

**Program:** B.Tech  
**Semester:** Third  
**Course:** Object Oriented Programming  
**Course Code:** 3.205

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## Course Objective:

- Understand the features of C++ supporting object oriented programming
- Understand the relative merits of C++ as an object oriented programming language
- Understand how to produce object-oriented software using C++
- Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism
- Understand advanced features of C++ specifically stream I/O, templates and operator overloading

### Unit I

**OOPs fundamentals:** What is OOPs? Procedure Oriented Programming vs. Object Oriented Programming. Programming paradigms: procedural programming, modular programming, object-oriented programming.

**OOP's principles:** Abstraction, Encapsulation, Classes and Objects Polymorphism and Inheritance.

**Language Constructs:** Programming basics, data type, loops and decisions Control statements.

### Unit II

**Classes and Objects:** Structures and classes, Definition and declaration of a class, Scope resolution operator, private and public member functions, creating objects, Accessing class data members and member functions, Arrays of objects, Objects as function Arguments.

### Unit III

#### More on Classes

**Constructors and Destructors:** concept of constructor, types of constructor (Copy constructor, Default constructors, parameterized). Destructors, Inline member function, friend function, this pointer, function overloading, operator overloading.

### Unit IV

**Inheritance:** Concepts of inheritance, Base class and derived class, visibility modes, single inheritance: private inheritance, public inheritance, protected inheritance, Ambiguity in single inheritance, Multiple inheritance, Ambiguity in multiple inheritance nested classes.

**Templates:** Function templates, class template.

**Polymorphism and Streams:** Concepts of polymorphism, types of polymorphism, function Overloading & function overriding, Virtual function, Static & dynamic binding. Streams.

### **Suggested Readings:**

1. *Object Oriented Programming in C++* by Robert Lafore Techmedia Publication.
2. *Object Oriented Programming in C++* Saurav Sahay Oxford University Press.
3. *Object Oriented Programming in C++* R Rajaram New Age International Publishers 2<sup>nd</sup> Edition

**Program:** B.Tech

**Semester:** Third

**Course:** Object Oriented Programming Lab

**Course Code:** 3P.205

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1. Write a program to assign data to the data members of a class such as day, month, year and to display the contents of the class on the screen.
  2. Write a program to demonstrate how to define both data member and member function of a class within the scope of the class definition.
  3. Write a program to illustrate the use of the simple arithmetic operations such as addition, subtraction, multiplication and division using a member function. These methods are defined within the scope of a class definition.
  4. Write a program to read students particulars such as roll number, age, sex, height and weight from key board and display the contents of the class on the screen. The class student is defined as an array of the class objects.
  5. Write a program to assign some values to the member of class objects using a pointer structure operator (->).
  6. Write a program to display a series of Fibonacci numbers using the constructor where the constructor member function has been defined out of the class definition using the scope resolution operator.
  7. Write a program to illustrate an inline member function to read a data member of a class from keyboard and to display it on the screen.
  8. Write a program to perform the simple arithmetic operations such as addition, subtraction, multiplication and division using a member function and these functions are defined as an inline substitution.
  9. Write a program to read the derived class data members such as name, roll number, sex, height and weight from the keyboard and display the contents of the class on the screen.
  10. A program consists of a base class and derived class. The base class data members are name, roll number and age. The derived class data members are height and weight. The derived class has been declared as an array of class objects. The member functions are used to get information on the derived class from the keyboard and display the contents of the array of class objects on the screen.
  11. A program to illustrate how a multiple inheritance can be declared and defined in a program. This program consists of two base classes and one derived class. The base class basic\_info contains the data members name, roll number and sex. An another base class academic\_fit contains the data members course, semester and rank. The derived class financial\_assist contains the data member amount besides the data members of the base classes. The derived class has been declared as public inheritance. The member functions are used to get information of the derived class from the keyboard and display the contents of class objects on the screen.

