P: MINI PROJECT**

**CREDITS: 02**

### **Teaching Scheme**

Practical: 2 Hour/Week

### **Examination Scheme**

College Assessment: 50 Marks

**Course Objectives and Expected Outcomes:** The objective of this course is to convert an idea or concept into a simple working physical model. During this course, student will learn regarding fabrication/construction of a simple mechanical or electro-mechanical working model using various manufacturing processes.

---

A group of students (not more than 10 students) shall prepare a working model of any mechanical or electro-mechanical system. Computer / mathematical model or simulation is not acceptable. Student shall submit a report with photograph of the model.

A teacher shall be allotted for each batch (Max 09 & Min. 05 Students) and the workload shall be 1 hour / batch per week.



Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur

Faculty of Engineering and Technology

B.E. (Power ENGINEERING): Third SEMESTER

Syllabus for

**BEPOE301T (BEELE301T) Applied Mathematics- III (EN/ET/EE/Mech/Power Engg)**

Scheme (Theory: 4 hrs, Tutorial: 1hr.)

UNIT - I: LAPLACE TRANSFORM (15Hrs)

Definition, Properties, Evaluation of integrals by Laplace Transform, Inverse Laplace Transform and its Properties, Convolution theorem (statement only), Laplace Transform of Periodic Functions (statement only), Unit Step Function and Unit Impulse Function, Applications of Laplace Transform to solve Ordinary Differential Equations, Simultaneous Differential Equations, Integral Equations & Integro-Differential Equations.

UNIT – II: FOURIER SERIES & FOURIER TRANSFORM (08 Hrs)

Periodic functions and their Fourier Expansions, Even and Odd functions, Change of interval, Half Range Expansions.

Fourier Transform: Definition and Properties (excluding FFT), Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform to Solve Integral Equation.

UNIT – III: CALCULUS OF VARIATIONS(05 Hrs)

Functionals, Maxima and minima of functionals, Euler's equation(statement only), Functionals dependent on First & Second order derivatives, Isoperimetric Problems, Solution of Boundary Value problems by Rayleigh-Ritz method.

UNIT- IV: FUNCTIONS OF COMPLEX VARIABLE (12 Hrs)

Analytic function, Cauchy- Riemann Conditions, Harmonic Functions (excluding

orthogonal system), Milne-Thomson Method, Cauchy Integral Theorem & Integral Formula (Statement only), Taylor's & Laurent's series (Statement only), Zeros and Singularities of Analytic function, Residue Theorem (Statement only), Contour integration (Evaluation of real definite integral around unit circle and semi-circle).

#### UNIT - V: PARTIAL DIFFERENTIAL EQUATIONS(08Hrs)

Partial Differential Equations of First Order First Degree i.e. Lagrange's form, Linear Homogeneous Equations of higher order with constant coefficients. Method of separations of variables, Simple Applications of Laplace Transform to solve Partial Differential Equations (One dimensional only).UNIT –VI: MATRICES(12Hrs)

Linear and Orthogonal Transformations, Linear dependence of vectors, Characteristics equation, Eigen values and Eigen vectors, Statement and Verification of Cayley Hamilton Theorem [without proof], Reduction to Diagonal form, Reduction of Quadratic form to Canonical form by Orthogonal transformation, Sylvester's theorem [without proof], Solution of Second Order Linear Differential Equation with Constant Coefficients by Matrix method.

#### Text Books

1. Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication
2. Advanced Engineering Mathematics by Erwin Kreyszig, 8th Edition, Wiley India
3. Applied Mathematics for Engineers & Physicist by L.R. Pipes and Harville,
4. Calculus of variation by Forrey

#### Reference Books

1. A Text Book of applied Mathematics, Volume II , by P.N. Wartikar & J.N. Wartikar, Poona Vidyarthi Griha Prakashan
2. Introductory methods of Numerical Analysis, by S.S. Sastry, PHI
3. Mathematics for Engineers by Chandrika Prasad

4. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi  
Publication.

Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur

Faculty of Engineering and Technology

B.E. (MECHANICAL ENGINEERING): THIRD SEMESTER

**BEPOE302T (BEME302T): KINEMATICS OF MACHINE (Theory)**

CREDITS: 04

Teaching Scheme Examination Scheme

Lectures: 3 Hours/Week Duration of Paper: 03 Hours

Tutorial: 1 Hour/Week University Assessment: 80 Marks

College Assessment: 20 Marks

Course Objectives and Expected Outcomes: The study of kinematics is concerned with understanding of relationships between the geometry and the motions of the parts of a machine. The overall objective of this course is to learn how to analyze the motions of mechanisms, design mechanisms to give desired motions. This course includes relative motion analysis, design of gears, gear trains, cams and linkages, graphical and analytical analysis of position, velocity and acceleration, clutches, brakes & dynamometers. Students will be able to understand the concepts of displacement, velocity and acceleration of simple mechanism, drawing the profile of cams and its analysis, gear kinematics with gear train calculations, theory of friction, clutches, brakes & dynamometers.

UNIT – I [ 8 Hrs.]

Basic concept of mechanism, link, kinematics pairs, kinematics chain, mechanism, Difference between machine and mechanism, Inversions, machine, simple & compound chain, Degrees of freedom, Estimation of degree of freedom of mechanism by Grubber's criterion and other methods.

Harding's notations, Classification of four bar chain , Class-I & Class-II, Kutzbach theory, Various types of mechanism such as Geneva wheel, Pawl and ratchet mechanism, Exact straight line mechanism, Approx. straight line mechanism, Transport mechanism.

#### UNIT – II [ 8 Hrs.]

Quantitative kinematics analysis of mechanisms: - Displacement, Velocity and Acceleration analysis of planer mechanism by graphical method as well as analytical method. Coriolis component of acceleration, Instantaneous center method, Kennedy's theorem.

#### UNIT – III [ 8 Hrs.]

Concepts of cam mechanism, Comparison of cam mechanisms with linkages. Types of cams and followers and their applications. Synthesis of cam for different types of follower motion like constant velocity, parabolic, SHM, cycloid etc.

#### UNIT – IV [ 8 Hrs.]

Concept of motion transmission by toothed wheels, comparison with cams and linkages, various tooth profiles, their advantages and limitations, gear tooth terminologies, concept of conjugate action, law of conjugate action, kinematics of involute gear tooth pair during the contact duration, highlighting locus of the point of contact, arc of contact, numbers of pairs of teeth in contact, path of approach and path of recess, interference, undercutting for involute profile teeth.

Kinematics of Spiral and helical gears, Kinematic analysis and torque analysis of simple epicyclic gear train.

#### UNIT – V [ 8 Hrs.]

Synthesis of Mechanism:- Introduction to type, Number and dimensional synthesis, Synthesis of Mechanism by graphical method, Transmission angle, Freudenstein's equation, Roberts Cognate Linkage.

#### UNIT – VI [ 8 Hrs.]

Laws of friction, Friction of inclined plane, Efficiency of inclined plane, Friction in journal bearing-friction circle, Pivots and collar friction-uniform pressure and uniform wear.

Clutches, Brakes & Dynamometers: Single, multiple and cone clutch, Shoe brake, Band brake, Band and Block brake, Absorption and transmission type dynamometers (Numerical are expected on clutches and brakes only).

LIST OF TUTORIALS:

- 1) Drawing sheets on Inversion of
  - i) Class I & Class II four bar chain
  - ii) Single slider crank chain
  - iii) Double slider crank chain
- 2) Problem on degree of freedom of mechanisms
- 3) Problems on kinematic analysis i) Graphical method ii) Analytical method
- 4) Cam constructions
- 5) Problem on gears
- 6) Analysis of epicyclic gear train with torque analysis
- 7) Problems on synthesis
  - i) Graphical method
  - ii) Analytical method
- 8) Study of construction and working with neat sketch of
  - i) Clutches
  - ii) Brakes
  - iii) Dynamometers

TEXT BOOKS:

1. Theory of Machine, S. S. Rattan, Tata McGraw Hill.
  2. Mechanism and Machine Theory, J.S. Rao & Dukki Patti, New Age International (P) Ltd, Publishers.
  3. Theory of Machines, P L Ballaney, Khanna Publications.
- REFERENCE BOOKS:

1. Theory of Machines and Mechanisms, J. E. Shigley and J. J. Uicker, Oxford University Press.

2. Theory of Machines and Mechanism, Ghosh & Mallik, Affiliated East- West Press, New Delhi.

3. Theory of Machine , Thomas Bevan, Pearson publication

4. Advanced Mechanism Design–Analysis and Synthesis, A.G.Erdman and G.N.Sandor, Vol. I and II, Prentice – Hall

5. Theory of Machines, Sadhu Singh, Pearson publications.

**BEPOE303T (BEME304T): MANUFACTURING PROCESSES (Theory)**

CREDITS: 04

Teaching Scheme Examination Scheme

Lectures: 3 Hours/Week Duration of Paper: 03 Hours

Tutorial: 1 Hour/Week University Assessment: 80 Marks

College Assessment: 20 Marks

Course Objectives and Expected Outcomes: This course is designed to provide students with an overview of a wide variety of manufacturing processes for processing of engineering materials.

Students will learn principles, operations and capabilities of various moulding, metal casting, metal forming, press working, metal joining processes & also processing on plastics. Upon completion of this course, students shall understand the importance of manufacturing processes and be able to select and apply suitable processes for an engineering product.

UNIT – I [ 8 Hrs.]

Pattern Making & Moulding: - Pattern making: Types, materials used, Pattern making allowances, color codes. Core making: - Types, core material & its properties. Moulding: Types of sand moulds, moulding sand composition. moulding sand properties, moulding machines. Shell moulding, CO2 moulding.

UNIT – II [ 8 Hrs.]

Gating System & Casting Processes: - Gating design -Elements of gating systems, pouring equipments, riser design Melting furnaces -Types, Electric furnace, Induction furnace, Cupolaconstruction & operation. Cleaning, inspection & casting defects. Foundry mechanizing Special casting processes such as investment Casting, Centrifugal Casting, Slush Casting and Die Casting.

UNIT – III [ 8 Hrs.]

Joining Processes: - Introduction to metal Joining- Types of Welding. Arc Welding & Gas Welding Processes, Defects & Inspection of Welding Joints, Electrodes, weldability of Metals, Welding equipments. Fixtures, TIG Welding, MIG Welding, Spot Welding.

UNIT – IV [ 8 Hrs.]

Forming Process for metals:- Rolling, Forging, Extrusion, Drawing, Mechanics of forming process, Determination of Rolling pressure and roll specification force, drive force and torque, power loss in bearing, Determination of forging forces and stresses, Equipment (hammer/press) capacity required. (No analytical treatment)

UNIT – V [ 8 Hrs.]

Press Working: - Classification, types of presses, press terminology, Force analysis in press working, Die cutting operation, types of dies, Die and punch allowance, introduction to shaping operations, bending, forming and drawing.

UNIT – VI [ 8 Hrs.]

Introduction to Plastics, Properties & types, applications, Forming & Shaping of plastics – Extrusion, injection moulding, Blow moulding, wire drawing, Compression moulding, Transfer moulding, Embossing, Calendaring. Introduction to Joining of Plastics- Mechanical Fastening, Spin Welding, Solvent Bonding,

Ultrasonic welding, Induction welding, Dielectric welding, Hot Plate welding, Vibration welding, Hot gas welding.

TEXT BOOKS:

1. Workshop Practice, H. S. Bawa, Tata Mc-Graw Hill
2. Manufacturing Engineering & Technology, Kalpakjian, Pearson
3. Modern Materials and Manufacturing Process, R. Gregg Bruce, John E. Neely, Pearson Education
4. Workshop Technology (Volume I), Hajra Chaudhary, Media Promoters &



## Publishers

5. Workshop Technology (Vol. I & II), B. S. Raghuwanshi, Dhanpat Rai & Co.
6. Manufacturing technology (Vol. I), P. N. Rao, Tata Mc-Graw Hill
7. Manufacturing Science, Ghosh & Malik, East West Press.
8. Textbook of Production Engineering, P.C. Sharma, S. Chand & Co.

## REFERENCE BOOKS:

1. Workshop Technology, Vol I & II, WAJ Chapman, Elsevier Butterworth-Heinemann.
2. Manufacturing Processes, M. Begman.
3. Processes & Materials of Manufacturing, R. Lindberg, Allyn & Bacon.

## **BEPOE303P(BEME304P): MANUFACTURING PROCESSES (Practical)**

CREDITS: 01

Teaching Scheme Examination Scheme

Practical: 2 Hours/Week University Assessment: 25 Marks

College Assessment: 25 Marks

## LIST OF PRACTICALS:

Minimum Eight out of the following shall be performed:

1. Study of Cupola Furnace
2. Study of Moulding Techniques
3. Study of Casting Process
4. Study of Pattern Making
5. Study of Joining Processes
6. Study of Forming Processes
7. Study of Drawing Processes

8. One Job – Pattern Making

9. One Job – Casting

10. One Job – Welding

**BEPOE304T (BEME303T): FLUID MECHANICS (Theory)**

CREDITS: 04

Teaching Scheme Examination Scheme

Lectures: 3 Hours/Week Duration of Paper: 03 Hours

Tutorial: 1 Hour/Week University Assessment: 80 Marks

College Assessment: 20 Marks

Course Objectives and Expected Outcomes: This course is designed to develop an understanding of the behavior of fluids at rest or in motion and the subsequent effects of the fluids on the boundaries as the mechanical engineers has to deal with fluids in various applications. This course will also develop analytical abilities related to fluid flow. It is expected that students will gain conceptual understanding of fluids and their properties and will be able to apply the analytical tools to solve different types of problems related to fluid & fluid flow.

UNIT – I [ 8 Hrs.]

Fluid Properties :- Types of fluids, Mass Density, Specific Weight, Specific Gravity, Newton's Law of Viscosity, Dynamic Viscosity, Stoke's Theorem, Surface Tension, Capillarity, Compressibility, Vapour pressure.

Fluid Kinematics :- Types of Flow- steady, unsteady, uniform, non-uniform, laminar, turbulent, one, two and three dimensional, compressible, incompressible, rotational, irrotational, stream lines, path lines, streak lines, velocity components, convective and local acceleration, velocity potential, stream function, continuity equation in Cartesian co-ordinates.

UNIT – II [ 8 Hrs.]

Fluid Statics :- Pressure, Measurement of pressure using manometers, Hydrostatic law, Pascal's law, Pressure at a point, Total pressure, Centre of pressure, Pressure on a plane (Horizontal, vertical, Inclined) and Curved Surfaces, Archimedes's principle, Buoyancy and stability of floating and submerged bodies, Metacentric height.

UNIT – III [ 8 Hrs.]

Fluid Dynamics :- Introduction to Navier-Stroke's Equation, Euler equation of motion along a stream line, Bernoulli's equation, application of Bernoulli's equation to pitot tube, venturi meter, orifices, orifice meter.

UNIT – IV [ 8 Hrs.]

Laminar And Turbulent Flow :- Definition, Relation between pressure and shear stresses, Laminar flow through round pipe, Fixed parallel plates, Turbulent flow and velocity distribution.

Dimensional Analysis: - Dimensional Analysis, Dimensional Homogeneity, Rayleigh method & Buckingham's pi Theorem.

UNIT – V [ 8 Hrs.]

Flow Through Pipes :- TEL, HGL, Energy losses through pipe, Darcy-Weisbach equation, Minor losses in pipes, TEL, HGL, Moody diagram, pipes in series and parallel, Siphons, Transmission of power. UNIT – VI [ 8 Hrs.]

Boundary Layer Theory :- Development of Boundary Layer on a flat plate, Laminar and Turbulent Boundary Layers, Laminar Sub Layer, Separation of Boundary Layer.

Flow around Immersed Bodies: - Lift and Drag, Classification of Drag, Flow around circular cylinder and Aerofoil, Development of lift on Aerofoil.

LIST OF TUTORIALS:

- 1) Applications based on fluid properties such as block sliding over an inclined plane, capillary phenomenon etc.
- 2) Study of Manometers

- 3) Study of stability of floating bodies and submerged bodies
- 4) Determination of coefficient of discharge of flow meters
- 5) Verification of Bernoulli's equation
- 6) Stokes Law
- 7) Case study of pipe network
- 8) Reynold number & its significance
- 9) Losses in pipes (Hagen Pois. Equation)

TEXT BOOKS:

1. Fluid Mechanics, Dr. R.K. Bansal, Laxmi Publication (P) Ltd. New Delhi
2. Engineering Fluid Mechanics, Kumar K.L., S. Chand & company Ltd. Eurasia  
Publication House
3. Fluid Mechanics & Hydraulic Machines, R.K. Rajput, S. Chand & Company Ltd.
4. Hydraulic and Fluid Mechanics, Modi P.N. and Seth S.M., Standard Book House.

REFERENCE BOOKS:

1. Introduction to Fluid Mechanics, James E.A., John and Haberm W.A., Prentice Hall  
of India
2. Fluid Mechanics, Jain A.K., Khanna Publication
3. Engineering Fluid Mechanics, Garde R.J. and Miraj Goankar, Nem chand & Bros,  
Roorkee, SCITECH, Publication (India) Pvt. Ltd.
4. Fluid Mechanics and Fluid Power Engineering, Dr. D.S. Kumar, S.K. Kataria &  
sons
5. Fluid Mechanics, Frank M. White, McGraw Hill Publication
6. Introduction to Fluid Mechanics, James A. Fay
7. Fluid Mechanics, Cengel & Cimbala, Tata McGraw Hill
8. Fundamentals of CFD, Anderson, McGraw Hill, International Edition, Mechanical

Engineering series

9. Fluid Mechanics, Streeter V.L. and Wylie E.B., McGraw Hill International Book co.

**BEPOE305T (BEME305T): ENGINEERING METALLURGY (Theory)**

CREDITS: 04

Teaching Scheme Examination Scheme

Lectures: 3 Hours/Week Duration of Paper: 03 Hours

Tutorial: 1 Hour/Week University Assessment: 80 Marks

College Assessment: 20 Marks

Course Objectives and Expected Outcomes: This course is designed to develop fundamental concepts of crystallography, phase transformation and heat treatment processes. Students will learn the atomic structure of metals, imperfections, diffusion mechanisms and mechanism of plastic deformation, various ferrous & non ferrous metals & their alloys. They will also understand equilibrium diagrams, time-temperature transformation curves and heat treatment processes. Upon completion of this course, students will be able to understand the concepts of crystal structure, microstructure and deformation. They will also acquire the knowledge of phase diagrams which are useful for design and control of heat treating processes, various ferrous & non ferrous metals & alloys with engineering applications, non-destructive tests & powder metallurgy with applications.

UNIT – I [ 8 Hrs.]

Introduction to engineering materials their classification, properties & application. Difference between metals & non metals, Mechanical properties of metal, Study of crystal structure, Polymorphism & allotropy, Macroscopic & microscopic examination; Imperfections in crystal, Miller indices, Mechanism of plastic deformation, slip, dislocation & twinning.

UNIT – II [ 8 Hrs.]

Solidification of pure metal, nucleation & grain growth, directional & progressive solidification, Ingot structure, Dendritic solidification, Solid solution & their types, Alloy & their formation, Mechanical Mixture, Hume Rothery Rule, grain shape & size, its effect on the properties. Binary equilibrium diagrams, Isomorphus system, Study of Fe-Fe-C diagram - uses & limitations, Invariant reactions.

#### UNIT – III [ 8 Hrs.]

TTT Curve – Construction & limitations, Heat treatment – Principle, purpose, Annealing & its types, Normalizing, Tempering, Austempering, Martempering, Hardening, Retained austenite & its elimination, Maraging, Patenting; Surface hardening such as Carburising, Nitriding, Induction hardening, Jomini End quench test for hardenability

#### UNIT-IV [ 8 Hrs.]

Plain carbon steel, Classification based on Carbon Percent & application; Limitations, Effect of impurities; Alloy steel, Effects of various alloying elements, Tool steel & its classification, Red hardness; Stainless steel – Classification, composition & application; Hadfield Manganese steel, Maraging Steel, O.H.N.S. Steel, Selection of steel for various applications.