**Program:** B.Tech  
**Semester:** Third  
**Course:** Physics of Semiconductor Devices  
**Course Code:** 3.203

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### Course Objective:

- Know the physics of semiconductor junctions, metal-semiconductor junctions and metal-insulator-semiconductor junctions.
- Know the physics and application of semiconductor hetero junctions and quantum-confined structures.
- Understand the fundamental principles and applications of modern electronic and optoelectronic semiconductor devices.

### Unit I

**Physics and Properties of Semiconductors:** crystal structure, energy bands, statistics, Fermi level, carrier concentration at thermal equilibrium, carrier transport phenomena, Hall effect, recombination, optical and thermal properties, basic properties for semiconductor operation. Device Processing Technology: oxidation, diffusion, ion-implantation, deposition, lithography, etching and interconnect.

### Unit II

**p-n Junction:** depletion region, diffusion, generation-recombination, current-voltage characteristics, junction breakdown, charge storage and transient behavior. Integrated-Circuit Technology: understanding at the level of Muller and Kamins of integrated-circuit fabrication processes. Bipolar transistor: transistor action and dependence on device structure, charge control switching model, Ebers-Moll Model, current-voltage characteristics, non-ideal and limiting effects at extremes of bias.

### Unit III

**State-of-the-Art Bipolar Transistor Technology:** poly-si emitters, narrow base, structural tradeoffs in optimizing performance. Metal-Semiconductor Contacts: equilibrium, idealized metal semiconductor junctions, nonrectifying (ohmic) contacts, Schottky diodes, tunneling. Metal-Oxide-Silicon System: MOS structure, capacitance, oxide and interface charge (charging of traps, tunneling through oxide).

### Unit IV

**MOS Field-Effect Transistor:** Threshold voltage, derivation of current-voltage characteristics, dependence on device structure. State-of-the-Art MOS Technology: small-geometry effects, mobility degradation due to channel and oxide fields, velocity saturation, hot-electron effects, device wear out mechanisms.

### **Suggested Readings:**

1. "Physics of Semiconductor Devices" by S. M. Sze and Kwok K. Ng, 3rd Edition, (John Wiley & Sons, 2002)
2. "Solid State Electronic Devices", by Ben G. Streetman and Sanjay Banerjee 6th Edition, Prentice Hall, 2005
3. "Semiconductor Device Fundamentals", by Robert F. Pierret, Addison-Wesley Publishing, 1996
4. "Semiconductor Physics and Devices", by Donald A. Neamen, 3rd Edition, McGrawHill, 2003

**Program:** B.Tech  
**Semester:** Third  
**Course:** Mathematics III  
**Course Code:** 9.204

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### Course Objective:

- The subject helps the students to develop the fundamentals and basic concepts in vector calculus, ODE, Laplace transform and complex functions. Students will be able to solve problems related to engineering applications by using these techniques.
- To find the velocity and acceleration of a particle moving along a space curve.
- Apply the principles of Differential Calculus to solve a variety of practical problems in Engineering and Applied Science.
- Apply the principles of Partial Differentiation, Directional Derivatives, and Double integral.

### Unit I:

**Complex Variables:** Continuity, differentiability and analyticity of a function of a complex variable, Cauchy Riemann differential equations in Cartesian and polar forms. Harmonic functions, Bilinear and conformal transformations. Complex integration, Cauchy's integral theorem and formula. Derivatives. Taylor's and Laurent's Series. Poles and Singularities. Cauchy's Residue Theorem. Contour integration (Poles on real axis excluded)

### Unit II:

**Special Functions:** Series solution of Differential equations by the method of Frobenius. (Roots differing by non integer and equal roots). Bessel's equation: solution and Bessel's function of the first kind, Recurrence relations. Orthogonality of Bessel's Functions. Generating function and Bessel's integral. Legendre's equation: solution and Legendre's polynomials, Rodrigue's Formula. Orthogonarity relations. Generating function and recurrence relation. Definition of Hankeki's function. Elliptic Integral of the first and second kind. Jacobi's form of elliptic integrals.

### Unit III:

**Numerical Techniques:** Algebraic Equations, Bisection method, Regula-Falsi method and Newton-Raphson method and Gausse limination method and Iterative methods-Gauss Seidal and Jacobi's method.