#### UNIT-V [ 8 Hrs.]

Cast iron – Classification, gray cast iron, white cast iron, nodular cast iron, malleable cast iron, Mottled cast iron, Ni – hard & Ni – Resist cast iron, Meehanite Alloy; Study of non-ferrous alloys – Brasses, its types, Cu-Zn diagram; Bronzes, its types, Cu-Sn diagram; Al-Si diagram.

#### UNIT-VI [ 8 Hrs.]

Principles of hardness measurement, Hardness Test – Brinell, Rockwell, Vicker  
Non-destructive tests – Ultrasound Test, Die Penetration Test, radiography test  
Powder metallurgy – Introduction, metal powder & its production, blending & mixing, compaction, sintering, Hot Isostatic Pressing, Secondary processes, Advantages, limitations & application of powder metallurgy, few products such as self Lubricating Bearing, Gears & Pump

Rotors, Electric Contacts & Electrodes, Magnets, Diamond Impregnated Tools etc.

TEXT BOOKS:

1. Introduction to Physical Metallurgy, Sidney H. Avner, Tata McGraw-Hill
2. Introduction to Engineering Materials, B.K.Agrawal, Tata McGraw-Hill
3. Heat Treatment – Principles & Techniques, T.V.Rajan, C.P. Sharma, Ashok Sharma, Prentice – Hall India
4. Materials Science & Metallurgy, Dr. V.D.Kotgire, Everest Publishing House
5. Text Book of Materials Science & Metallurgy, O.P.Khanna , Dhanpat Rai Publication
6. Engineering Materials & Metallurgy, Srinivasan, Tata Mc-Graw Hill

REFERENCE BOOKS:

1. Materials Science, Willium Callister, John Wiley & Sons
2. Material Science, Narula & Gupta, Tata Mc-Graw Hill
3. Material Science & Metallurgy, Parashivamurthy, Pearson
4. A First course on Material Science, Raghavan, PHI Learning
5. Introduction to Material Science for Engineers, Shakeford & Murlidhara, Pearson
6. Engineering Physical Metallurgy and Heat Treatment, Yu M Lakhtin, CBS Publisher
7. Metallurgy for Engineers, E C Rollason, ButterWorth & Heineman Ltd.
8. Engineering Metallurgy, R A Higgins, Viva Books
9. Fundamentals of Solidification, W Kurtz and D J Fisher, Springer
10. Physical Metallurgy, Clark, CBS Publisher

**BEPOE306T (BEELE305T) ELECTRONIC DEVICES & CIRCUITS**

L = 4 T = 1 P = 2 Credits = 6

Examination Scheme

College Assessment University Examination Total Univ. Exam.

Duration

20 80 100 3 Hrs

Learning Objective Learning Outcomes

The course objective is to impart knowledge of basic semiconductor devices, transistors, amplifiers, FET & MOSFETS. Students also learn digital circuits with Boolean Algebra, logic gates etc.

students will be able to understand principle & working of basic semiconductor devices, transistors, amplifiers, FET & MOSFETS.

Conversion of numbers from one code to other code.

Logic gates and truth tables of digital circuits.

Unit 1: Theory of PN-junction diodes, operation and characteristics, Zener diodes and voltage regulators, Half and Full Wave Rectifiers, Filters, Ripple factor, Voltage doublers.

Unit 2: BJT, Theory of operation, characteristics, Biasing arrangements, Stability factor, Small signal analysis of CE, CB, CC amplifiers and their comparison, Power Transistors, Transistor as a switch.

Unit 3: Power amplifiers- classification as A,B, AB, C, Push pull amplifiers, Cross over distortion, Positive and Negative amplifiers- classification, feedback amplifiers, advantages and applications.



Unit 4: Oscillators- Barkhausen's criterion, RC and Crystal oscillators. Field effect transistors and MOSFETs- Principle of operation and characteristics, biasing arrangements.

Unit 5: Differential amplifier circuits and their stages, current source, biasing, level Shifting techniques, Common mode and differential mode gain, Impedance of different stages.

Unit 6: Boolean Identities, Binary, Gray, Octal, Hex & ASCII, Codes, Logic gates and their truth tables, De Morgan's Laws, Concept of Sum of Products and Product of Sums.

Text Books

Title of Book Name of Author/s Edition & Publisher

Electronic Devices and Circuits Millman and Halkias McGraw Hill

Integrated Electronics Millman and Halkias McGraw Hill

Digital Integrated Electronics H. Taub McGraw Hill

Introduction to Operation Amplifiers Wait Tata McGraw Hill

Reference Books

**BEPOE306P (BEELE305P) ELECTRONIC DEVICES & CIRCUITS**

Practical based on above syllabus

Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur

Faculty of Engineering and Technology

B.E. (Power ENGINEERING): FOURTH SEMESTER

**BEPOE401T (BEME402T): ENGINEERING THERMODYNAMICS (Theory)**

CREDITS: 04

Teaching Scheme Examination Scheme

Lectures: 3 Hours/Week Duration of Paper: 03 Hours

Tutorial: 1 Hour/Week University Assessment: 80 Marks

College Assessment: 20 Marks

Course Objectives and Expected Outcomes: This course provides the basic knowledge about Thermodynamic laws and relations, their application to various processes. At the end of this course, student will be able to understand the thermodynamic laws and their applications, the concept of entropy and availability, thermodynamic relations, and shall understand the various thermodynamic processes & cycles.

UNIT – I [ 8 Hrs.]

Introduction to Thermodynamics: Basic concepts of Thermodynamics, Systems and its forms, Property, State, Process, Cycles, Thermodynamics equilibrium, temperature, Zeroth law of thermodynamics, Introduction to First law of thermodynamics, Energy transfer, Heat and Work, Mechanical form of work, Non-mechanical form of work.

Ideal Gas: Gas laws-Boyle's law, Charle's law, Avagadro's law, Equation of state, Specific Heat, Universal gas constant, Constant pressure, Constant volume, Isothermal, Isentropic and Polytropic process on P-V Diagram.

Calculation of Heat transfer, Work done, Change in Internal Energy and Enthalpy.

UNIT – II [ 8 Hrs.]

First law of Thermodynamics for Closed System undergoing a process and cycle (Control Mass

System) and Open System (Control Volume System), Steady Flow process apply to Nozzle, Turbine, Compressor, Pump, Boiler, Throttling Device, Heat Exchanger. (Analytical treatment on First law applied to closed and open system is expected).

#### UNIT – III [ 8 Hrs.]

Second Law of Thermodynamics:- Introduction, Thermal Energy Reservoirs, Kelvin-Planck and Clausius Statements, Heat Engine, Refrigerator, Heat Pump, Perpetual Motion Machine I and II, Carnot Cycle, Thermodynamic Temperature scale.

Entropy: Clausius Inequality, Entropy, Principle of increase of Entropy, Change in Entropy for different Thermodynamics Processes with T-S Diagram, Reversible and Irreversible Processes, Availability.(Simple analytical treatment is expected)

#### UNIT – IV [ 8 Hrs.]

Properties of Steam: - Sensible Heat, Latent Heat, Critical State, Triple Point, Wet Steam, Dry Steam, Superheated Steam, Dryness Fraction, Internal Energy of Steam, External Work Done during Evaporation, T-S Diagram, Mollier Chart, Work and Heat Transfer during various Thermodynamic Processes with steam as working fluid, Determination of Dryness Fraction using various Calorimeter. (Analytical Treatment using steam table and Mollier chart is expected)

#### UNIT – V [ 8 Hrs.]

Vapour Power Cycle:- Introduction, Vapour Carnot Cycle, Rankine Cycle, Method to increase Thermal Efficiency, Reheat-Rankine Cycle, Regenerative Rankine Cycle with opened and closed feed water heaters.

#### UNIT – VI [ 8 Hrs.]

Air Standard Cycles: - Otto Cycle, Diesel Cycle, Dual Cycle, Brayton Cycle, Stirling Cycle, Ericsson Cycle (Work done & efficiency analysis is expected)

#### TEXT BOOKS:

1. Engineering Thermodynamics, P. K. Nag, Tata McGraw-Hill Publications
2. Thermal Engineering, P. L. Ballani, Khanna Publications

3. Engineering Thermodynamics, S.S. Khandare, Charotar Publication House

REFERENCE BOOKS:

1. Thermodynamics and Engineering approach, Yunus A. Cengel, Michael A. Boles,

Tata McGraw-Hill Publications

2. Engineering Thermodynamics, D. P. Mishra, Cengage Learning Publications

3. Engineering Thermodynamics, Gordon Rogers, Pearson Publications

4. Thermodynamics, S. C. Gupta, Pearson Publications

## BEPOE402T (BEELE405T) COMPUTER PROGRAMMING

L = 4 T = 1 P = 2 Credits = 6

### Examination Scheme

College Assessment University Examination Total Univ. Exam.

Duration

20 80 100 3 Hrs

Learning Objective Learning Outcomes

The student will learn the concept of programming and topics using C & C++ language and apply it in the field of engineering and technology. Similarly student will know about the Matrix operation and use of graphic tools for representation.

The student on completion has understood

General information of computers and operating systems

Structure of "C" program, Data types, Storage class,

variables, expressions and Operators

Use of arrays and sorting techniques

Pointers and structures.

Basics of strings and arrays

C++ concepts

Matrix operation using programming.

Use of graphic tools for presentation.

Unit-I: Structure of „C“ program, Data types, Variables, Input/output statements, Storage class, operators,

Program control statements, Concept of function & Recursion.

Unit-II: Arrays, Searching (Linear & Binary), Sorting (Bubble & Selection).

Unit III: Structure(Arrays of Structures, Copying elements of one structure into another, Nested Structure,

Structure Pointer)Pointer, File Handling(File open, close, read , write, Copy).

Unit IV: Introduction to C++ concepts.

Unit-V: Introduction to MATLAB Programming

Import/export data, Program and run simple scripts (M-files), Use graphics tools to display data,

Conditional Statements (If-else, if-elseif), and Iterative statements (While, For loop).

Unit -VI: Matrix operation (Transpose, determinant, Inverse), Plotting of graphs (Basic plot, generating waveforms) using Matlab Programming. Manipulating text (Writing to a text file, Reading from a text file, Randomising and sorting a list, Searching a list), Programming using MATLAB functions.

Text Books

Title of Book Name of Author/s Edition & Publisher

A text book on Programming languages C& C++ Kakade & Deshpande DREAMTECH PRESS 2ndEd.

Pascal & C Programming Venugopal TATA MCGRAW-HILL

EDUCATION PVT. LTD.Let us C Y. Kanetkar 8

The BPB PUBLICATIONS

Computer Programming in C Balguru Swami

Reference Books

C Programming languages B.W. Kernighan and D.M.

Ritchie 2nd EDITION PEARSON EDUCATION

METLAB-A Practical introduction to programming problem Solving Stormy Attaway Elsevier

Mastering METLAB 7 Duane Hansselman BruceLittlefield Pearson

**BEPOE402P (BEELE405P) COMPUTER PROGRAMMING**

Practical based on above syllabus

**BEPOE403T (BEELE404T) ELECTRICAL MACHINES-I**

L = 4 T = 1 P = 2 Credits = 6

Examination Scheme

College Assessment University Examination Total Univ. Exam.

Duration

20 80 100 3 Hrs

Learning Objective Learning Outcomes Student will learn

The basic principle of transfer of electrical power, operation, construction of 3-phase transformers, their classification, connections and phasor diagrams.

The basic principle, construction, operation, performance characteristics, steady state analysis and applications of electrical motors and induction generator.

The student will be able to understand Principle, construction, connections, vector grouping, operation and testing of 3-phase transformer conversion of 3-phase supply to 2-phase supply, parallel operation of 3-ph. Transformers.

Principle, armature and field construction, types, operation characteristics, armature reaction, commutation, methods to improve commutation in dc generators.

Principle, types, voltage build up, performance characteristics, torque evaluation in dc motors

Principle, construction, types, torque development,

performance characteristics, tests to determine performance indices & parameters of equivalent circuit of 3-phase and double cage induction motors, methods of starting, speed control and braking of induction motors. Revolving and cross field theories, operation, characteristics, types, equivalent circuit & tests.

#### UNIT-1

SINGLE PHASE TRANSFORMER :- Transformer phasor diagram, equivalent circuit diagram.

Transformer equivalent circuit parameter calculation using O.C. & S.C. test. Polarity test and parallel operation of single phase transformer.

3-PHASE TRANSFORMER: principle and operation of three phase transformer and, O.C. & S.C. test on three phase transformer, determination of equivalent circuit parameters, Regulation, Efficiency, Magnetizing current and harmonics, winding identifications, various connections with vector group.

#### UNIT-2

Three phase to two conversion, parallel operation of three phase transformer, methods of cooling, back to

back test, maintenance of transformer, insulation of transformer.

#### UNIT-3

D.C. MACHINES: - Basis principle & operation, Armature reaction & commutation,

Compensating winding, interpoles. Type of excitation. Characteristics of shunt series & compound motor and generator speed control of d.c. shunt & series motor, constant horse power & constant torque drive of

d.c. motor.

#### UNIT-4

THREE PHASE INDUCTION MOTOR: - Types of induction motor and production of torque. Torque-slip characteristics, No load blocked rotor test, circle diagram, losses, efficiency, double cage motor, operating



characteristics & influence of machine parameter on the performance of motor. Induction motor as a induction generator.

#### UNIT-5

Starting of 3 phase I.M. speed control of I.M. by pole changing, frequency control, rotor resistance by varying supply voltage, braking regenerative braking, plugging, dynamic braking Crawling & cogging.

#### UNIT-6

SINGLE PHASE I.M.: - Double field revolving and cross field theory split phase motor shaded pole motor, equivalent circuit, Torque-slip characteristics.

#### Text Books

Title of Book Name of Author/s Edition & Publisher

Electrical Machines P.K. Mukherjee & S. Chakraborty Dhanpat Rai Publication (P) Ltd.

Electrical Machines I. J. Nagrath & Dr. D.P. Kothari 3

rd , Tata McGraw Hill

Electrical Machines P. S. Bhimbra Tata McGraw Hill

#### Reference Books

Performance & Design of A.C. M/C M.G. Say CBS PUBLISHERS AND

DISTRIBUTORS PVT. LTD.

3rd ed. Rev.

### **BEPOE403P (BEELE404P) ELECTRICAL MACHINES-I**

Practical based on above syllabus

**BEPOE404T (BEME403T): HYDRAULIC MACHINES (Theory)**

CREDITS: 04

Teaching Scheme Examination Scheme

Lectures: 3 Hours/Week Duration of Paper: 03 Hours

Tutorial: 1 Hour/Week University Assessment: 80 Marks

College Assessment: 20 Marks

Course Objectives and Expected Outcomes: This course includes hydraulic turbines, centrifugal pumps, positive displacement pumps and miscellaneous water lifting devices. At the end of this course, students will understand practical applications of fluid; based on momentum and angular momentum principles involved in hydraulic machines. They will also understand design parameters and performance characteristics of various hydraulic machines & devices.

UNIT – I [ 8 Hrs.]

Compressible Flow:- Speed of Sound and the Mach Number, Isentropic Nozzle Flow, Normal Shock Wave, Shock Wave in Convergent-Divergent Nozzle, Vapour flow through Nozzle, Oblique Shock Wave, Isentropic Expansion. Introduction to impact of jet.

UNIT – II [ 8 Hrs.]

Theory of turbo machines and their classification, Elements of hydro-electric power plant, Impulse Turbine:- principle, constructional features, Installation of Pelton Turbine, Velocity Diagram and Analysis, Working proportions, Design parameters, Performance characteristics, Governing.

UNIT – III [ 8 Hrs.]

Reaction or pressure Turbine:- principles of operation, Degree of reaction, comparison over Pelton Turbine, Development of reaction turbine, Classification, Draft tube, Cavitation in Turbine, Francis Turbine, Propeller Turbine, Kaplan Turbine:- Types, Constructional features, Installations, Velocity Diagram and analysis, Working proportions, Design parameters, Performance characteristics, Governing, selection of turbines.

#### UNIT – IV [ 8 Hrs.]

Hydrodynamic pumps:- Classification and Applications, Centrifugal pumps:- Principle of operation, Classification, Component of Centrifugal Pump installation, Priming methods, Fundamental equation, Various heads, Velocity heads, Velocity triangles and their analysis, slip factor, Effect of outlet blade angle, Vane shapes, Losses and Efficiencies of pumps, Multi staging of pumps, Design Consideration, Working proportions, N.P.S.H., Cavitations in pumps, Installation and operation, Performance characteristics, Pump and system matching and Introduction to self priming pumps.

#### UNIT – V [ 8 Hrs.]

Positive Displacement Pumps:- Basic principle, Classification, Reciprocating Piston / Plunger Pumps:- Types, Main Components, Slip, Work Done, Indicator Diagram, Cavitations, Air vessels, Gear pump, Screw pump, Vane pump. UNIT – VI [ 8 Hrs.]

Similitude: - Types of similarities, Dimensionless number and their significance, Unit and Specific Quantities, Model Testing: - Application to hydraulic turbine and hydrodynamic pumps, Miscellaneous Water Lifting Device: - Air lift pumps, Hydraulic Ram, Submersible pump, Regenerative pumps.

#### LIST OF TUTORIALS:

- 1) Selection of Turbine
- 2) Design of centrifugal Pumps
- 3) Design of Francis Turbine
- 4) Design of reciprocating Pumps
- 5) Governing of Turbines
- 6) Study of Hydro-Kinetic System

#### TEXT BOOKS:

1. Fluid Mechanics & Fluid Power Engineering – D. S. Kumar, S.K. Kataria & Sons

## Publications

2. Fluid Mechanics & Machines – R. K. Bansal, Laxmi Publications

### REFERENCE BOOKS:

1. Fluid Mechanics with Engineering Applications, E. Finnemore & Franzini, Tata

Mc-Graw Hill

2. Hydraulic Machines-Theory and Design, V. P. Vasandani, Khanna Publishers

3. Fluid Mechanics, A. K. Jain, Khanna Publishers

4. Hydraulic & Compressible Flow Turbo-machines, A. T. Sayers, Mc-Graw Hill

5. Mechanics of Fluids, Merle C. Potter, CL-Engineering

6. Fluid Mechanics, John F. Douglas, Pearson

**BEPOE404P (BEME403P): HYDRAULIC MACHINES (Practical)**

CREDITS: 01

Teaching Scheme Examination Scheme

Practical: 2 Hours/Week University Assessment: 25 Marks

College Assessment: 25 Marks

LIST OF PRACTICALS:

Minimum Eight out of following shall be performed:

1. To determine the metacentric height of given floating vessel.
2. To verify Bernoulli's theorem.
3. To find the value of co-efficient of given venture meter fitted in a pipe.
4. To find the value of co-efficient of Discharge for a given orifice meter.
5. Performance characteristics of Pelton wheel.
6. Performance characteristic of Francis Turbine.
7. Performance characteristic of Kaplan Turbine.
8. Performance characteristic of Reciprocating pump.
9. Performance characteristic of Variable speed pump.
10. Performance characteristic of Axial Flow Pump.
11. To find friction losses in pipe.
12. To determine co-efficient of discharge in pipes.

**BEPOE405T (BEELE406T) ENVIRONMENTAL STUDIES**

L = 3 T = 0 P = 0 Credits = 0

Examination Scheme

College Assessment University Examination Total Univ. Exam.

Duration

20 80 100 3 Hrs

Learning Objective Learning Outcomes

Student will be able to learn the natural sources available.

Students will also learn about ecosystem, biodiversity, pollution.

Student will also learn the effect on environment on social aspects and Human population.

The student on completion of course will understand the

Ecosystem

Environmental issues related with social and human population.

Biodiversity and its conservation

Unit 1 : Multidisciplinary nature of environmental studies

Definition, scope and importance (2 lectures)

Need for public awareness.

III

Unit 2 : Natural Resources :

Renewable and non-renewable resources :

Natural resources and associated problems.

a) Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.

b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources : Growing energy needs, renewable and non renewable, energy sources, use of alternate energy sources. Case studies.

f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. (8 lectures)

### Unit 3 : Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids. • Introduction, types, characteristic features, structure and function of the

following ecosystem :-

a. Forest ecosystem

b. Grassland ecosystem

c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) (6 lectures)

#### Unit 4 : Biodiversity and its conservation

- Introduction – Definition : genetic, species and ecosystem diversity.
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values

- Biodiversity at global, National and local levels.

- India as a mega-diversity nation

V

- Hot-spots of biodiversity.
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity. (8 lectures)

#### Unit 5 : Environmental Pollution

##### Definition

- Cause, effects and control measures of :-
  - a. Air pollution
  - b. Water pollution
  - c. Soil pollution
  - d. Marine pollution
  - e. Noise pollution
  - f. Thermal pollution
  - g. Nuclear hazards
- Solid waste Management : Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.



- Pollution case studies.
- Disaster management : floods, earthquake, cyclone and landslides. (8 lectures)

VI

#### Unit 6 : Social Issues and the Environment

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case

Studies

- Environmental ethics : Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act • Forest Conservation Act
- Issues involved in enforcement of environmental legislation.
- Public awareness. (7 lectures)

#### Unit 7 : Human Population and the Environment

- Population growth, variation among nations.
- Population explosion – Family Welfare Programme.

VII

- Environment and human health.

- Human Rights.
- Value Education.
- HIV/AIDS.
- Women and Child Welfare.
- Role of Information Technology in Environment and human health.
- Case Studies. (6 lectures)

Unit 8 : Field work

- Visit to a local area to document environmental assetsriver/  
forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc. (Field work Equal to 5 lecture hours)

**BEPOE406T (BEELE403T) DIGITAL AND LINEAR ELECTRONIC CIRCUITS**

L = 3 T = 1 P = 2 Credits = 5

Examination Scheme

College Assessment University Examination Total Univ. Exam.

Duration

20 80 100 3 Hrs

Learning Objective Learning Outcomes

To introduce the basics of logic families, multiplexers, Flip flops, timers.

Students will introduce with operational amplifiers, Linear IC's and multivibrators used in digital electronics.

students will be able to understand

Basic fundamentals of logic gates, , Flip flops, timers.

Basic Operational amplifier circuits:

Simple linear circuit Applications of Operational amplifier

Study of Linear ICS

Unit 1:

TTL, CMOS Logic Families, Combinational Logic concepts, Decoders, Encoders, Multiplexers, Demultiplexers, Code converters, Karanaugh map Principle.

Unit 2:

Introduction to Flip-flop, Latch, Concept of Clock, Overview of RAM, ROM, EPROM & EEPROM, Master slave Flip-flop and conversion of one type to another.

Unit 3:

Introduction to sequential circuits, Synchronous and Asynchronous Counters, Different module counters with reset/ clear facility, Adders, Subtractors, Concept of ALU.

Unit 4:

Basics of Operational Amplifiers, Ideal and non-ideal OPAMPs, Inverting & non-inverting OPAMPs, Integrators, Differentiators, Summer and Averaging circuits, Instrumentation amplifiers, Grounding & Shielding Problems in opamps

Unit 5:

Precision rectifiers, Constant Current & Constant Voltage sources, Introduction to Active filters, Butterworth 2nd order filter – Design & operation, Clipping, clamping and comparator circuits, Sample & Hold circuits, A/D & D/A converters, Phase locked loops.

Unit 6:

Study of Linear ICs : LM 741, LM 555, LM 339, LM 723, LM 78xx & 79xx series, Astable, monostable and bistable multivibrators using IC LM 555.

Text Books

Title of Book Name of Author/s Edition & Publisher

Digital Integrated Electronics Herbert Taub McGraw Hill

Introduction to Operation Amplifiers Wait Tata McGraw Hill

Operational Amplifiers- Design and applications Tobey Grahame-Huelsman TMH

Reference Books

Operational Amplifiers and applications R. Gaikwad

Linear ICs Manual I, II, III National Semiconductors

### **BEPOE406P (BEELE403P) DIGITAL AND LINEARELECTRONIC CIRCUITS**

Practical based on above syllabus

**Syllabus for**  
**Applied Mathematics- III (IT/CE)**  
**Scheme (Theory: 4 hrs, Tutorial: 1 hr)**

**UNIT - I: LAPLACE TRANSFORM(14 Hrs)**

Definition, Properties, Laplace Transform of Derivatives and Integrals, Evaluation of Integrals by Laplace Transform, Inverse Laplace Transform and its Properties, Convolution Theorem(Statement Only), Laplace Transform of Periodic Functions(Statement Only) and Unit Step Function, Applications of Laplace Transform to solve Ordinary Differential Equations, Simultaneous Differential Equations, Integral Equations & Integro-Differential Equations.

**UNIT – II: FOURIER TRANSFORM (06 Hrs)**

Definition and Properties(excluding FFT), Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform to Solve Integral Equations.

**UNIT – III: Z-TRANSFORM(08 Hrs)**

Definition, Convergence of Z-transform and Properties, Inverse Z-transform by Partial Fraction Method, Power Series Expansion, Convolution of two sequences. Solution of Difference Equations with Constant Coefficients by Z-transform method.

**UNIT –IV: MATRICES (12 Hrs)**

Linear and Orthogonal Transformations, Linear dependence of vectors, Characteristics equation, Eigen values and Eigen vectors, Statement and Verification of Cayley-Hamilton Theorem [without proof], Reduction to Diagonal form, Reduction of Quadratic form to Canonical form by Orthogonal Transformation, Sylvester's Theorem[without proof], Solution of Second Order Linear Differential Equation with Constant Coefficients by Matrix method. Largest Eigen value and Eigen vector by Iteration method.

**UNIT – V: THEORY OF PROBABILITY (10 Hrs)**

Axioms of Probability, Conditional probability, Baye's Rule, Random variables: Discrete and Continuous random variables, Probability function and Distribution function, Joint distributions, Independent Random Variables, Conditional Distributions.

**UNIT – VI: MATHEMATICAL EXPECTATION & STOCHASTIC PROCESS(10 Hrs)**

Mathematical Expectation, Variance, Standard Deviation, Moments, Moment generating function, Covariance & Correlation Coefficient, Conditional expectation. Stochastic process: Bernoulli and Poisson process.

## **Text Books**

1. Higher Engineering Mathematics by B.S. Grewal, 40<sup>th</sup> Edition, Khanna Publication.
2. Advanced Engineering Mathematics by Erwin Kreyszig, 8<sup>th</sup> Edition, Wiley India.
3. Applied Mathematics for Engineers & Physicist by L. A. Pipes and L. R. Harvill.
4. Theory & Problems of Probability and Statistics by M. Spiegel , Schaum's Series, McGraw Hill .
5. Probability and Statistics for Engineers by Miller, Freund and Johnson, 4<sup>th</sup> ed. PHI.

## **Reference Books**

1. A Text Book of applied Mathematics, Volume II , by P.N. Wartikar & J.N. Wartikar, Poona Vidyarthi Griha Prakashan
2. Introductory methods of Numerical Analysis, by S.S. Sastry, PHI
3. Mathematics for Engineers by Chandrika Prasad
4. Probability, Statistics with Reliability, Queuing and Computer Science Applications by K. S. Trivedi.
5. Probability, Statistics and Random Processes by T. Veerarajan, Mc Graw-Hill .
6. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.



## **BECME302T            DIGITAL ELECTRONICS**

### **UNIT I:**

Analog V/S, Digital Systems, Transistors as Switch, Boolean Algebra, Boolean identities, Logic problems, Binary, Gray, Octal, Hex, and ASCII Codes, Logic gates, and Truth Tables, D Morgan's Law's , Sum of Product and Product of Sum.

Logic families: TTL, BCL, CMDS etc, Pan-in, Fan-out, propagation delay properties.

### **UNIT II:**

Combinational logic – concepts, SSI, MSI & VLSI circuits Classification standard TTL, CMGS characteristics, Decoders, Encoders. Multiplexers, Demultiplexers, code converters, characteristics of display devices, standard configuration of gates as SSI/MSI/LSI circuits.

### **UNIT III:**

K- Map, simplification of sum of products and products of sum, solution to problems using K-Map; conversion of Decoders / MUX into one another Use of MUX as function generator.

### **UNIT VI:**

Introduction to Flip Flop, Loathers, concept of clock, Memories organization with Flip Flop as basic cell, Ram, RCM, EPROM & one type to another type Flop Flops.

### **UNIT V:**

Excitation tables & introduction to sequential circuits counters-synchronous / asynchronous. Different modular counters with rest / clear facility Design of counters of arbitrary module with K-Maps, Lock free counters.

### **UNIT IV:**

Arithmetic Circuits – Adders, sub tractors, (Half & Full). BCD adder / sub tractor concept of ALU and its design. Integrated circuits version of multivlnators and their design parameters.

### **Text Books :**

1. Modern Digital Electronics by R. P. Jain , TMH Publication
2. Digital Electronics and Computer Design by M. Morris Mano, Pearson Edu.

### **Reference Books:**

1. Digital Integrated Electronics – Herbert Taub Mc Graw Hill.
2. Introduction to Electronics by Earl Gates, 6<sup>th</sup> edition , Cengage Learning
3. Palmer: Introduction to Digital Introduction to Digital System (Tata Mc Graw Hill).
4. Ryan: Digital Electronics (Mc Graw Hill) Practical based on above syllabus.
5. Digital circuits and Microprocessor: Herbert Taub, Mc Graw Hill.

\*\*\*\*\*

## **BECME302P            DIGITAL ELECTRONICS**

**Practical based on syllabus.**

\*\*\*\*\*



## **BECME303T            CONCEPTS IN COMPUTER ENGINEERING**

### **UNIT I:            INPUT/OUTPUT UNITS AND COMPUTER MEMORY**

Description of computer input units, other input methods, computer output units. Memory cell, memory organization, read only memory, serial access memory, physical devices used to construct memory, Magnetic hard disk, floppy disk drive, compact disk read only memory (CDROM), magnetic tape drives, DVD.

### **UNIT II:            COMPUTER GENERATIONS AND PROCESSOR**

First generation computers, second generation computers, third generation computers, fourth generation computers, fifth generation computers, Moor's law, classification of computers, parallel computers, distributed computing system. Structure of instructions, description of a processor, a machine language program

### **UNIT III:            COMPUTER LANGUAGES**

Algorithms, Flowchart, Why programming languages, Generation of Programming languages, Characteristics of good programming languages, Machine level language, assembly language, middle level language-C, high level programming languages. Factors affecting the choice of languages, developing a program Introduction to HTML, Python Programming and compilation.

### **UNIT IV:            COMPUTER SOFTWARES**

Introduction, Types of Computer Software, System Management Programs, System Development Programs, Unique Application Programs, Problem Solving, Structuring the logic, using the Computer,

### **UNIT V:            OPERATING SYSTEMS & OPEN SOURCE TECHNOLOGY**

Need of operating system, Definition of operating system, types of operating systems. Introduction to Various operating systems-UNIX, MAC OS, LINUX (UBUNTU, FEDORA) and WINDOWS. Open source: history and Open source software development, Free software, Free software license provider, Proprietary Vs. Open source Licensing model, FOSS, GNU project.

### **UNIT VI:            MULTIMEDIA DATA ACQUIAION AND PROCESSING**

Representation of an Image, Capturing a moving image with camera, Compression of video data, MPEG Compression standard, Acquiring and storing audio signals, Compression of audio signals, Audio signal processing, speech processing

#### **Textbook:**

- 1) Fundamentals of Computers, V. Rajaraman, IV edition, PHI
- 2) Fundamentals of Computers by E. Balagurusamy, Tata-Mc-Graw Hill Publications

#### **Reference books:**

- 1) Operating system by Achyut Godbole and Atul Kahate , 3<sup>rd</sup> edition, Tata-Mc-Graw Publications
- 2) Open source technology by Kailash Vadera and Bhawesh Gandhi, Laxmi Publications

\*\*\*\*\*

## **BECME304T PROGRAMMING METHODOLOGY AND DATA STRUCTURES**

### **UNIT I : Introduction and Arrays using C**

Taxonomy and history of Computer Programming Program Execution basics. Problem solving and programming strategies, programming paradigms. Algorithm and flowchart design, Principles of Structured programming C Language Fundamentals, Loop control statements, Arrays One dimensional & Two-dimensional array. Functions – Definition, call, prototypes, block structure, external variables, Recursion

### **UNIT II : Structure using C**

Storage Classes – extern declaration and information hiding. Pointers – Address and indirection operators, Pointer arithmetic – Functions and pointers – Arrays and pointers – Strings and pointers – Multi-dimensional arrays and pointers – Pointer arrays – Pointers to functions – Dynamic memory management. Structures – Variables, Accessing members, Assignment and nesting – Pointers to Structures – Structures and functions – Structures and arrays – Structures containing pointers – Unions

### **UNIT III : Searching and Sorting**

Introduction to data structures, Searching and sorting techniques- Linear search, Binary search, Indexed search, Insertion sort, selection sort, Bubble Sort, radix Sort, Merge Sort, Hashing, Collision resolution policies.

### **UNIT IV : Stack and Queue**

Stack and queue - Array representation of stacks, Queues and Dequeue, Circular queue, Polish notation, Implementation of stack using arrays, Application of stack & queue: Conversion from Infix to Postfix , Evaluation of postfix expressions, Priority Queues  
Linked list- Singly linked list: Operations on linked list, Searching, Insertion, Deletion

### **UNIT V : Linked List**

Linked list- Singly linked list: Operations on linked list, Searching, Insertion, Deletion,  
Doubly linked list, Operations on doubly linked list, Sorted Linked List, circular list, , sparse matrix storage using linked list

### **UNIT VI : Trees and Graph**

Trees- Definition, Binary Trees, Binary tree Traversal, Pre-order , Inorder , Post Order ,  
Expression trees , Balanced Binary Trees . Different tree traversal algorithms,  
Graphs - Mathematical Properties, Degree, Connectedness, Directed Graphs, Directed Acyclic Graph,  
Representation of Graphs and Applications: Adjacency matrix, path matrix, Linked Representation of a graph,  
Graph traversal - DFS & BFS, Shortest path,

### **Text Books :-**

- 1) Let us C , Yashavant Kanetkar, – BPB Publications. 2002 Fundamentals of Data Structure by Horowitz and Sahani (CBS Publications)
- 2) Introduction to Data Structure in C by Ashok N. Kamthane, Pearson Education

### **Reference Books:-**

- 1) Data Structures using C by Tenenbaum (Pearson Education)
- 2) An Introduction to DS with applications by Trembley and sorenson (Mc Graw Hill)
- 3) Data Structure and Programme Design in C by Kruse, Leung and Tondo, (PHI)
- 4) Data structure and Algorithm by Lafore (BPB)
- 5) Schaum's outline: Data Structures by Seymour Lipschutz (Tata Mc Graw Hill)

\*\*\*\*\*

**Practical based on syllabus (Not restricted to following list)**

- 1) Menu driven program for Selection Sort, Bubble Sort for n elements.
- 1) Menu driven program for Sort, Insertion Sort, Quick sort, Merge sort for n elements.
- 2) Program to implement Binary Search for n elements using Recursion.
- 2) Program to implement Linear Search for n elements using Recursion.
- 3) Program to convert Infix to postfix expression.
- 3) Program to convert Infix to prefix expression.
- 4) Menu driven program to perform PUSH, POP and Traversal on a Stack.
- 4) Menu driven program to perform INSERT, DELETE and Traversal on a Queue.
- 5) Program to implement Circular Queue.
- 5) Program to implement D-Queue.
- 6) Program to perform different operations on Singly Link List.
- 6) Program to perform different operations on Circular Link List.
- 7) Menu driven program to perform Inorder, Preorder & Postorder traversal on Binary Tree
- 8) Program To create a Binary Search Tree and perform Addition of a node, Deletion of a node and display.
- 9) Program to implement Depth First Search on a graph.
- 10) Program to implement Breath First Search on a graph.

\*\*\*\*\*

**UNIT 1: Introduction**

Data and Signal, Bandwidth, Data Communication – Components, Data Representation, Data Flow, Networks – Network Criteria, Physical Structure (Types of Connection, Physical Topology), Categories of Network (LAN, WAN, MAN), Interconnection of Network – Internet, Protocols and Standards, Network Model – Layered Tasks, The OSI Reference Model, Introduction to TCP/IP Protocol Suite, Addressing – Physical, Logical, Port, Specific

**UNIT 2: Physical Layer**

Physical Layer Objectives, Transmission Media – Wired and Wireless, Switching – Circuit switching Network, Datagram Network, Virtual Circuit Network, Digital Transmission (Digital to Digital Conversion, Analog to Digital Conversion), Analog Transmission (Digital to Analog Conversion, Analog To Analog Conversion), Modem.

**UNIT 3: Data Link Layer**

Design Issues of Data Link Layer, Framing, Logical Link Control – Protocols for Noiseless Channel (Simplest, Stop-and-Wait), Protocols for Noisy Channel (Stop-and-Wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ), Multiple Access Control – Random Access Protocols (ALOHA, CSMA, CSMA/CD, CSMA/CA), IEEE Standard 802 for LAN – 802.3, 802.4, 802.5

**UNIT 4: Network Layer**

Need for Network Layer, Internet as a Datagram Network, Logical Addressing – Classfull Addressing in IPv4, Routing – Routing Algorithm (Distance Vector Routing, Link State Routing), Congestion and Congestion Control – (Open Loop, Closed Loop)

**UNIT 5: Transport Layer**

Objectives of Transport Layer, Process to Process Delivery, Addressing – (IANA Ranges, Socket Addresses), Multiplexing and De-multiplexing, Reliable and Unreliable Services, Quality of Service - Traffic Shaping policies

**UNIT 6: User Support Layers – Session, Presentation, Application**

Session Layer – Introduction, Presentation Layer – Data Compression, Network Security and Privacy – Introduction to Cryptography (Symmetric and Asymmetric), Digital Signature, Authentication (Message and Entity), Application Layer – Domain Name System, Electronic Mail, Architecture of Browser

**Textbook:**

1. Data Communications and Networking, Behrouz A Forouzan, Fourth Edition, (McGraw Hill)

**References Books:**

1. Computer Communication Network design and analysis by Schwartz.
2. Computer Networks (PHI) by Andrew S. Tanenbaum.
3. Data and Computer Communication by William Stallings.
4. Computer Networks : A Top-Down Approach by Behrouz A Forouzan, Firouz Mosharraf, Mc-Graw Hill.

\*\*\*\*\*

**BECME306T**

**ENVIRONMENTAL ENGINEERING –I  
(Audit Course)**

\*\*\*\*\*

**Practicals based on Web Technologies**

Introduction to web design: Web page & web site, Web Publishing. Introduction to HTML: Structure tags: <html>, <head>, <title>, <body> Block level tags: Headings, Paragraph, Comments, Breaks, Center, Division, Preformatted, Text alignment and font size. Text level tags: Bold, Italic, Underlined, Strike-through, superscript, subscript. Horizontal Rules Colors' in web page: Background color, Text color, Link color. Lists: Ordered Lists, Unordered Lists, Definition List, Nesting lists. Linking HTML Documents. URLs Types of URLs: Absolute URLs, Relative URLs. Linking HTML Documents: The Anchor tag, linking to document in same folder, Linking to document in Different folder, Linking to document on the web, Linking to specific location within document.