### Unit IV:

**Interpolation:** Introduction, Lagrange's interpolation formula. Difference operator, relation between them. Difference Table. Newton's forward and backward difference interpolation formulae. Numerical Differentiation & Integration, Newton's forward and backward difference formulae, Numerical integration. Trapezoidal rule and Simpson's 1/3<sup>rd</sup> & 3/8<sup>th</sup> rule.

### Suggested Readings:

*Higher Engineering Mathematics by B.S. Grewal, Khanna Publisher*

**Program:** B.Tech  
**Semester:** Third  
**Course:** Introduction of System Theory  
**Course Code:** 6.201

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### Course Objective:

- Ability to apply knowledge of science and engineering fundamentals
- Ability to undertake problem identification, formulation, and solution
- Ability to communicate effectively, with the engineering team and with the community at large
- Ability to manage information and documentation

### Unit I

**Introduction to signals and systems:** Definition, Basis of classification, Representation of common signals and their properties, System modeling. Analogous System: Introduction, D Alembert's Principle, Force-voltage and force-current analogies, Electrical analogue of mechanical, Hydraulic and thermal systems.

### Unit II

**Fourier Transform Method:** Introduction, Fourier transform pair, Amplitude spectrum and phase spectrum of signals, Sinusoidal transfer function. Laplace Transform Method: Introduction, Laplace transform pair, Laplace transformation of common functions, Gate function, Step function and impulse function, Laplace theorems shifting, initial value, final value and convolution theorems. Inverse Laplace transform by partial fraction expansion and convolution integral method.

### Unit III

**System Analysis:** System Analysis by Laplace Transform method, System response. Natural, forced, transient and steady state responses. Transfer function and characteristic equation, Superposition integral, Concept of poles and zeros, Nature of system response from poles and zeros.

### Unit IV

**System Stability:** Concept of stability, Types, Necessary and sufficient conditions, Routh Hurwitz stability criterion, Limitations and its applications to closed loop systems. State-Space Concept: Introduction, Definition: State, State variable, State vector and state space, State space representation, Derivation of State model from transfer function, Bush form and diagonal canonical form of state model, Non-uniqueness of state model, Derivation of transfer function from state model, Transition matrix and its properties, Solution of time invariant state equation.

### *Suggested Readings:*

1. *Analysis of Linear Systems – D.K.Cheng.*
2. *Control System Engineering – Nagrath&Gopal*
3. *Control System – A. Anand Kumar*
4. *Networks and Systems – D. Roy Choudhury*
5. *Signals and Systems - Basu&Natarajan*

**Program:** B.Tech

**Semester:** Third

**Course:** Introduction to System Theory Lab

**Course Code:** 6P.201

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### List of Experiments

1. Study of the Commands used in MATLAB.
2. To perform the application of MATLAB for equation.
3. To perform the application of MATLAB for simple mathematical operations.
4. To obtain the Fourier transform of a Signal.
5. To plot the graph of a Sine wave signal & its Power Spectrum.
6. To plot the graph of a Cosine wave signal & its Power Spectrum.
7. To plot the graph of Phase shift of Cosine wave signal & its Power Spectrum.
8. To plot the graph of Square wave signal & its Power Spectrum.

**Program:** B.Tech  
**Semester:** Third  
**Course:** Analog Electronics  
**Course Code:** 6.202

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### Course Objective:

- Ability to apply knowledge of science and engineering fundamentals
- Ability to undertake problem identification, formulation, and solution
- Ability to communicate effectively, with the engineering team and with the community at large
- Ability to manage information and documentation

#### Unit I

**Special Diodes-** LED, Varactor diode, Photo diode, Schottky diode, Tunnel diode; their characteristics and applications. Transistors as a switch.

#### Unit II

**Active filters & Converters:** First and second order low pass & High pass filters, Band Pass & Band-Reject filters, All-Pass filter, Filter using MATLAB. Voltage to Frequency and Frequency to voltage Converters, Analog to Digital and Digital to Analog Converters.