Inserting E-mail links Including Images: Image formats Linking HTML Documents: The Anchor tag, Linking to document in same folder, Linking to document in Different folder, Linking to document on the web, Linking to specific location Within document. Inserting E-mail links tables, Forms, Frames: Tables: Creating Tables, Editing of rows and columns of table, rowspan, colspan, formatting tables using attributes border, Border colour, back ground, align, width, cell spacing, cell height. Forms: Creating Forms, Forms controls: text controls, Password fields, Radio Buttons, Check boxes, Reset and Submit buttons. The <TEXTAREA>, <SELECT> and <OPTION> tags. Frames: Introduction to frames, Advantages and disadvantages of frames, creating basic frames Frame targeting. Style sheets: Adding style sheet to document: Linking to a Style sheet, Embedding style sheet, Using inline Style

sheet Building a small web site Text Book: HTML,XHTML,CSS & XML By Example Teodoru Gugoiu, Firewall Media

**Reference Books:**

1. Castro, HTML 4 for World Wide Web, 3rd ed. Pearson education.
2. Barrett, Essential JavaScript for web professionals, Pearson Education.

**Group 1: HTML Tags**

1. Develop and demonstrate a HTML document that illustrates
  - a) the use of Formatting Text.
  - b) Headings tags(H1,H2,H3,H4,H5,H6)
  - c) Font Details (Font Size,Style, Type, Color)
  - d) Setting Color(BG Color)

**Group 2: Table & Lists**

2. Develop and demonstrate a HTML document that illustrates
  - a) Unordered List(UL)
  - b) Ordered List(OL) and Definition list (DL)
  - c) Table Alignment (Cell Spacing, Cell Padding ,Height ,Width, Border, Rowspan , colspan)
  - d) Setting Different Table Attributes(Color, Image)

**Group 3: Image & Link**

3. Develop and demonstrate a HTML document that illustrates
  - a) Image as a background
  - b) Hyperlink using an image
  - c) Hyperlink with another web page(A, Base, Href)
  - d) Link to email address, FTP Websites

**Group 4: Forms and Frames**

- a) Develop and demonstrate a HTML document that illustrates
- b) Create "Website Login Form" which consists of following details UserName , Password Address, Phno, Sex, Hobbies, Date Of Birth ,Country , along with submit and Reset Button.
- c) Create a Web page having Main Frame along with three Sub Frames(Windows)
- d) Create a Frame which will consider as a Main Frame along with other Sub Frame. when the particular link gets selected from the main frame it will displayed the output on target frame.
- e) Create a login form as above which will use the post method by sending data on another form.

**Group 5 :Multimedia**

- a) Develop a web page to play audio file using <a> Tag.
- b) Develop a web page to play video file using <Embed> Tag.

Group 6 DHTML

- a) Create a CSS document on Internal style sheet
- b) Create a CSS document on External style sheet
- c) Create a CSS document on Inline style sheet
- d) Create a CSS document on placing Images at different position

From above practical list perform at least two practical from each group.

\*\*\*\*\*

SYLLABUS FOR  
**DISCRETE MATHEMATICS AND GRAPH THEORY**  
**BE IV Semester (CS/CT/CE/IT)**  
Scheme (Theory: 4 hrs. & Tutorial:1 hr.)

**UNIT-I: Mathematical Logic and Set Theory (08 Hrs)**

Propositions and Logical Operations, Quantifiers, Conditional Statements and Tautologies, Methods of Proof, Principle of Mathematical Induction. Basic concepts of set theory, Operations on Sets, The power set.

**UNIT-II: Relations and Functions(12 Hrs)**

**Relations:** Ordered pairs and n-tuples, Product Sets and Partitions, Relations and Digraphs, Matrix of Relation, Paths in Relations and Digraphs, Properties of Relations, Equivalence Relations & Partitions, Compatible Relation, Manipulation of Relations, Composition of Relations, Transitive Closure of a relation, Partial order relation, Partially ordered set, Hasse Diagrams.  
**Functions:** Definition, Composition of functions, Types of Functions, Invertible Function, Permutation Function, Characteristics function of a set with Theorems.

**UNIT-III: Group Theory (12 Hrs)**

Binary Operations, Properties, Semigroups, Monoids, Subsemigroup, Submonoid, Isomorphism & Homomorphism, , Groups(only definitions and examples) Subgroups and Homomorphism, Cosets and Lagrange's Theorem, Normal subgroups.

**Unit- IV: Rings, Lattices & Boolean Algebra(10 Hrs)**

Rings, Fields, Integral Domain, Ring Homomorphism (definitions & examples), Lattices: Properties, Types of Lattices, Sub lattices, Isomorphic Lattices, Complemented & Modular Lattices (definitions & examples), Boolean Algebra: Definition, Properties, Simplification of Switching Circuits.

**Unit-V: Graph Theory (12 Hrs)**

Basic concepts of Graph Theory, Digraphs, Basic definitions, Paths and Circuits, Reachability and Connectedness, Matrix representation of graphs, Subgraphs & Quotient Graphs, Isomorphic digraphs & Transitive Closure digraph, Euler's Path & Circuit (only definitions and examples). Trees, Binary Tree, Labeled Trees, Undirected Trees, Spanning Trees of Connected Relations, Prim's Algorithm to construct Spanning Trees, Weighted Graphs, Minimal Spanning Trees by Prim's Algorithm & Kruskal's Algorithm.



## **Unit-VI: Combinatorics(06Hrs)**

Generating Functions, Recurrence Relations, Counting: Permutations & Combinations, Pigeonhole Principle with Simple Applications.

### **Text Books**

1. Discrete Mathematical Structures(3<sup>rd</sup> Edition) by Kolman, Busby & Ross  
PHI.
2. Discrete Mathematical Structures with Applications to Computer Science  
by Tremblay & Manohar, Tata McGraw- Hill.
3. Combinatorial Mathematics, C.L.Liu (McGraw Hill)

### **Reference Books**

1. Discrete Maths for Computer Scientists & Mathematicians by Mott,  
Kandel, Baker.
2. Elements of Discrete Mathematics by C. L. Liu.
3. Discrete Mathematics by Lipschutz.
4. Discrete Mathematics by R.Johnsonbaugh.
5. Higher Engineering Mathematics by B.S. Grewal, 40<sup>th</sup> Edition, Khanna  
Publication

**UNIT I :**

Introduction: File structure design, File processing operations :open, close, read, write, seek. Unix directory structure. Secondary storage devices: disks, tapes, CD-ROM. Buffer management. I/O in Unix.

**UNIT II :**

File Structure Concepts: Field & record organization, Using classes to manipulate buffers, Record access, Record structures, file access & file organization, Abstract data models for file access. Metadata. Extensibility, Portability & standardization.

**UNIT III:**

Data Compression, Reclaiming spaces in files, Introduction to internal sorting and Binary searching. Keysorting. Indexing concepts. Object I/O. Multiple keys indexing. Inverted lists, Selective indexes, Binding.

**UNIT IV :**

Cosequential processing : Object-Oriented model, its application. Internal sorting: a second look. File Merging : Sorting of large files on disks. Sorting files on tapes. Sort merge packages. Sorting and Cosequential processing in Unix. 08 Hrs

**UNIT V:**

Multilevel indexing : Indexing using Binary Search trees. OOP based B-trees. B-tree methods Search, Insert and others. Deletion, merging & redistribution. B\*trees. Virtual B-trees. VL records & keys. Indexed sequential file access and Prefix B+trees.

**UNIT VI:**

Hashing : Introduction, a simple hashing algorithm. Hashing functions and record distributions. Collision resolution. Buckets. Making deletions. Pattern of record access. External hashing. Implementation. Deletion. Performance. Alternative approaches.

**Text Book:**

Michael J.Folk, Bill Zoellick, Greg Riccard :File Structures : An Object-Oriented Approach using C++. (Addison-Wesley) (LPE)

**Reference Books:**

1. M, Loomis: "Data Management & File Processing" (PHI)
2. O.Hanson: "Design of Computer Data Files" McGraw-Hill (IE)
3. D. E. Knuth: " The Art of Computer Programming", Volume 3, (Addison Wesley).
4. James Bradly: " Files and Database Techniques", (Mc Graw Hill).

\*\*\*\*\*

## **BECME403T            MICROPROCESSOR**

### **UNIT I:**

8086 architecture and pin configuration, Software model of 8086 microprocessor. Memory addresses space and data organization. Data types. Segment registers, memory segmentation. IP & Data registers, Pointer, Index registers. Memory addresses generation.

### **UNIT II:**

8086 Instruction set overview, addressing modes. 8086 instruction formats. 8086 programming : Integer instructions and computations: Data transfer instructions, Arithmetic instructions and their use in 8086 programming.

### **UNIT III:**

8086 programming: logical instructions. Shift and rotate instructions and their use in 8086 programming. 8086 flag register and Flag control instructions, compare instruction, control flow and jump instructions, Loops & loop handling instructions. 8086 programming using these instructions.

### **UNIT IV:**

The 8086 stack segment and stack related instructions. 8086 I/O Address space. Subroutines and related instructions, Parameter passing, Concept of Macros, Status saving on stack. Concept of recursion at assembly program level. 8086 Programming using subroutines, recursion and macros.

### **UNIT V:**

8086 I/O: Types of input output, isolated I/O interface, input output data transfers, I/O instructions and bus cycles. Programmable Peripheral Interface 8255 PPI: pin diagram, internal organization, modes of operation. 8086 I/O programming using 8255.

### **UNIT VI:**

8086 Interrupts types, priority and instructions. Interrupt vector table, External hardware-interrupt interface signals & interrupts sequence. Software interrupts. Non-maskable interrupts. Programmable Interrupt Controller 8259: pin diagram, internal organization, modes of operation. 8086 Interrupt-driven programming using 8259.

### **TEXT BOOKS:**

1. W. A. Triebel & Avatar Singh: The 8088/8086 Microprocessors (4e) (PHI /Pearson Education)
2. Liu & Gibson: The 8088/8086 Microprocessor (2/e) (PHI)

### **REFERENCES:**

1. Barry B. Brey : The Intel Microprocessor Architecture, Programming & Interfacing (6/e)(PHI)
2. Ray & Bhurchandi: Advanced Microprocessors & Peripherals (TMH).
3. John P Uffenbeck, “8086/8088 Families: Designing, Programming and Interfacing”. Prentice Hall .
4. 8086 Microprocessor and its applications by Nagoor Kani 2<sup>nd</sup> edition, Mc Graw Hill

\*\*\*\*\*

## **BECME403P**

## **MICROPROCESSOR LAB**

**Practical based on syllabus.**

\*\*\*\*\*

**Unit 1:**

Problem solving & computers, Numerical methods for roots of equations, polynomial, transcendental, quadratic equations. Bisection, False Position, Newton-Raphson & Direct substitution methods.

**Unit 2:**

Solution of Simultaneous Equations: Gauss Elimination, Gauss Seidel, Gauss- Jordan Methods. Matrix methods & Inversion Interpolation : Linear & polynomial.

**Unit 3:**

Numerical differentiation by polynomial fit, Numerical integration by Trapezoidal Rule, Simpson Rule, Gaussion Quadratre.

**Unit 4:**

Sampling frequency distribution, measures of central tendency, dispersion moments. Discrete probability distributions. Probability, Various types of distributions.

**Unit 5:**

Regression : Linear LS fit, Nonlinear fit. Polynomial function. Correlation : Coefficient, Properties of correlation coefficient. Multiple, Partial and Rank correlation.

**Unit 6:**

Test of significance: Introduction, The  $\chi^2$ -test. The t-test, the F-test .

**Text Books:**

1. V Rajaraman : Computer Oriented Numerical Methods (PHI)
2. J.N. Kapoor : Mathematical Statistics (MCG)

**Reference :**

1. Sastry: Numerical Computation Methods(PHI)
2. M.R. Spiegel: Statistics (McGraw Hill)

\*\*\*\*\*

## **BECME405T                    OBJECT ORIENTED METHODOLOGY**

### **UNIT I:**

Introduction ,object oriented development ,object oriented Terms, object module, object & classes link and associations,generalization,grouping constructs, a sample object module ,advanced object modeling, aggregation, abstract classes, multiple inheritance,metadata,candidate keys, constraints

### **UNIT II:**

Dynamic modeling events & states, nested state diagrams, concurrency advanced dynamic modeling concepts, a sample dynamic module, relation of objects & dynamic module, functional models, data flow diagrams,specufying operations,constraints,a sample functional module.

### **UNIT III:**

Design methodology, overview of analysis, problem statement, TM network, object modeling, various phases, dynamic modeling, various phases, adding operations, refining the object model,

### **UNIT IV:**

system design, overview ,sub systems, allocating subsystems, management of data stores,choosing software control,implementation,handling boundary conditions, trade offs.

### **UNIT V:**

Object design, overview ,designing algorithms, design optimization ,optimization of control, adjustment of inheritance, design of associations, object representations, physical packaging,documenting,design decisions.

### **UNIT VI:**

Comparison of methodologies ,information modeling ,notations, implementations ,programming languages ,data base systems ,object oriented reusability ,extensibility ,robustness

### **Text Books:**

1.Object oriented modeling and design by James Rumbaugh, Michal Blaha, Williams premeriani, frwderick Eddy,William Lorenson FHL1997.

### **Reference Books:**

1. Fundamentals of Object oriented design in UML by Meilir Page jones Addison-Wesley Professional, 2000
2. Object Oriented Modelling and design with UML, 2nd edition by Blaha, Pearson Education, India

\*\*\*\*\*

## **BECME405P                    OBJECT ORIENTED METHODOLOGY LAB**

### **Practical based on syllabus.**

\*\*\*\*\*

**GROUP I :**

1. Study of working of various storage media.
2. Study of COBOL coding sheet.
3. Write a program to demonstrate the use of different editing characters.
4. Write a menu driven program to accept two numbers from keyboard and perform its addition, subtraction, multiplication and division based on choice.

**GROUP II :**

5. Write a program to demonstrate STRING and UNSTRING verb.
6. Write a program to single and multidimensional table handling in COBOL.
7. Write a program to demonstrate various conditions in COBOL.
8. Write a program to demonstrate various table sorting methods.

**GROUP III :**

9. Write a program to create sequential file and display all the records.
10. Write a program to create indexed sequential file and display all the records.
11. Write a program to create relative file and display all the records.
12. Write a program to demonstrate Master and Transaction file working together
13. Write a program to demonstrate addition and deletion of records in a file

**GROUP IV :**

14. Write a program to demonstrate sorting of a file.
15. Write a program to demonstrate merging of files.
16. Write a program to design output layout and generation of report.
17. Write a program to demonstrate hashing algorithm

Minimum 8-10 practicals must be conducted compulsorily selecting min. 2 from each group

\*\*\*\*\*

**Syllabus for**  
**Applied Mathematics- III (IT/CE)**  
**Scheme (Theory: 4 hrs, Tutorial: 1 hr)**

**UNIT - I: LAPLACE TRANSFORM(14 Hrs)**

Definition, Properties, Laplace Transform of Derivatives and Integrals, Evaluation of Integrals by Laplace Transform, Inverse Laplace Transform and its Properties, Convolution Theorem(Statement Only), Laplace Transform of Periodic Functions(Statement Only) and Unit Step Function, Applications of Laplace Transform to solve Ordinary Differential Equations, Simultaneous Differential Equations, Integral Equations & Integro-Differential Equations.

**UNIT – II: FOURIER TRANSFORM (06 Hrs)**

Definition and Properties(excluding FFT), Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform to Solve Integral Equations.

**UNIT – III: Z-TRANSFORM(08 Hrs)**

Definition, Convergence of Z-transform and Properties, Inverse Z-transform by Partial Fraction Method, Power Series Expansion, Convolution of two sequences. Solution of Difference Equations with Constant Coefficients by Z-transform method.

**UNIT –IV: MATRICES (12 Hrs)**

Linear and Orthogonal Transformations, Linear dependence of vectors, Characteristics equation, Eigen values and Eigen vectors, Statement and Verification of Cayley-Hamilton Theorem [without proof], Reduction to Diagonal form, Reduction of Quadratic form to Canonical form by Orthogonal Transformation, Sylvester's Theorem[without proof], Solution of Second Order Linear Differential Equation with Constant Coefficients by Matrix method. Largest Eigen value and Eigen vector by Iteration method.

**UNIT – V: THEORY OF PROBABILITY (10 Hrs)**

Axioms of Probability, Conditional probability, Baye's Rule, Random variables: Discrete and Continuous random variables, Probability function and Distribution function, Joint distributions, Independent Random Variables, Conditional Distributions.

**UNIT – VI: MATHEMATICAL EXPECTATION & STOCHASTIC PROCESS(10 Hrs)**

Mathematical Expectation, Variance, Standard Deviation, Moments, Moment generating function, Covariance & Correlation Coefficient, Conditional expectation. Stochastic process: Bernoulli and Poisson process.

## **Text Books**

1. Higher Engineering Mathematics by B.S. Grewal, 40<sup>th</sup> Edition, Khanna Publication.
2. Advanced Engineering Mathematics by Erwin Kreyszig, 8<sup>th</sup> Edition, Wiley India.
3. Applied Mathematics for Engineers & Physicist by L. A. Pipes and L. R. Harvill.
4. Theory & Problems of Probability and Statistics by M. Spiegel , Schaum's Series, McGraw Hill .
5. Probability and Statistics for Engineers by Miller, Freund and Johnson, 4<sup>th</sup> ed. PHI.

## **Reference Books**

1. A Text Book of applied Mathematics, Volume II , by P.N. Wartikar & J.N. Wartikar, Poona Vidyarthi Griha Prakashan
2. Introductory methods of Numerical Analysis, by S.S. Sastry, PHI
3. Mathematics for Engineers by Chandrika Prasad
4. Probability, Statistics with Reliability, Queuing and Computer Science Applications by K. S. Trivedi.
5. Probability, Statistics and Random Processes by T. Veerarajan, Mc Graw-Hill .
6. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.





BEIT302T

PROGRAMMING LOGIC AND DESIGN USING 'C'

(Theory Credit: 05)

Teaching Scheme:

Lecture: 4 Hours/week

Tutorial: 1 Hour/week

Examination Scheme:

Theory: T (U): 80 Marks T (I): 20 Marks

Duration of University Exam. : 03 Hours

=====

UNIT I:

Introduction and Structure of 'C' Programming: Algorithms and Flowchart, Characteristics of algorithm, Basic Techniques, Decision Making, Looping Technique, Multiway Decision Making. Examples through 'C'.

UNIT II:

Function and Pointers: Introduction to functions, why use function, Scope rule of function, call by value, call by reference, recursion, Iterative versus recursive style, Storage Classes in C. Preprocessor Directives in 'C': Macro, File Inclusion. Array: one dimensional array, pointer and array, Searching (Linear and Binary) and Sorting (Selection, Bubble, Insertion). Array of pointers, multidimensional array (2-D array).

UNIT III:

String and Structure: Introduction to string, pointers and strings, standard library function and user defined function, two dimensional array of character, array of pointer to string, limitation. Structure: Declaration, Accessing and memory representation of structure, array of structure, additional features of structure, pointer to structure. Union: Introduction, difference between structure and union, union of structure.

UNIT IV:

Console and File I/O: Types of I/O, console I/O functions, File I/O: data organization, file operation, file opening modes, file copy programming, String I/O files, Text file and binary file, low level disk I/O, Command line argument, detecting errors in reading / writing. Bitwise operators, Enumerated data types, typedef, typecasting, bit-field operator, volatile qualifier.

UNIT V

Dynamic memory allocation and Graphics in 'C': Malloc(), Calloc(), free(), realloc(), sizeof() operator. Setting Text mode: textmode(), textbackground(), textcolor(), gotoxy(), cputs(). Setting Graphics Mode: Drawing a Point on Screen, Drawing – lines, rectangle, circles, arcs, polygon. Functions to fill colors. Display Text in Graphics mode, outtext(), outtextxy(), justifying text. Computer animation: getimage (), putimage (), imagesize().

UNIT VI:

Advanced Concept in 'C: Different types of pointers, ROM – BIOS function, Elementary TSR's.

Text Books:

1. Programming Techniques Through 'C' : M. G. Venkateshmurthy (Pearson)
2. LET US 'C' : Yashwant P. Kanetkar. (BPB).
3. Graphics Under C: Yashwant Kanetkar (BPB).
4. Writing TSR'S through 'C': Yashwant Kanetkar (BPB).
5. Programming in 'C': Ashok N. Kamthane (2<sup>nd</sup> Edition[Pearson])

Reference Books:

1. The Complete Reference C (4th Edition): Herbert Schildt [ TMH]
2. The C Programming Language: Dennis Ritchie & Brain Kernighan [Pearson]
3. Programming with C : K.R.Venugopal & S.R.Prasad [TMH]
4. Programming in C: B. L. Juneja and Anita Seth (cengage learning)
5. A First Course in Programming with 'C': T. Jeyapoovan (Vikas)

\*\*\*\*\*

BEIT302P

PROGRAMMING LOGIC AND DESIGN USING 'C'

(Practical Credit: 01)

Teaching Scheme:  
Practical: 2 Hours/week

Examination Scheme:  
Practical: P (U): 25 Marks P (I): 25 Marks  
Duration of University Exam. : 02 Hours

=====

Note:

1. Practicals are based on PROGRAMMING LOGIC AND DESIGN USING 'C' syllabus (subject code: BEIT302T)
2. Practicals have to be performed using 'C' language
3. There should be at the most two practicals per unit
4. Minimum ten practicals have to be performed
5. Do not include study experiments

\*\*\*\*\*

BEIT303T

ETHICS IN INFORMATION TECHNOLOGY

(Theory Credit: 04)

Teaching Scheme:

Lecture: 3 Hours/week

Tutorial: 1 Hour/week

Examination Scheme:

Theory: T (U): 80 Marks T (I): 20 Marks

Duration of University Exam. : 03 Hours

=====

UNIT I:

An overview of Ethics: Ethics in business world, Ethics in IT, Ethics for IT professionals and IT users, IT professionals, Ethical behavior, IT professional malpractices, IT users.

UNIT II:

Computer and Internet Crime: IT security incidents: Increasing Complexity Increases Vulnerability, Higher Computer user Expectations, Expanding and changing systems. Introduces new risks, Increased Reliance on Commercial Software with known Vulnerabilities, Types of Exploits, Perpetrators, Reducing Vulnerabilities, Risk Assessment, Establishing a Security Policy, Educating Employees, contractors and part-time Workers, Prevention, Detection, Response.

UNIT III:

Privacy: The right of Privacy, Recent History of Privacy Protection, Key Privacy and Anonymity issues, Governmental Electronic Surveillance, Data Encryption, Identity Theft, Consumer Profiling, Treating Consumer Data Responsibility, Workplace Monitoring, Advanced surveillance Technology, Defamation, Freedom of Expression: Key issues, Controlling Access to Information on the Internet, Anonymity, National, Security Letters, Defamation and Hate Speech.

UNIT IV:

Intellectual Property: Copyrights, Patents, Trade Secret Laws, Key Intellectual Property Issues, Plagiarism, Reverse Engineering, Open Source Code, Competitive Intelligence, Cyber squatting, Software Development, Strategies to Engineer Quality Software, The Importance of Software Quality, Software Development Process, Capability Maturity Model Integration for Software, Key Issues in Software Development, Development of Safety-Critical Systems, Quality Management Standards.

UNIT V:

Ethics of IT Organization: Need for Nontraditional Workers, Contingent Workers H-IB Workers, Whistle-blowing, Protection for Whistle-Blowers, Dealing with Whistle-Blowing Situation.

UNIT VI:

The Impact of Information Technology on the Quality of Life: The impact of IT on the standard of Living and productivity, the Digital Divide, The impact of IT on Health care costs, Electronic Health Records, Use of Mobile and Wireless Technology, Telemedicine. Medical Information Wet Sites for lay people.

Text Books:

1. George Reynolds, "Ethics in information Technology" Cengage Learning

Reference Books:

1. Deborah G.Johnson,"Computer Ethics",3/e Pearson Education.
2. Sara Baase, "A Gift of Fire: Social, Legal and Ethical Issues, for Computing and the Internet," PHI Publications.
3. Richard A.Spinello, "Case study in Information Technology Ethics", second Edition PHI Publications.
4. Duncan Lanford "Internet Ethics".
5. D. Micah Hester and Paul J. Ford "Computer and Ethics in the Cyber age".

\* \* \* \* \*

BEIT304T DIGITAL ELECTRONICS AND FUNDAMENTALS OF MICROPROCESSOR  
(Theory Credit: 05)

Teaching Scheme:

Lecture: 4 Hours/week

Tutorial: 1 Hour /week

Examination Scheme:

Theory: T (U): 80 Marks T (I): 20 Marks

Duration of University Exam. : 03 Hours

=====

UNIT I:

Analog Vs. Digital Systems, Boolean Algebra, D' Morgan's Laws. Types of Number System: Decimal, Binary, Octal, Hex, Type of Codes: Reflected (Gray), Self Complementary (Excess-3), BCD and ASCII codes, Conversion of Codes, Gates and their truth tables.

UNIT II:

Forms of Expression: Sum of products and Product of Sums, Standard Sum of products and Product of Sums, Minterms and Maxterms, Canonical Sum of products and Product of Sums. Karnaugh map: simplification of functions using K-map (up to 5 variables) and their implementation using logic gates.

UNIT III:

Combinational Circuits: Decoders, Encoders. Priority Encoder, Multiplexers, Demultiplexers, Code converters. Implementation of Functions using Decoder. Arithmetic Circuits: Adder (Half and Full), Subtractor (Half and Full). BCD adder / Subtractor, Concept of ALU.

UNIT IV:

Types Flip Flops: SR, JK, Master Slave JK, D and T. Race around Condition (Racing) and Toggling. Characteristics Table and Excitation Table, Conversion of Flip-Flop. Sequential Circuits: Counters, Modulus of Counter, Types- Synchronous Counter and Asynchronous (Ripple) counter.

UNIT V:

8085 microprocessor architecture, addressing modes, instruction sets.

UNIT VI:

Interrupts, Basic memory organization, Timing diagram, Programming in 8085.

Text Books:

1. Modern digital Electronics- R. P. Jain, McGraw Hill.
2. Digital Integrated Electronics- Herbert Taub, McGraw Hill.
3. Digital Logic and Computer Design- Morris Mano (PHI).
4. Digital Integrated Electronics- Herbert Taub, McGraw Hill.
5. Digital Electronics Logic and System – James Bingnell and Robert Donovan, Cengage Learning
6. Digital Circuits & Systems by K.R.Venugopal & K. Shaila
7. 8 bit Microprocessor by Ramesh Gaonkar.
8. 8 bit microprocessor & controller by V. J. Vibhute, Techmak Publication.
9. 8085 Microprocessor & its Applications by A. Nagoor Kani, Mc Graw Hill.

BEIT304P DIGITAL ELECTRONICS AND FUNDAMENTALS OF MICROPROCESSOR  
(Practical Credit: 01)

Teaching Scheme:  
Practical: 2 Hours/week

Examination Scheme:  
Practical: P (U): 25 Marks P (I): 25 Marks  
Duration of University Exam. : 02 Hours

=====

Note:

1. Practicals are based on DIGITAL ELECTRONICS AND FUNDAMENTALS OF MICROPROCESSOR syllabus (subject code: BEIT304T)
2. There should be at the most two practicals per unit
3. Minimum ten practicals have to be performed
4. Do not include study experiments

\*\*\*\*\*



BEIT305T

## DATA COMMUNICATION

(Theory Credit: 05)

Teaching Scheme:

Lecture: 4 Hours/week

Tutorial: 1 Hour/week

Examination Scheme:

Theory: T (U): 80 Marks T (I): 20 Marks

Duration of University Exam. : 03 Hours

=====

UNIT I:

Data Communication: Communication Model, Data Representation, Data Flow (Simplex, Half duplex, Full duplex), Communication networking.

UNIT II:

Protocol Models: Need for protocol architecture, OSI Model fundamentals, TCP/IP Model fundamentals, addressing (Physical, Logical, Port addressing).

UNIT III:

Physical Layer and Media: Data and Signals, Analog and Digital, Periodic Analog Signals, Digital Signals, Transmission impairment, Data Rate Limits, Performance, Digital Transmission, Digital-to-Digital Conversion(Line Coding & Block coding), Analog-to-Digital Conversion(PCM & DM), Transmission Modes(Parallel & Serial).

UNIT IV:

Analog Transmission and Multiplexing: Analog Transmission, Digital-to-analog Conversion (ASK, FSK, PSK & QAM), Analog-to-analog Conversion (AM, FM & PM), Multiplexing (Frequency Division Multiplexing and Time Division Multiplexing), Switching: -switching networks, circuit switching, and Packet switching.

UNIT V:

Communication Media: Transmission Media: Guided media (Twisted pair, Co-axial cable, Optical fiber), Connectors (Twisted pair, Co-axial cable, Optical fiber), Unguided Media (Radio, microwave, satellite, Infrared).

UNIT VI:

Local Area Networks: The Basics (Topologies, hub, Switch, Bridges, Gateway), Local Area Networks- Internetworking, Local Area Networks- Software and support System, Introduction to Metropolitan Area Networks and Wide Area Network, Internet.

Text Books:

1. Data Communications and Networking By A. Behrouz Forouzan, 4th edition, TMH publication
2. Data Communications and Networking, 1/e, Curt White, CENGAGE Learning, ISBN: 9788131505571.

Reference Books:

1. Data and Computer Communications, William Stallings, Seventh Edition, Pearson Prentice Hall.
2. Electronics Communication Systems by G. Kennedy, 5<sup>th</sup> edition, TMH
3. Analog and Digital Communication By T.L. Singal, TMH

BEIT306T

## ENVIRONMENTAL ENGINEERING

(Total Credits: Nil)

Teaching Scheme:

Lecture: 2 Hours/week

Examination Scheme:

Theory: (Audit Course)

UNIT I: Introduction:

Definition, scope and importance; Need for public awareness institution in environment, people in environment

UNIT II: Natural Resources:

Renewable and non-renewable and associated problem; Role of an individual in conservation of natural resources; equitable use of resources for sustainable lifestyles

UNIT III: Ecosystems:

Concept of an ecosystem – understanding ecosystem, ecosystem degradation, resource utilization Structure and function of an ecosystem- producers, consumers and decomposers, Energy flow in the ecosystem – water, carbon, oxygen, nitrogen, and energy cycle, integration of cycles in nature Ecological Succession; Food chains ,food webs and ecological pyramids ;Ecosystem types- Characteristic features structure and function of forest ,grassland ,desert and aquatic ecosystems.

UNIT IV: Bio-diversity:

Introduction – biodiversity at genetic, species and ecosystem levels Bio-geographic classification of India Value of biodiversity- consumptive use value, productive use value, social, ethical, moral, aesthetic and optional value of biodiversity. India as a mega – diversity nation; hotspots of biodiversity Threats to bio-diversity –habitat loss, poaching of wildlife, man-wild life conflicts. Common endangered and endemic plant and animal species of india. Insitu and Exsitu conservation of biodiversity.

UNIT V: Pollution:

Definition; causes effects and control measures of air, water, soil, marine, noise and thermal pollution and nuclear hazards Solid water management – causes, effects and control measures of urban and industrial waste Role of individual and institution in prevention of pollution Disaster management – floods, earthquake, cyclone, landslides

UNIT VI: Social Issues and the Environment:

Unsustainable to sustainable development; urban problems related to energy; Water conservation, rainwater harvesting, watershed management; problems and concerns of resettlement and rehabilitation of affected people. Environmental ethics - issues and possible solutions – Resource Consumption patterns and need for equitable utilization; Equity disparity in Western and Eastern countries; Urban and rural equity issues; need for Gender equity. Preserving resources for future generations The rights of animals; Ethical basis of environment education and awareness; Conservation ethics and traditional value systems of India Climate change, global warming, acid rain, Ozone layer depletion, Nuclear accidents and holocausts. Wasteland Reclamation; Consumerism and Waste products Environment legislations - The Environment (protection) Act ; The Water (prevention and control of pollution) Act ; The Wildlife Protection Act; Forest Conservation Act ; Issues involved in enforcement of environmental Legislations – environment impact assessment (EIA), Citizens actions and Action groups. Public awareness – using an environmental calendar of activities self initiation

## UNIT VII : Human Population and the Environment:

Global population growth, variation among nations Population Explosion; Family welfare programmes - methods of sterilization; Urbanization Environment and human health – Climate and health, infectious Diseases, water –related diseases, risk due to chemical in food, cancer and environment. Human Rights – Equity, nutrition and health rights, intellectual property rights(IPRS), Community Biodiversity registration(CBRs).Value education – environment value, valuing nature, valuing culture, social justice, human heritage, equitable use of resources , common property resources , ecological degradation. HIV/AIDS; Women and child welfare; Information technology in environment and human health.

### Text Books:

1. UGC publication “a text book of environment studies for undergraduate courses by Erach bharucha”, published by university Press (india) Pvt. Ltd., Hyderabad-500029.
2. Text Book of Environmental Studies, Second Edition by Deeksha Dave and S. S. Katewa, Cengage Learning

\*\*\*\*\*

Teaching Scheme:  
Practical: 2 Hours/week

Examination Scheme:  
Practical: P (U): 25 Marks P (I): 25 Marks  
Duration of University Exam. : 02 Hours

- =====
- G-01: Demonstration of computer hardware and Bios settings.  
(North Bridge, South Bridge, PCI slots, ISA slots, AGP slot, memory bank slots, EIDE connector, Floppy connector, Chipset, Power connector, CPU slot, SMPS, Bios cell, Clock) (Ports-Serial, Parallel, PS/2, USB, Types of USB-A, B, Mini-A, Mini-B, Games, Ethernet/RJ42, Modem/RJ11, VGA, S-Video, HDMI, DVI- Mini & Micro DVI, IEEE 1394 Interface, SCSI, Minijack)
- G-02: To demonstrate and study the various types I/O devices.  
(Ex: Printers, Mouse, Scanner, monitor (CRT, LCD) etc.)
- G-03: Execution of internal and external dos commands.  
(Ex: Format, type, copy con, prompt, etc.)
- G-04: Batch programming: Command Redirection and Pipelines, Variables and Control constructs.
- G-05: Demonstration of system tools for windows operating systems.
- G-06: Experiment based on system Registry of windows operating system.
- G-07: Demonstration of complete booting process of windows operating system.
- G-08: Demonstrate and study of networking accessories and Commands  
(Hub, Switch, Bridge, Router, LAN Card, CAT cables, Coaxial cable, Fiber Optic cable, Repeater, Modem, Commands: ping, tracert etc.)
- G-09: To demonstrate and study the troubleshooting of a computer system.  
(Power supply problem, Boot failure Problem, Display problem, RAM problem, Motherboard Problem, CPU problem, CMOS battery problem etc.)

Note:

1. Practical sessions based on Any Six/Seven groups may be planned.

Reference Books:

1. PC Hardware: The complete Reference by Craig Zacker, 1st Edition, TMH publication.
2. Troubleshooting, Maintaining and Repairing PCs by Stephen Bigelow, 5th Edition, TMH publication.
3. PC Hardware: A Beginner's Guide by Ron Gilster, 1st edition, TMH publication.
4. Mastering Windows XP registry by Peter D Hipson. Sybex publication.
5. Windows ® Command-Line Administration: Instant Reference by John Paul Mueller, Sybex publication
6. Network + Training Guide by Drew Bird and Mike Harwood, Pearson Education

SYLLABUS FOR  
**DISCRETE MATHEMATICS AND GRAPH THEORY**  
**BE IV Semester (CS/CT/CE/IT)**  
Scheme (Theory: 4 hrs. & Tutorial:1 hr.)

**UNIT-I: Mathematical Logic and Set Theory (08 Hrs)**

Propositions and Logical Operations, Quantifiers, Conditional Statements and Tautologies, Methods of Proof, Principle of Mathematical Induction. Basic concepts of set theory, Operations on Sets, The power set.

**UNIT-II: Relations and Functions(12 Hrs)**

**Relations:** Ordered pairs and n-tuples, Product Sets and Partitions, Relations and Digraphs, Matrix of Relation, Paths in Relations and Digraphs, Properties of Relations, Equivalence Relations & Partitions, Compatible Relation, Manipulation of Relations, Composition of Relations, Transitive Closure of a relation, Partial order relation, Partially ordered set, Hasse Diagrams.  
**Functions:** Definition, Composition of functions, Types of Functions, Invertible Function, Permutation Function, Characteristics function of a set with Theorems.

**UNIT-III: Group Theory (12 Hrs)**

Binary Operations, Properties, Semigroups, Monoids, Subsemigroup, Submonoid, Isomorphism & Homomorphism, Groups (only definitions and examples) Subgroups and Homomorphism, Cosets and Lagrange's Theorem, Normal subgroups.

**Unit- IV: Rings, Lattices & Boolean Algebra(10 Hrs)**

Rings, Fields, Integral Domain, Ring Homomorphism (definitions & examples), Lattices: Properties, Types of Lattices, Sub lattices, Isomorphic Lattices, Complemented & Modular Lattices (definitions & examples), Boolean Algebra: Definition, Properties, Simplification of Switching Circuits.

**Unit-V: Graph Theory (12 Hrs)**

Basic concepts of Graph Theory, Digraphs, Basic definitions, Paths and Circuits, Reachability and Connectedness, Matrix representation of graphs, Subgraphs & Quotient Graphs, Isomorphic digraphs & Transitive Closure digraph, Euler's Path & Circuit (only definitions and examples). Trees, Binary

Tree, Labeled Trees, Undirected Trees, Spanning Trees of Connected Relations, Prim's Algorithm to construct Spanning Trees, Weighted Graphs, Minimal Spanning Trees by Prim's Algorithm & Kruskal's Algorithm.

### **Unit-VI: Combinatorics(06Hrs)**

Generating Functions, Recurrence Relations, Counting: Permutations & Combinations, Pigeonhole Principle with Simple Applications.

#### **Text Books**

1. Discrete Mathematical Structures(3<sup>rd</sup> Edition) by Kolman, Busby & Ross PHI.
2. Discrete Mathematical Structures with Applications to Computer Science by Tremblay & Manohar, Tata McGraw- Hill.
3. Combinatorial Mathematics, C.L.Liu (McGraw Hill)

#### **Reference Books**

1. Discrete Maths for Computer Scientists & Mathematicians by Mott, Kandel, Baker.
2. Elements of Discrete Mathematics by C. L. Liu.
3. Discrete Mathematics by Lipschutz.
4. Discrete Mathematics by R.Johnsonbaugh.
5. Higher Engineering Mathematics by B.S. Grewal, 40<sup>th</sup> Edition, Khanna Publication

**BEIT402T**

**ALGORITHMS AND DATA STRUCTURES**

**(Theory Credit: 05)**

**Teaching Scheme:**

**Lecture: 4 Hours/week**

**Tutorial: 1 Hour/week**

**Examination Scheme:**

**Theory: T (U): 80 Marks T (I): 20 Marks**

**Duration of University Exam. : 03 Hours**

=====

**UNIT I:**

**An Introduction to data structure:** Introduction, Definition, Classification of data structure, Concept of data, Data types, Abstract data Types (ADT), Features of structured program. Introduction to algorithms: Definition and Characteristics of an Algorithm, Apriori analysis, Time and space complexity, Average , Best and Worst case complexities, Big 'O' Notations, Asymptotic notations, Top-Down and bottom-up programming techniques, Recursion, Divide and conquer strategy. ( e.g. Quick sort, Tower of Hanoi).

**UNIT II:**

**Stacks and Queue:** Definition and Terminology, Concept of stack, Stack implementation, Operation on stack, Algorithms for push and pop, Implementing stack using pointers, Application of stacks, Evaluation of polish notation, multiple stack. Queue: Queue as ADT Implementation of queue, Operation on queue, Limitations, Circular queue, Double ended queue (dequeue), Priority queue, Application of queues, multiple queues.

**UNIT III:**

**Linked List :** Introduction, Linked list, Representation of linear linked list, Operation on linked list, Types of linked list, Singly linked list, Circular linked list, Doubly linked list, Circular doubly linked list, Application: Addition of Two polynomials, Generalized linked list, Sparse matrix.

**UNIT IV:**

**Tree:** Introduction to Non Linear Data Structures, Binary tree Concept and terminology, Representation of binary trees, Algorithm for tree traversals (recursive and non recursive). Conversion of general tree to binary tree (Implementation not expected). Binary search trees, Extended binary tree, Threaded binary tree. Height balanced and weight balanced binary trees, B-Tree, B<sup>+</sup> Tree, AVL tree, Multiway tree, 2-3 Tree.

**UNIT V:**

**Graphs:** Concepts and terminology, Representation of graphs using adjacency matrix, adjacency list, Depth First search and Breadth First Search Algorithms, Spanning trees, Minimal cost spanning tree and Shortest path algorithm ( Single Source-all pairs).

**UNIT VI:**

**Searching and sorting Techniques:** Importance of searching. Sequential, Binary, Sorting : Bubble sort, selection sort, quick sort, Merge sort, heap sort, Shell sort, Analysis of these algorithms in worst and average cases. Hashing techniques and collision handing mechanism.

**Text Books:**

1. Data Structures with C by SEYMOUR LIPSCHUTZ [TMH].
2. Data Structure using C by ISRD Group [TMH].
3. Data Structure through C by G. S. BALUJA [Dhanpat Rai & co.].
4. Introduction to Data Structure in C by Ashok N. Kamthane [Pearson].
5. Data structures using C and C++ by Tenenbaum [Pearson].
6. Data structures Pseudocode with C by Gilberg/Foruzen, Cengage Learning

\*\*\*\*\*



**BEIT402P**

**ALGORITHMS AND DATA STRUCTURES**  
**(Practical Credit: 01)**

**Teaching Scheme:**  
**Practical: 2 Hours/week**

**Examination Scheme:**  
**Practical: P (U): 25 Marks P (I): 25 Marks**  
**Duration of University Exam. : 02 Hours**

=====

**Note:**

1. Practicals are based on ALGORITHMS AND DATA STRCUTURES syllabus (subject code: BEIT402T)
2. Practicals have to be performed using 'C' language
3. There should be at the most two practicals per unit
4. Minimum ten practicals have to be performed
5. Do not include study experiments

\*\*\*\*\*

**BEIT403T**

**THEORY OF COMPUTATION**  
**(Theory Credit: 05)**

**Teaching Scheme:**

**Lecture: 4 Hours/week**

**Tutorial: 1 Hour/week**

**Examination Scheme:**

**Theory: T (U): 80 Marks T (I): 20 Marks**

**Duration of University Exam. : 03 Hours**

=====

**UNIT I:**

Strings, Alphabet, Language operations, Finite state machine definitions, Finite automation model, Acceptance of strings and language, Non deterministic finite automation, Deterministic finite automation, Equivalence between NFA and DFA, Conversion of NFA into DFA, Minimization of FSM, Equivalence between two FSM's Moore and Mealy machines

**UNIT II:**

Regular sets, Regular expressions, Identity rules, Manipulation rules, Manipulation of regular expressions, Equivalence between RE and FA, Inter conversion, Pumping lemma, Closure properties of regular sets(proofs not required), Chomsky hierarchy of languages, Regular grammars, Right linear and left linear grammars, Equivalence between regular linear programming and FA, Inter conversion between RE and RG.

**UNIT III:**

Context free grammar, Derivation trees, Chomsky normal form, Greibach normal form, Push down automata, Definition, Model acceptance of CFL, Equivalence of CFL and PDA, Inter conversion, Closure properties of CFL(Proofs omitted), Pumping Lemma of CFL, Introduction of DCFL and DPDA

**UNIT IV:**

Turing Machine: Definition, Model of TM, Design of TM, Universal Turing Machine, Computable function, Recursive enumerable language, Types of TM's (proofs not required), Linear bounded automata and Context sensitive language, Counter machine

**UNIT V:**

Decidability and Undecidability of problems, Properties of recursive & recursively enumerable languages, Halting problems, Post correspondence problem, Ackerman function, and Church's hypothesis.

**UNIT VI:**

Recursive Function: Basic functions and operations on them, Bounded Minimalization, Primitive recursive function,  $\mu$ -recursive function, Primitive recursive predicates, Mod and Div functions, Unbounded Minimalization, Equivalence of Turing Computable function and  $\mu$ -recursive function.

**Text Books:**

1. Introduction to Automata Theory, Languages and Computation by J. E. Hopcraft, R. Motwani, J. D Ullman, second Edition, Pearson Education, Aisa
2. An Introduction to Formal Languages and Automata by Peter Linz

3. Introduction to Languages and the theory of Automata by John Martin, Third Edition(TMH)

**Reference Books:**

1. Theory of Computer Science, Automata, Languages and Computation by K. L. P. Mishra and N. Chandrasekaran, Third Edition, PHI Learning.
2. Elements of Theory of Computation by Lewis H.P and Papadimition C.H.

\*\*\*\*\*

**BEIT404T                      COMPUTER ARCHITECTURE AND ORGANIZATION**  
**(Theory Credit: 05)**

**Teaching Scheme:**

**Lecture: 4 Hours/week**

**Tutorial: 1 Hour/week**

**Examination Scheme:**

**Theory: T (U): 80 Marks T (I): 20 Marks**

**Duration of University Exam. : 03 Hours**

=====

**UNIT I:**

**Basic Structure of Computers:**

Functional Units, Basic Operational Concepts, Bus Structures, Software, Multiprocessors and Multicomputers.

**Machine Instructions:**

Memory Locations and Addresses, Memory Operations, Machine program sequencing, addressing modes and encoding of information, Assembly Language ,Stacks, Queues and Subroutine.

**UNIT II:**

**Instruction Sets:**

Instruction Format, limitations of Short word- length machines, High level language Considerations, Motorola 68000 architecture.

**Processing Unit:**

Some fundamental concepts, Execution of a complete instruction, Single, two, three bus organization, Sequencing of control Signals.

**UNIT III:**

**Micro-programmed Control:**

Microinstructions, grouping of control signals, Micro program sequencing, Micro Instructions with next Address field, Perfecting microinstruction, Emulation, Bit Slices, Introduction to Microprogramming, Macro Processor.

**UNIT IV:**

**Arithmetic:** Number Representation, Addition of Positive numbers, Logic Design for fast adders, Addition and Subtraction, Arithmetic and Branching conditions, Multiplications of positive numbers, Signed Operand multiplication, fast Multiplication, Booth's Algorithm, Integer Division, Floating point numbers and operations.

**UNIT V:**

**The Memory System:**

Some Basic Concepts, Semiconductor RAM Memories, Memory system considerations, Semiconductor ROM Memories, Memory interleaving, Cache Memory, Mapping techniques, Virtual memory, Memory Management requirements.

**UNIT VI:**

**Computer Peripherals:**

I/O Devices, DMA, Interrupt handling, online storage, File services.

**Processors:**

Families of microprocessors Chips, Introduction to RISC & CISC Processors, Introduction to Pipelining.

**Text Books:**

1. Computer Organization 4<sup>th</sup> Edition, 2001 V. Carl Hamacher Mc GrawHill.
2. Computer Organization and Design (The Hardware/Software Interfaces) 4th Edition David A. Patterson & John L. Hennessy Morgan Kaufmann.

\*\*\*\*\*

**BEIT405T**

**OBJECT ORIENTED METHODOLOGY  
(Theory Credit: 05)**

**Teaching Scheme:**

**Lecture: 4 Hours/week**

**Tutorial: 1 Hour/week**

**Examination Scheme:**

**Theory: T (U): 80 Marks T (I): 20 Marks**

**Duration of University Exam. : 03 Hours**

=====

**UNIT I:**

Introduction object-oriented development, Object Oriented Methodology, three Models, object oriented terms, object modeling Technique, object and classes links and associations, generalization and inheritance, grouping constructs a sample object module. Advanced object modeling; aggregation abstract classes, multiple, inheritance, metadata, candidate keys.

**UNIT II:**

Dynamic modeling, events and states, nested state diagrams, concurrency, advanced dynamic modeling concepts, functional models, data flow diagram, constraints, a sample functional module

**UNIT III:**

Design methodology overview of analysis, problem statement, ATM network, object modeling, various phases, dynamic modeling, various phases

**UNIT IV:**

System design, overview, sub systems, allocating subsystems, management of data stores, choosing software control, implementation, handling boundary condition

**UNIT V:**

Object design, overview, designing algorithms, design optimization, optimization of control, adjustment of inheritance, design of associations, object representation, physical packaging,

**UNIT VI:**

Implementation, programming languages, database systems, object oriented style, reusability, extensibility, robustness.

**Text Books:**

1. Object Oriented Modeling and Design by James Rumbaugh, Michal Blaba, William Premerlani, Frederic Eddy, William Lorerson, PHI, 1997
2. Object -oriented Programing Using C++ and Java by Ramesh Vasappanavar, Anand Vasappanavar , Gautam Vasappanavar, PEARSON, 2011

**Reference Books:**

1. Mastering C++ by A.R.Venugopal, Rajkumar, T. Ravishanker ,TMH, 1997.
2. Computer Science A Structured Approach Using C++ by Behrouz A. Forouzan , Richard F. Gilberg, Second Edition, CENGAGE Learning.

3. Object Oriented Programming with C++ by E Balagurusamy, Fifth Edition, TMH.

\*\*\*\*\*

**BEIT405P**

**OBJECT ORIENTED METHODOLOGY  
(Practical Credit: 01)**

**Teaching Scheme:  
Practical: 2 Hours/week**

**Examination Scheme:  
Practical: P (U): 25 Marks P (I): 25 Marks  
Duration of University Exam. : 02 Hours**

=====

**Note:**

1. Practicals are based on OBJECT ORIENTED METHODOLOGY syllabus (subject code: BEIT405T)
2. Practicals have to be performed using 'C++' language
3. There should be at the most two practicals per unit
4. Minimum ten practicals have to be performed
5. Do not include study experiments

\*\*\*\*\*

**BEIT406P**

**COMPUTER LAB-II  
(Practical Credit: 02)**

**Teaching Scheme:**  
**Practical: 2 Hours/week**

**Examination Scheme:**  
**Practical: P (U): 25 Marks P (I): 25 Marks**  
**Duration of University Exam. : 02 Hours**

=====

- G-01. Experiment based on MS Office macro programming.
- G-02. Installation of OS and Configuring a Desktop for- the Windows Operating System (XP and 7) and the Linux Operating System (Ubuntu/Fedora/Mint).
- G-03. Introduction to UNIX Operating System, The UNIX architecture and Command Usage, The File System, PIPES, Filters using Regular Expressions.
- G-04. Introduction to Linux Operating System, flavors of Linux vi Editor, vim Editor
- G-05. The Shell - Shell Variables; Scripts; Meta Characters and Environment; if and case Statements; for, while and until loops; Essential Shell Programming.
- G-06. AWK (The Pattern-Action Language) - BEGIN and END Patterns; Variables, Records and Fields; Loops; Handling Text; String Manipulations.
- G-07. Introduction to MATLAB Simulator and Programming based on MATLAB Simulator.

**Note:**

- 1. Practical sessions based on Any Four/Five groups from G-01 to G-06 may be planned.
- 2. Practical Group G-07 is compulsory.

**Reference Books:**

- 1. Sumitabha Das, "UNIX – Concepts and Applications", Fourth Edition, Tata McGraw Hill, 2006.
- 2. Behrouz A. Forouzan and Richard F. Goldberg, "UNIX and Shell Programming", Thomson Publishing, 2005.
- 3. Guide to Unix and Linux by Harley Hahn's 1st edition, TMH publication, 2011.
- 4. Microsoft Office Programming: A Guide for Experienced Developers by Rod Stephens, Apress, 2003
- 5. Dale Dougherty and Arnold Robbins, "sed and awk", Second Edition, O'Reilly Media, 1997
- 6. "A concise Introduction to MATLAB", by William J. Palm III, First Edition, Tata McGraw Hill.
- 7. "MATLAB and Simulink for Engineers" by Agam Kumar Tyagi, Oxford University Press.



8. "MATLAB for Engineers", by Holly Moore, Prentice Hall, Third Edition
9. [www.mathworks.in](http://www.mathworks.in)

\*\*\*\*\*

**Syllabus for**  
**Applied Mathematics- III (Civil Engineering)**  
**Scheme (Theory: 4 hrs, Tutorial: 1hr)**

**UNIT –I : FOURIER SERIES (06Hrs)**

Periodic functions and their Fourier expansions, Even and Odd functions, Change of interval, Half range expansion.

**UNIT - II: PARTIAL DIFFERENTIAL EQUATIONS(12Hrs)**

Partial Differential Equations of first order first degree i.e. Lagrange's form, Linear Homogeneous Equations of higher order with constant coefficients. Method of separations of variables, Applications to simple problems of vibration of strings and beams, Elementary concept of double Fourier series and their application to simple problems of vibration of rectangular membrane.

**UNIT – III: CALCULUS OF VARIATIONS (08Hrs)**

Maxima and minima of functional, Euler's equation, Functionals dependent on First & Second orders derivatives. Rayleigh-Ritz method, Simple applications.

**UNIT –IV: MATRICES(12Hrs)**

Linear and Orthogonal transformations, Linear dependence of vectors, Characteristics equations, Eigen values and Eigen vectors. Reduction to diagonal form, statement and verification of Cayley Hamilton Theorem [without proof.] Sylvester's theorem, Quadratic form Transformation of co-ordinates ,Transformation of forces and couples, Association of matrices with linear differential equation of second order with constant coefficients.

**UNIT – V: NUMERICAL METHODS(14Hrs)**

Error in numerical calculations, Errors in series approximation, Rounding of errors, Solution of Algebraic and Transcendental Equation: Bisection method, False position method, Newton –Raphson method and their convergence , Solution of system of simultaneous linear equations: Gauss elimination method, Gauss Jordan method. Gauss Seidel method, Crouts method, Numerical solution of ordinary differential equation :Taylor's series method, Picard's method, Runge-Kutta 4<sup>th</sup> order method, Euler modified method. Milne's Predictor- Corrector method.

## **UNIT – VI: INTRODUCTION TO OPTIMIZATION TECHNIQUES (08Hrs)**

Linear programming problem: Formulation, Graphical method, Simplex method.

### Text Books

1. Higher Engineering Mathematics by B.S. Grewal, 40<sup>th</sup> Edition, Khanna Publication
2. Advanced Engineering Mathematics by Erwin Kreyszig, 8<sup>th</sup> Edition, Wiley India
3. Applied Mathematics for Engineers & Physicist by L.R. Pipes and Harville,
4. Calculus of variation by Forrey

### Reference Books

1. A Text Book of applied Mathematics, Volume I &II , by P.N. Wartikar& J.N. Wartikar, Poona VidyarthiGrihaPrakashan
2. Introductory methods of Numerical Analysis, by S.S. Sastry, PHI
3. Mathematics for Engineers by Chandrika Prasad
4. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication

## BECVE 302 T STRENGTH OF MATERIALS

### Objectives:

1. To make students learn and apply basic theories and concepts of equilibrium, shear force, bending moment in beams and frames, bending stress, shear stress, torsional stress and stress-strain laws to different materials for different conditions of loading.
2. To make students learn and understand the concept and theory of deflection of beams, frames, trusses.

### Outcomes:

- a. The students would be able to understand the behavior of materials under different stress and strain conditions.
- b. The students would be able to draw bending moment, shear force diagram, bending stress and shear stress distribution for beams under the different conditions of loading and calculate the deflection.

### Syllabus :

#### Unit – I

Mechanical properties and uniaxial problems.

Types of force distribution, concept of stress and strain, Stress strain behavior of ductile and brittle material in uniaxial state of stress, elastic, plastic and strain hardened zones stress-strain relations, Elastic constants, relation between elastic constant, Uniaxial loading and deformation of simple cases of statically indeterminate problems under axial loading, temperature change etc., Thin wall pressure vessels cylindrical and spherical subjected to internal pressure.

#### Unit – II

Axial force, shear force and bending moment diagram

Concepts of free body diagrams, types of loads, Determination of axial forces, shear forces and bending moment at a section, axial force, shear force and bending moment in beams and simple frames, Differential relations between shear force and bending moment, Relation between load and shear force.

#### Unit – III : Stress in beams

Bending stresses in simple beams, Assumptions and derivation of simple bending theory relation between bending moment, bending stress and curvature of homogeneous and composite beams, Shear stresses in simple beams, Shear flow and shear stress distribution, shear stress in composite beams, combined effect of bending moment and axial force.

#### Unit – IV : Torsion

Torsion of circular section, assumptions and derivation of relations between torsional moment, shear stress and angle of twist, Torsional stress in solid and circular sections, **Introduction to Torsion in rectangular section**, Torsion in thin walled hollow section

#### Unit – V : Deflection of beams

Derivation of differential equation of moment curvature relation, Differential equation relating deflection and moment, shear and load, Deflection of simple beams by integration, **Introduction to Deflection of linearly varying beams by integration.**

**Unit –VI** : State of stress in two dimensions

State of stress in two dimensions, differential equation of equilibrium, Transformation of stresses, principal stresses, maximum shear stresses, Mohr's circle, Combined bending and torsion, Combined effect of torsion and shear, Shear flow in thin walled section, Concept of shear centre of thin wall sections, unsymmetrical bending.

**BECVE 302 P : STRENGTH OF MATERIALS**  
**(Any Eight practicals)**

1. To study various types of Strain Gauge apparatus.
2. To determine the Tensile Strength of Steel specimen.
3. To perform Hardness test on various metals. (Brinell's hardness test & Dynamic hardness test)
4. To perform standard Torsion test on metals.
5. To perform the Impact test on metal (Izod/ Charpy).
6. Compression test on Bricks and Stones.
7. To determine the spring constant of Closely Coiled Spring.
8. To perform shear test on different metals.
9. To perform fatigue test on mild steel bar.
10. To perform the bending test on wooden beam and find its Flexural Rigidity.

**Text Book:**

<b>Sr.No</b>	<b>Title</b>	<b>Publication</b>
1.	Strenght of Materials by S.P. TimoShenko	Mc. Graw Hill
2	Mechanics of Materials by Ferdinand P. Beer, E. Russell John StonJr	Mc. Graw Hill

**Refrence :Sr.No**  
**Publication**

**Title**

1	<b>Strength of materials by Singer</b>	<b>Haper and Row</b>
---	--	----------------------

## **BECVE 303 ENVIRONMENTAL ENGINEERING – I**

### **Objectives:**

1. To prepare students to apply basic knowledge of environmental engineering in conventional civil engineering practice involving water supply engineering in particular.
2. The course will provide students knowledge regarding the sources, of water demands, population forecasting, and conveyance of water.
3. To prepare students to analyze, plan, and design of various phases of water supply systems.
4. To provide the students the knowledge regarding the various characteristics of water, estimation of the quantity of water.
5. The course will provide students with fundamentals of solid waste management

### **Outcomes:**

- a. The students would be able to understand the importance and necessity of water supply.
- b. The students would be able to determine the capacity of water supply scheme.
- c. The students would have the basic knowledge related to the conveyance systems and the appurtenances used.
- d. The students would have knowledge of characteristics of water, drinking water standards and necessity of treatment.
- e. The students would be able to design various units of conventional water treatment plant.
- f. The students would be equipped with the basic knowledge related to design of water supply system.
- g. The students should be able to understand of necessity of treatment, types of treatment processes and disposal methods for solid waste.

## **Syllabus :**

### **Unit – I**

Introduction: Importance and necessity of water supply scheme.

Water Demand: **All types of water demand**, empirical formulae, factors affecting per capita demand, variation in demand, design period, population forecasting methods and examples.

Sources of water: Rain water, Ground water-springs, infiltration galleries, Dug wells, tube wells, Surface water-stream, lake, river, impounding reservoirs, ponds **& sea**.

Intake structures: Location, types river, lake, canal, reservoir etc.

### **Unit – II**

Conveyance of water: Types of pipes, joints, fittings, **valves & appurtenances**.

Hydraulic design aspects: Friction, Manning's, **DarcyWeishbach& Hazen Williams equationand problem**.

Rising main and pumps: **Concept of rising main**, Classification, working, merits and demerits, selection of pumps.

### **Unit – III**

Water quality: Physical, Chemical and bacteriological characteristics of water, **Health effects of various water characteristics**, Standards of drinking water. ( WHO 2011, CPHEEO, IS 10500). Water born diseases

Water treatment: Objective of treatment, unit operations and processes, **house hold & community based rural water treatment, decentralized water treatment**, flow sheet of conventional water treatment plant.

Aeration: Purpose, types of aerators, design of cascade aerator.

Coagulation and Flocculation: Definition, Principles, types of coagulants and reactions, coagulant doses, types of mixing and flocculation devices.

### **Unit – IV**

Sedimentation: Principles, types of setting basins, inlet and outlet arrangements, simple design of sedimentation tank.

Clariflocculators: Principles and operation.

Filtration: Mechanism of filtration, types of filters-RSF, SSF, Pressure filters, elements of filters sand specification, operational problems in filtration, Design of SSF and RSF, **Membrane filtration technique of water treatment**.

### **Unit – V**

Disinfection: Purpose, Mechanism, criteria for good disinfectant, various disinfectants, their characteristics, disinfection by chlorination using different forms of chlorine. Types of chlorination.

Distribution systems: Requirements of a good distribution system, methods of distribution systems and layouts, Leakage and leak detector, **Study of fire hydrants**.

Storage reservoirs for treated water: Types, capacity of reservoir, mass curve.

### **Unit – VI**

Municipal solid waste management : Generation sources, composition, Methods of Collection, transportation, disposal, Recycle, Reuse.

Examples on simple hydraulic design of pipes, estimation of population and water quality, plain sedimentation tanks, cascade aerators, filters, pumps, dose of chlorine). Visit to Water treatment plant (compulsory).

## **BECVE 303 PRACTICAL ENVIRONMENTAL ENGINEERING – I**

### **Any TEN (Total)**

#### **I. Any Seven**

1. Determination of pH
2. Determination of Conductivity
3. Determination Chlorides
4. Determination of Solid's (Suspended & dissolved)
5. Determination of Turbidity
6. Determination of Acidity
7. Determination of Dissolved Oxygen
8. Determination of Membrane filtration technique.
9. Determination of Available Chlorine
10. Determination of Residual Chlorine
11. Jar Test
12. Bacteriological Plate count and MPN tests.
13. Determination of Alkalinity.

**II.** Only demonstration of COD, BOD.

**III.** Design of WTP using software.

**IV.** Brief Report on WTP Visit.

#### **Text book**

<b>Sr. No.</b>	<b>Title</b>	<b>Publication</b>
1.	Water supply & Sanitary Engineering by B.C. Punmia	Laxmi Publication
2.	Water supply and Sanitary Engineering by Birdie G.S.	Dhanpat Rai Publication
3.	Environmental Engg. I by P. N. Modi,	Std. Publication
4.	Environmental Engg.( Water supply Engg )by S.K.Garg	Khanna Publication

#### **Reference book**

<b>Sr. No.</b>	<b>Title</b>	<b>Publication</b>
1	CPHEEO manual, New Delh, Ministry of Urban Development	G.O.I.
2	Water supply and sewage by M.J.McGhee	Mc. Graw Hill
3	Environmental Pollution Control Engg. By C.S.Rao	Mc. Graw Hill



**B.E. III SEM (CIVIL ENGINEERING)**  
**SUBJECT: ENGINEERING GEOLOGY**

**UNIT-I: General Geology**

Definition and scope of Geology, Internal structure of the earth. Introduction to continental drift and plate tectonics. Volcanoes type and their products. Principles of stratigraphy, Geological Time Scale, Physiographic and tectonic divisions of India. Introduction to Indian stratigraphy. (4)

**Geomorphology:** Weathering and erosion, Geological action of Wind, River and Ground water and resulting land forms. Geomorphic forms and their consideration in civil engineering works. (3)

**UNIT-II: Mineralogy:**

Definition and classification of minerals, Physical properties of Minerals, introduction to common rock-forming minerals (3)

**Petrology:** Rock cycle, **Igneous rocks:** Formation of Igneous rocks, textures and structures, forms and tabular classification of Igneous rocks. Common Igneous rocks and their uses. **Sedimentary rocks:** formation of sedimentary rocks, classification of sedimentary rocks. Common Sedimentary rocks and their uses. **Metamorphic rocks:** Definitions, agents of metamorphism, types of metamorphism, zones of metamorphism, Common Metamorphic rocks and their uses. (6)

**UNIT-III: Structural Geology:**

Introduction, outcrops, dip and strike of beds. Problems on dip, strike, thickness and three bore hole problems. **Folds:** parts of fold, classification, effects on outcrops, their identification in field, Importance of folds in civil engineering projects. **Joints:** definition, nomenclature and classification, Importance of joints in civil engineering projects. **Faults:** terminology, classification, mechanics of faulting, recognition of faults in the field, Importance of faults in civil engineering projects. **Unconformity:** Formation of unconformity, Types of unconformity. (10)

**UNIT-VI: Earthquake Engineering:**

Introduction, Terminology, Earthquake waves, Causes and effects, Intensity, MMI and MSK intensity scale and magnitude, magnitude scales, Liquefaction, location of epicenter, Tsunami, Seismograph and seismogram, Classification of earthquake, Earthquake zones of India, Aseismic structures. (3)

**Landslides and Subsidence:** Introduction, Terminology, Causes of landslides, classification of landslides, stable and unstable slopes, Control of landslides, causes of land subsidence, subsidence hazard mitigation. (3)

#### **UNIT-V: Geohydrology:**

Introduction, Hydrologic cycle, Origin of groundwater, Occurrence and distribution of ground water, water table and water table contour maps, Aquifer, Aquitard, Aquiclude and aquifuges, confined and unconfined aquifers, perched aquifer, Artesian and flowing wells, Importance of groundwater studies in Civil Engineering works. (3)

**Site Investigations:** Surface and sub-surface investigation: Geological mapping, Drilling, Bore hole logs, geophysical methods: Electrical Resistivity and Seismic methods. (3)

#### **UNIT-VI: Application of geology to civil engineering works:**

Engineering properties of rocks. Engineering classification of rocks based on compressive strength. RQD, Rocks as a construction material: Building stone, Road metal, Railway ballast. (3)

**Dams:** Parts and terminology, Classification of dams, geological problems at dam site, dam location on different rocks and their stability, Reservoirs study,(2)

**Tunnels:** Terminology, soft ground tunneling, rock tunneling and their stability. (2)

#### **Text Books**

1. Geology for Engineers: FGH Blyth
2. Engineering and General Geology: Parbin Singh
3. Engineering Geology: B.S. SathyaNarayanswami
4. Principles of Engineering Geology: K.M. Bangar
5. Basic Geotechnical Earthquake Engineering: Kamalesh Kumar
6. Rock Mechanics for Engineers: B.P. Verma

#### **Laboratory Work**

1. Megascopic study of common rock-forming Minerals.
  2. Megascopic study of common Rocks.
    - a) Igneous Rocks
    - b) Sedimentary Rocks
    - c) Metamorphic Rocks
  3. Geological Maps: Drawing of geological cross sections with civil engineering projects.
  4. Field visit to civil engineering construction sites with reference to geological studies.
-

## BECVE 305T CONCRETE TECHNOLOGY

### Objectives:

1. To prepare the students to understand constituents of concrete and their effect on quality of concrete.
2. The course will prepare students to apply basic rules for manufacture of plastic concrete and its mechanization.
3. To prepare students to apply various methods for testing of plastic and hard concrete.
4. To prepare students to analyse behavior of concrete structure under different environmental conditions.
5. The course will prepare students to analyse and design various basic concrete building components.

### Outcomes:

- a. The students would be able to check and recommend different constituent of concrete.
- b. The students would be able to control method of manufacture of concrete.
- c. The students would be able to test strength and quality of plastic and set concrete.
- d. The students would have the understanding of application admixture and its effect on properties of concrete.
- e. The students would be able to understand the effect of process of manufacturing on different properties of concrete.
- f. The students would be able to understand various environmental factors which affect durability of concrete, analyse cause of deterioration of concrete components and to suggest various preventive measures to it.
- g. The students would be able to test various strength of concrete by destructive and nondestructive testing methods.

### Syllabus:

#### Unit – I Cement

**Chemistry of Cement**, Main constituents of cement Hydration of cement, Water required, Physical properties and testing of cement, Soundness test. Hardening and compressive strength Grades and different types of cements. Ordinary Portland cement, Rapid Hardening Cement, B.B. Blast furnace slag cement, Low heat Portland cement, Portland pozzolones cement, Portland flyash cement, Sulphate resisting cement. **Field test**,

**Aggregates** : Sources of aggregates, classification and nomenclature. Coarse and fine aggregate, normal weight (light and heavy weight aggregates). Aggregate characteristics and their significance in strength, workability, placement and compaction of concrete. Sampling. Particle shape and texture, Bond of aggregate, size & grading of aggregate strength of aggregates Mechanical properties and test-Specific gravity, Bulk density, porosity absorption of aggregates, moisture content of aggregate, bulking of sand abrasion test, impact value. **Sieve analysis** Deleterious substances in aggregates, organic impurities class and other fine material etc.

**Water** : **Quality of water for concrete mixing, suitability.**

#### Unit – II

**Fresh concrete** : Batching, Mechanical mixers, automatic batching and mixing plants. Efficiency of mixing. Workability Measurement – Slump cont test, compacting factor test, flow table, Vee-Bee consistometer, Factor affecting workability, setting time. **W/C Law** Significance of w/c ratio **cohesiveness**. Segregation, bleeding,

voids, permeability. Hot weather concreting. **Underwater concreting**, Conveyance of concrete, Placing of concrete. Compaction-vibrators. Curing of concrete Significance, methods of curing, Temperature effect on during & strength gain. IS code on curing. Maturity of concrete.

### Unit - III

#### **Strength of concrete-**

Gain of strength, Wet ratio, Factor affecting compressive strength w/c ratio. Type of cement, air entrainment, aggregates, mixing water, Admixtures, curing conditions. Tensile and flexural strength. Relation between cracking in compression. Impact strength fatigue strength. Shear strength, Bond between concrete & reinforcement. Modulus of elasticity, Poisson's ratio.

**Testing of Hardness of Concrete:** Compression test-cube strength & cylinder strength their relation, effect of aspect ratio on strength. Flexural strength of concrete, Determination of tensile strength. Indirect tension test. Splitting test. Abrasion resistance. Accelerated curing test.

### Unit - IV

**Mix Design** – Process, Statistical relation between mean & characteristic strength, Variance, Standard deviation. Factor affecting mix properties. Grading of aggregate, aggregate/ cement ration etc. Degree of quality control. Design mix by Road note no. 4 (BS). **IS:10262:2009**.

**Additives and Admixtures:** Types of admixtures, Natural products-Diatomaceous earth By products-Pozzolones. Fly ash, silica fume, rice husk ash, , G.G. blast furnace slag. Admixtures-air entraining, water reducing, accelerators, retarders, plasticizers & Super plasticizers, permeability reducing, surface hardeners. **Corrosion inhibitors & water proofing agents.**

### Unit - V

**Special concrete :** Self compacting concrete, High performance concrete, fiber reinforced & polymer concrete, Ferro cement, Shotcrete pumped concrete, Free flow concrete.

**Shrinkage**-Early volume changes, drying shrinkage, mechanism of shrinkage. Factor affecting shrinkage. Influence of curing & storage conditions. Differential shrinkage. Carbonation shrinkage. Creep-Factors influencing. Relation between creep & time, nature of creep, effect of creep.

### Unit - VI

Durability of concrete-significance water as an agent of deterioration. Permeability of concrete, Efflorescence. Distress in concrete structures and its causes, causes of deterioration of concrete.

Cracks in concrete: Causes, types, prevention, repairs of cracks – materials and methods  
Non Destructive tests.

## **BECVE 305 PLIST OF EXPERIMENTS**

- 1.To determine the Normal consistency of cement .
2. To determine initial and final setting times of cement.
3. To determine soundness of cement.
- 4.To determine compressive strength and tensile strength of cement.
5. To determine particle shape , texture and elongation/ flakiness index of aggregate .
- 6.Sieve analysis and particle size distribution of aggregate.
7. To determine crushing value test, Impact value and Abrasion value of given aggregate.
8. To determine Bulk Density, Specific Gravity, Absorption & Moisture Content of Aggregate.
9. To determine Bulking and Percentage silt in sand.
10. To determine Workability - Slump test, Compaction factor of concrete.
11. Concrete mix design Road note 4 method, I.S. Method and ACI Method.
12. To determine Compressive strength of concrete cube.
- 13 To determine the quality of concrete by using Rebound hammer/ Ultrasonic Pulse Velocity Instrument.

### **Text Book**

<b>Sr.No</b>	<b>Title</b>	<b>Publication</b>
1	Concrete Technology by GambhirMc. Graw Hill	
2	Concrete Technology by A.M. Neville	Pearson Education

### **RefrenceSr.NoTitle**

<b>Sr.No</b>	<b>Title</b>	<b>Publication</b>
1	Properties of Concrete by A.M. Neville	Pearson Education

## BECVE 306 HYDROLOGY AND WATER RESOURCES

### Objectives:

1. To provide the students with the fundamentals of hydrology and hydrological cycle in water resource engineering.
2. To provide the students with the knowledge of interrelationship between various hydrological parameters and its effect on the design and analysis of hydrological structures.
3. To impart knowledge to the students to understand the importance of surface water and ground water resource management.
4. To provide the students knowledge of the processes and the methods of the determination of yield of a given basin.

### Outcomes:

- a. The students would demonstrate the capability to establish correlation between the various hydrological parameters.
- b. The students would have the knowledge of measurements of various parameters and its importance in water resource management.
- c. The students would be able to understand the hydrograph theory in the analysis of runoff and determination of design discharge for various hydrological projects.
- d. The students would be able to exhibit the various statistical methods used in hydrological analysis.
- e. The students would have the knowledge of importance of groundwater recharging and its methodology.

### Syllabus:

#### Unit – I

1. Introduction: definition, and its importance, development of hydrology and allied science, hydrological cycle, hydrological **equation** and brief description of its components, , importance of temperature, humidity and wind in hydrological study.
2. Precipitation: Definition ~~anticipation~~, artificial rains, types of precipitation- orthographic, conventional and cyclonic, factors affecting precipitation:  
Measure of precipitation: automatic and non-automatic rain gauges, selection of site, adequacy of rain gauge stations, optimal number of rain gauge, radar measurement of rainfall, mass curve, missing records, intensity duration frequently and depth area duration **curves**.

#### Unit - II

3. Infiltration: definition, mechanism, factors affecting infiltration, infiltration indices, measurement
4. Evaporation and transpiration: definition, mechanism and factors affecting evaporation, evaporation estimations by pan, water budget, energy budget and **empirical** formula, control of evaporation. Evapotranspiration and its measurement. Interception and its measurement.

#### Unit - III

5. Runoff: Source and components of run-off, classification of streams, factors affecting the runoff processes, estimation methods, measurement of discharge of streams by area-slope and area-velocity method.
6. Hydrographics: Definition, typical flood hydrograph and its components, base flow and base flow separation, unit hydrograph theory, S-curve and its use, instantaneous **Unit Hydrograph**.

#### **Unit - IV**

7. Statistical Methods: statistics in hydrological analysis, probability and probability distributions, average measure of dispersion, , Analysis of time series, frequency analysis.
8. Floods: causes and effects, factors affecting peak flows and estimation of peak flows, basin flood, flood routing and flood forecasting

#### **Unit - V**

9. Geohydrology: Introduction, occurrence and distribution of ground water, , aquifer, aquiclude, **aquitard** and aquifuge., electrical sensitivity method, confined and unconfined aquifer, porosity, permeability, specific yield, specific retention, Darcy's law, introduction to hydraulic wells, open wells, safe yield test (**Numericals**).

#### **Unit - VI**

10. Groundwater recharge: Concept of recharge, selection of recharge sites, recharging methods, spreading method, induced recharge method, recharge well method, sub-surface dams, waste water recharge, recharge by urban storm runoff, recharge through rain water harvesting.
11. **Recent trends in Hydrology: Software use in Hydrology such as HYMOS, MIKE-II, HECRAS, HYDROCAD and SWAT**

#### **Assignments:**

1. Based on Watershed Management.
2. Based on Soft Computing for statistical Data Analysis.
3. Visit to Hydrological station.

#### **Text Book**

<b>Sr.No</b>	<b>Title</b>	<b>Publication</b>
1	Hydrology & Water Resources Engg by ReddyLaxmi Pub.	
1	Hydrology by SubramanyamMc. Graw Hill	

#### **ReferenceSr.NoTitle**

<b>ReferenceSr.No</b>	<b>Title</b>	<b>Publication</b>
1	Hydrology & Water Resources Engg by S.K.GargKhanna Pub.	
2	Text book of Hydrology by P. Jaya Rami ReddyLaxmi Pub.	





## BECVE 401 T      STRUCTURAL ANALYSIS – I

### Objectives:

- 1 To make students understand the determinate and indeterminate structures, their method of analysis And construction of influence lines.
- 2 To make students understand the behavior of beams and frame using, Column Analogy Method, strain energy method, slope deflection method etc.

### Outcomes:

- a. The student would be able to apply knowledge to analyse concept of deflection, bending moment and shear force diagram in beams, frames, trusses and columns under various loading conditions using different analysis methods.
- b. The student would be able to apply knowledge to determine forces in determinate and indeterminate structures by the force and matrix method.
- c. The students would be able to perform ILD analysis of determinate beams and trusses.

### Syllabus:

#### Unit – I

Introduction of Statically indeterminate Structures : Concept of Static indeterminacy, Analysis of fixed and continuous beams by theorem of three moments, effects of sinking of support.

#### Unit – II

Rolling loads on simply supported beams with concentrated and uniformly distributed loads, maximum B.M. and S.F. Influence lines for reactions, bending moments and shear forces in simply supported beam, cantilevers and beams with overhangs. Influence lines for forces in members of simple trusses and for BM and SF in panels of simple trusses.

#### Unit – III

Strain energy method as applied to the analysis of redundant frames and redundant truss up to two Degrees, Determination of deflection of trusses. Castigliano's theorems. Maxwell's reciprocal theorem. Betti's theorem.

#### Unit – IV

Buckling of columns and beams. Euler's and Rankine's formula. Analysis of Two-Hinged arches. Three Hinged Arch, S.F. and normal thrust, parabolic arches.

#### Unit – V

Slope deflection method as applied to indeterminate beams & continuous beams portal frames. Frame with inclined legs upto 3 degree of freedom.

Approximate method: Analysis of multi-storied frame, portal, cantilever and substitute frame methods.(max. three bay three storey).

#### Unit – VI

Introduction to flexibility method upto two DOF, Column Analogy Method.

## BECVE 401 P      PRACTICALS: STRUCTURAL ANALYSIS – I

Minimum TEN of the following :

1. To find the slope and deflection of continuous beam.
2. To find the value of Flexural rigidity (EI) for a given beams and compare with theoretical value.
3. To determine the moment required to produce a given rotation at one end of a beam when the other end is i) Pinned ii) Fixed
4. To study the behavior of different types of struts and to calculate the Eulers Buckling load for each case.
5. To verify the Maxwell's reciprocal theorem for beam.
6. To measure the strain in the cantilever beam with the help of acoustic strain gauge.
7. Study of various types of strain gauges.
8. Plotting of influence lines by making use of Muller-Breslau principle.
9. Determination of deflection of trusses by Willot-Mohrs diagram.
10. Determination of material fringe value.
11. Determination of stress in beam by photoelastic method.
12. To find horizontal thrust and to draw the influence line for horizontal thrust for two hinge arch.
13. To calculate horizontal deflection at roller end in two hinged arch.
14. To measure the strain in the cantilever beam with the help of electrical resistance strain gauge.
15. To determine horizontal thrust for indeterminate portal frame
16. Study of Poloriscope

### Text Book

Sr.No	Title	Publication
1.	<b>Theory of Structure by S P Timoshenko</b>	Mc. Graw Hill
2.	Intermediate Structural Analysis by C K Wang	Mc. Graw Hill
3.	Plain and Reinforced concrete Structures, Vol.-II by Jain, Jai Krishna	Laxmi Publication
4.	Theory of Elasticity by S P Timoshenko	Mc. Graw Hill
5.	Experimental Stress Analysis by Rally & Dally	Mc. Graw Hill

### Refrence

Sr.No	Title	Publication
1	Structural Analysis by C.S.Reddy	Mc. Graw Hill
2	Structural Analysis by R.C. Hibbler	Pearson Education

## BECVE 402 T GEOTECHNICAL ENGINEERING-I

### Objectives:

1. To impart knowledge about origin and classification of soils.
2. To impart knowledge about index properties and their determination.
3. To impart knowledge about engineering properties and their determination.
4. To impart knowledge about stress distribution in soil mass.

### Outcomes:

- a. Students would be able to determine the index and engineering properties of the soil.
- b. Students would be able to determine the suitability of foundation for a particular type of soil.
- c. Students will be able to classify the soils.
- d. Students would be able to evaluate the stresses in the soil mass.

### Syllabus :

#### Unit I

1. Introduction : Formation of soil, residual & transported soil, major deposits found in India, **soils** generally used in practice such as sand, gravel, organic soil, clay, Betonies, , black cotton soil etc. **Introduction to clay mineralogy.**
2. Phases of soil: Various soil weight & volume inter-relationship. Density index, methods of determining in situ density.

#### Unit II

Index Properties & Their Determination, Water content, specific gravity, sieve analysis, particle size distribution curve, sedimentation analysis, Differential and free swell value, Consistency of soil, Atterberge's limits . Classification of Soil : Particle size classification, Textual classification, Unified & I.S. classification system, **field identification of Expansive soil, Swelling pressure.**

#### Unit III

3. Permeability: Darcy's law & its validity, Discharge & seepage velocity, factors affecting permeability, Determination of coefficients of permeability by Laboratory and field methods, permeability of stratified soil.
4. Seepage : Seepage pressure, quick **sand** condition, characteristics & uses of flownets, Preliminary problems of discharge estimation **in** homogeneous soils, Effective, Neutral and total stresses in soil mass.

#### Unit IV

5. Stress Distribution : Stress distribution in soil Mass, Boussinesque **equation, point load and uniformly distributed load over rectangular & circular areas, Use of Newmarks charts.**

#### Unit V

6. Consolidation : Compression of laterally confined soil, Terzaghis 1-D consolidation theory (formation of Differential equation), Determination of coefficient of consolidation, Degree of consolidation. Determination of preconsolidation pressure, Settlement, Rate of settlement.
7. Compaction : **Mechanism** of compaction, factors affecting compaction, standard & modified proctor Tests, field compaction equipments, quality control, **Advance compaction Techniques, Nuclear density meter.**

#### Unit VI

8. Shear Strength : Introduction, Mohr Coulombs theory, **Drainage condition**, Measurement of shear strength by direct shear test, triaxial test, unconfined compression test, vane shear test, sensitivity.

These shall comprise of ten experiments and terms work to be presented in the form of journal for assessment of sessional and practical examination.

- A. List of Experiments : Any 10
1. Moisture content and Specific gravity of soil.
  2. Grain size Analysis – (Sieve Analysis).
  3. Consistency limit, plastic limit and liquid limit of soil.
  4. Hydrometer Analysis.
  5. Constant Head Permeability test of or Falling Head Permeability test.
  6. Consistency limit of soil ( shrinkage limit).
  7. Field Density by sand replacement method.
  8. Field Density by core cutter method.
  9. Unconfined compression test.
  10. Direct shear Test.
  11. Triaxial shear test (Demonstration).
  12. Proctors compaction Test and Proctor needle test.
- B. One field visit or one case study included in journal.
- C. Use of plasticity Chart or Newmarks Chart.

### Text book

Sr. No.	Title	Publication
1	Soil Mechanics & Foundation Engg. by K.R. Arora	Std. Publisher
2	Soil Mechanics & Foundation Engg. by B.C.Punmia	Laxmi Publication
3	Basic & Applied Soil Mechanics by Gopal Rajan & Rao	Newage international Pub.
4	Geotechnical Engg. by P. Raj	Dorling Kindersley Pvt. Ltd
5	Geotechnical Earthquake Engg. by Steven L. Kramer	Prentice Hall

### Reference book

Sr. No.	Title	Publication
1	Soil Mechanics & Foundation Engg by Modi	Std. Publisher
2	Soil Mechanics & Foundation Engg by V.N.S.Murthy	CBS Publisher

## **BECVE 403 T TRANSPORTATION ENGINEERING – I**

### **Objectives:**

1. To educate the students on the various components of Highway Engineering and Bridge engineering.
2. To expose the students to highway planning, engineering surveys for highway alignment, Design of Geometric Elements of Highways and Urban roads, Flexible and Rigid pavements design, Traffic Engineering, traffic safety analysis, transportation planning and Highway material testing.
3. To make them understand desirable properties and testing procedures of highway materials as per BIS standard and Indian Roads Construction (IRC) for various practices adopted for construction.
6. To educate students on the various components of Pavements.
7. It exposes the student to learn types of pavements, components and functions of pavements, types of highway vehicles and aircrafts, IRC loadings, equivalent axle loading and load factors, Flexible and Rigid design methods, etc.

### **Outcomes:**

- a. A person with broad vision and complete knowledge of design and construction practices in highway engineering and pavement.
- b. The student will be able to test highway materials and draw appropriate conclusion.
- c. The student will be able to maintain and propose measurement.
- d. The student will be able to undertake Traffic studies.

### **Syllabus:**

#### **Unit -I**

Highway Development & Planning: Principles of Highway planning, Road development in India Classification of roads, network patterns, Planning, Surveys.

Highway Alignment: Requirements, Engineering Surveys.

Highway Materials: Properties of sub grade and pavement component materials, Tests on sub grade soils, aggregates and bituminous materials. Application of Geosynthetics.

#### **Unit - II:**

Highway Geometric Design: Cross Section elements, carriageways, camber, stopping & overtaking sight distances Horizontal alignment- Curves, design of super elevation, widening, transition curves, vertical curves.

#### **Unit- III**

Pavement Design: Types of pavements & characteristic, Design parameters, Axle & Wheel load, tyre pressure, ESWL for dual Wheels, repetitions, Group Index & IRC method of flexible pavement design. Analysis of load & temperature stresses of rigid pavement, joints

Highway Construction & Maintenance: Earthen/Gravel road, Water Bound Macadam, Wet Mix macadam, Bituminous pavement, Cement Concrete pavement. Pavement failures, Pavement evaluation, Maintenance and strengthening measures.

#### **Unit-IV**

Traffic Engineering: Traffic characteristics (Road User, Driver and Vehicular characteristics)

Traffic Studies (Volume studies, speed studies, parking studies and accident studies.)

Traffic Safety (Causes and types of accidents, Use of intelligent transportation system)

#### **Unit- V**

Bridge Engineering: Classification, identification and site selection.

Flood discharge, waterways, scour depth, economic span.

IRC classification of Loads, Forces, Stresses: IRC Specification & code of practices, Critical combinations.

#### **Unit-VI**

Sub-Structure: Types of foundations & their choice, Open, Pile and well foundation, pneumatic Caissons, cofferdams. Abutment, Piers & Wing walls, Their types general design principles (empirical.)

Super Structure: Different structural forms

Rating and Maintenance: Methods & Techniques of rating of existing bridges Inspection, Repairs, maintenance, corrosion-causes and prevention, Aesthetics.

## **PRACTICAL : BECVE 403 P TRANSPORTATION ENGINEERING - I**

Every student must carry minimum of 10 (Ten) experiments from the following:

1. Sub grade Soil: CBR test
2. Sub grade Soil: AASHO Classification
3. Aggregates: crushing value test.
4. Aggregates: Los Angeles abrasion value test.
5. Aggregates: impact test.
6. Aggregates: shape test.(Elongation Index, Flakiness index and Soundness test)
7. Aggregates: Specific Gravity and Water absorption test.
8. Bitumen: Penetration Value.
9. Bitumen: Ductility Test.
10. Bitumen: Softening point test.
11. Bitumen: Flash and Fire point test.
12. Bitumen: Specific gravity.
13. Bitumen: Adhesion Test.
14. Short Field Visit

### **Text book**

<b>Sr. No.</b>	<b>Title</b>	<b>Publication</b>
1.	Highway Engineering: Khanna and Justo.	Nem Chand
2.	Bridge Engineering by S. P. Bindra.	<b>Dhanpat Rai Publication</b>
3.	Bridge Engineering by S. C. Rangwala. Limited	Charotar Publishing House Pvt.
4.	Principles and practices of Highway Engineering by S. K. Sharma	<b>Khanna Publication</b>

### **Reference book**

<b>Sr. No.</b>	<b>Title</b>	<b>Publication</b>
1	. Pavement Design: Yoder and Witzak	Wiley
2	Traffic Engineering: L.R.Kadiyali	Khanna Publishers

## BECVE 404 T SURVEYING – I

### Objectives:

1. To make the students aware of various surveying instruments, operating principles and their suitability.
2. To make the students understand various calculation methods used for converting field data to required format for plotting.
3. To develop skills of handling instruments and plotting various maps.
4. To prepare the students read the various maps.

### Outcomes:

- a. The students would be able to do temporary and permanent adjustments.
- b. The students would be able to measure distances and angles.
- c. The students would be able to orient and draw the various maps.
- d. The students would be able to calculate areas and volumes of the Civil Engg. work.
- e. The student would be able to undertake various civil engineering surveys work.

### Syllabus:

#### UNIT - I: Chain and Compass Traversing

- a) Classification, Principle of Survey, tape survey, cross staff survey, construction, use and testing of optical square, line ranger.
- b) Compass Traversing: Prismatic and Surveyor's Compass, true and magnetic bearing, local attraction, and magnetic dip, inclination, compass traversing adjustment of traverse.

#### UNIT - II: Leveling and Contouring

- a) LEVELLING: different types of Levels, Study of Dumpy Level, temporary adjustment, principle of levelling, reduction of levels, classification of levelling, Profile Levelling, Longitudinal Section And Cross Sections, Reciprocal Levelling, Corrections for Curvature and Refraction, distance to the visible horizon.

#### UNIT – III: Adjustment of Dumpy Level & Trigonometrical Levelling

- a) Adjustment of **auto level**: principle axes of **auto level**, relationship, testing and adjustment of bubble axis and line of collimation.
- b) Trigonometrical Levelling: Indirect levelling, elevation of point with base of an object accessible inaccessible in the same vertical plane.
- c) Contours : Defination, characteristics, uses, methods of locating contours.

#### UNIT – IV: THEODOLITE TRAVERSING :

- a)Theodolite : Introduction, Type of Theodolite ; **Modern Theodolite** Temporary adjustment, Principle Axes and relationship , permanent adjustment, Measurement of Horizontal & vertical angles, Magnetic Bearings, prolonging a line, lining in.
- b) Traverse Computation: Consecutive and independent coordinates, adjustment of closed traverse, Gales traverse table, area calculation by coordinates.

#### UNIT- V: Plane Table Surveying & Computation of Area & Volume

- a) Plane Table Surveying: Equipments, Advantages and Disadvantages, Orientation, methods of plane tabling, two point and three point problems in plane tabling. **Telescopic Alidade.**
- b) Computation of area and volume: Trapezoidal and Simpsons Rule. **Digital planimeter, construction and use.**



**UNIT- VI:** Hydrographic Surveying, Underground Surveying and Surveying Equipments.

- a) Hydrographic Surveying: Shore Line Survey, River Survey, Soundings, equipments, methods of locating soundings, three point problems.
- b) Underground Surveying: Correlation of underground and surface survey, transferring the levels underground.
- c) Surveying Equipments: Optical Theodolite, EDM, GPS.

## **BECVE 404 P      PRACTICAL: SURVEYING – I**

(Minimum 15 practical should be performed out of the following:

1. Demonstration of metric chain.
2. Measurement of distance by ranging and tape.
3. Locating various objects by tape & cross staff survey.
4. Determination of area of given polygon by tape and cross staff survey.
5. Measurement of bearings of sides of traverse with prismatic compass and computation of correct included angles.
6. Locating given building by tape and compass traversing (One full size drawing sheet)
7. Determination of elevation of various points with dumpy level by collimation plane method and rise & fall Method.
8. Fixing bench mark with respect to temporary bench mark with Auto level by fly levelling and check levelling.
9. L- Section and cross section of road (One full size drawing sheet each for L-section and cross section)
10. Measurement of horizontal angles using Theodolite by method of repetition-
11. Measurement of vertical angles with Theodolite.
12. Determination of horizontal distance between two inaccessible points with Theodolite.
13. Locating given building by Theodolite traversing (One full size drawing sheet)
14. Locating given building by plane table traversing (One full size drawing sheet)
15. Determination of elevation of point by trigonometric levelling.
16. To draw Contour map of given area (One full size drawing sheet)
17. **Determination of area of a irregular figure by using Planimeter**
18. **Study of Optical Theodolite, EDM, GPS.**
19. To give site Layout for given plan of building.

### **Text Book**

<b>Sr.No</b>	<b>Title</b>	<b>Publication</b>
1	Surveying and Levelling by Kanetkar and Kulkarni (Vol.I)	Pune Vidhati grihan Prakashan
2	Surveying and Levelling by Dr. B.C. Punmia (Vol. I & II)	Laxmi Pub.

### **Refrence**

<b>Sr.No</b>	<b>Title</b>	<b>Publication</b>
1	Advance Surveying - Total Station, GIS and Remote Sensing by Satheesh Gopi & R.Sathikumar & N. Madhu	Pearson Education

## BECVE 405 T BUILDING CONSTRUCTION & MATERIAL

### Objectives:

1. To prepare the students to understand components of buildings and their functions.
2. To prepare students to understand execution of various constructions activities and material.
3. To prepare students to analyse behaviour of structure under different environmental conditions.
4. To prepare students to identify & suggest rectification the various defects in civil engineering works.

### Outcomes:

- a. The students are able to identify components of a building.
- b. The students are able to differentiate and identify types of building materials.
- c. The students are able to select appropriate material for building construction.
- d. The students are able to plan various construction related activities and their quality control.

### Syllabus :

#### Unit-I :

Foundations: Necessity and types of R.C.C. foundations, **Detail of Deep foundation and precast foundation in general**, Details shallow foundations. Bearing capacity of soils and its assessment. Presumptive bearing capacity values from codes. Loads on foundations. Causes of failures of foundations and remedial measures, Foundation on black cotton soils Setting out foundation trenches, excavation timbering of foundation trenches. Load bearing and framed structures.

#### Unit-II

Brickwork :Qualities of good bricks, classification of bricks tests on bricks as per as codes. Terms used in brickwork, commonly used types of bonds in brickwork such as header, stretcher, English and Flemish bonds, principles of construction. Reinforced brickwork, brick knocking. Parapets, copings, sills and corbels, brief introduction to cavity walls, load bearing and partition walls. Masonry construction using cement concrete blocks and clay walls, load bearing and partition walls. Masonry construction using cement concrete blocks and clay blocks. Precast construction : Introduction to method and materials. Precast elements likes poles, cover, jallies, steps corbets, truss element etc.

#### Unit-III:

Stone Work : Stones, cutting and dressing, selection of stones types of stone masonry, principles of construction joints in masonry. Lifting heavy stones, common building stones in India. Arches and Lintels : Terminology in contraction, types chajjas and canopies, pre cast Lintels & Arches. Damp Proofing : Causes and effect of dampness. Various methods of damp proofing Damp proofing in plinth protection, New Techniques of Damp Proofing Damp Proofing in Plinth Protection, New Techniques of Damp proofing. Epoxy etc.

#### Unit-IV

Floors and Roofs : Floors : General principals, types and method of construction, floors finished quality, ~~testing floor tiles~~, synthetic & Ceramic Tiles. Roofs : Flat and pitches roofs, roof coverings, types AND their constructional features. Thermal Insulation

**Unit-V :**

Stairs : Types of stairs, functional design of stairs.

Doors and Windows : Purpose materials of construction and types.

**Unit-VI :**

Plastering and Pointing : Necessity, types and methods

Temporary Timbering : Centering and formwork shoring, underpinning and scaffolding.

Painting : White washing, colour washing and distemping new materials & Techniques.

**Text book**

<b>Sr. No.</b>	<b>Title</b>	<b>Publication</b>
1	Building Construction by Rangwala	Charotar Pub. House

**BECVE 406 P      COMPUTER APPLICATIONS IN CIVIL ENGINEERING**  
*(underline means newly added content while strikethrough words means deleted)*

**Objectives:**

1. To prepare student to understand basic computational technique and concept of developing flow chart and algorithm for engineering problems.
2. To make the students understand the techniques of handling huge practical data.
3. To prepare students to gain knowledge and necessary skills required to work as a team member or team leader in the development of large computer and software systems covering a broad range of engineering and scientific applications.
4. To prepare student to do advanced studies in computer applications.

**Outcomes:**

- a. The student would be able to analyze, identify and define computing requirement for engineering problems.
  - b. The student would be able to develop and execute computer program for solving mathematical and engineering problems.
  - c. The student would be able to deal with various types of solution errors occurred during cyclic computations.
  - d. The student would be able to develop tool for solving various engineering problems
  - e. The student would be able to work as an effective team member or team leader to accomplish common goal.
- The students would be able to debug the program for common errors.

**PRACTICAL: COMPUTER APPLICATIONS IN CIVIL ENGINEERING**

Minimum sixteen computer program development, minimum one from each of the following field using ~~FORTRAN 95~~/ C language. At least four programs in C language. It is recommended to have at least four programs based on numerical methods and two assignments in application software's such as spreadsheets, database management programs, etc.

1. Engineering mechanics
2. Strength of material
3. Transportation engineering
4. Geotechnical engineering
5. Hydraulic engineering
6. Irrigation and water resources engineering
7. Surveying
8. Estimating and costing
9. Structural analysis
10. Structural design
11. Environmental engineering
12. Matrix algebra, solution techniques
13. Numerical integration
14. Table generation from IS: 456
15. Earthquake force calculation

**Text Book**

<b>Sr.No</b>	<b>Title</b>	<b>Publication</b>
1	The complete reference C by Schildt	Mc. Graw Hill
2	Programming with C by Balagurusamy	Mc. Graw Hill

**Reference**

<b>Sr.No</b>	<b>Title</b>	<b>Publication</b>
1	Programming with C by Ramkumar	Mc. Graw Hill
2	Programming with C by Gottfried	Mc. Graw Hill