#### Unit III

**Non Linear Circuits & Regulators:** Voltage Comparators, Precision Rectifiers, Schmitt Triggers, Analog Switches, Peak detectors, Sample and Hold circuit, Square and Triangular Wave Generators, Linear Regulators, Switching Regulators.

#### Unit IV

**Frequency Response:** low and high frequency response of common emitter and common source amplifiers. Feedback: General feedback structure; properties of negative feedback; series-series, series-shunt, shunt-series and shunt-shunt feedback amplifiers. Basic principle of sinusoidal oscillator, R-C Phase Shift and Wein Bridge oscillators, tuned oscillators- Collpits and Hartley; Crystal oscillator.

### Suggested Readings:

1. *Electronic Design: From Concept to Reality, 4th Edition, M. Roden and Carpenter.*
2. *Basic Electronics and Linear Circuits by NN Bhargava, Tata McGraw Hills, New Delhi*

**Program:** B.Tech

**Semester:** Third

**Course:** Analog electronics Lab

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**Course Code:** 6P.202

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### List of Experiments

1. To study the characteristics of MOSFET in different modes.
2. To observe the output waveform of inverting and non-inverting amplifier.
3. To observe the output wave form of summing and difference amplifier.
4. To observe the characteristics of LED.
5. To observe the characteristics of diode.
6. To study the switching action of BJT.
7. To study the switching action of FET.
8. To study the output wave form of filter or oscillator.

**Program:** B.Tech  
**Semester:** Third  
**Course:** Communication & Soft skills  
**Course Code:** 40B.201

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### **Course Objective:**

The aim is to develop students' soft skills, communication, leadership and teamwork skills; and personal development skills using practical approach and exposure of students to the realities of the world.

- To enhance Leadership – assessing the requirements of a task, identifying the strengths/weaknesses within the team, utilising the diverse skills of the group to achieve the set objectives.
- To improve Communication – demonstrating clear briefing and listening /speaking skills.
- To make them realize that effective communication and interpersonal skills are crucial to increase employment opportunities and to compete successfully in the business environment.
- The course aims to cause a basic awareness about the significance of soft skills in professional and inter-personal communications and facilitate an all-round development of personality. Hard or technical skills help securing a basic position in one's life and career. But only soft skills can ensure a person retain it, climb

### **UNIT-I Communication skills**

- Introduction
- Role of Communication in Today's World
- Objective of Communication
- Process of Communication
- Elements of Communication
- Essentials of Communication
- Barriers/ Factors Inhibiting Communication
- Flow of Communication
- Verbal Mode of Communication

### **Unit -II Communication Network**

- Non Verbal Mode of Communication
- Kinesics/Body Language, proxemics , chronemics, para lingual
- Style in Technical Communication
- Communication Skills; Reading, Writing, Speaking, Listening & Talking

### **Unit -III GRAPHICS**

- Introduction
- Planning of Graphics
- Placing of Graphics
- Construction of Graphics
- Types of Graphics(textual, visual, tables, bar Charts, pie charts, line charts, organizational charts, flow charts, maps & Pictographs)

## **Unit -IV TELEPHONIC CONVERSATION SKILLS**

- Introduction
- Stages in Telephonic Conversation
- Listening & Speaking Skills
- Telephonic Skills
- Problems in Telephonic Conversation
- Intensive Listening

### ***Suggested Books & Readings:***

- *Monippally, Matthukutty. M. 2001. Business Communication Strategies. 11<sup>th</sup> Reprint. Tata McGraw-Hill. New Delhi*
- *Swets, Paul. W. 1983. The Art of Talking So That People Will Listen: Getting Through to Family, Friends and Business Associates. Prentice Hall Press. New York*
- *Lewis, Norman. 1991. Word Power Made Easy. Pocket Books*
- *Sen , Leena .Communication Skills ; Eastern Economy Edition*
- *Ghanekar , Dr. Anjali . Essentials of Business Communication Skills ; Everest Publishing House*
- *David Green . Contemporary English Grammar, Structure & Composition ; MacMillan*
- *Dictionary; Oxford*
- *Dictionary ; Longman*

**Program:** B.Tech  
**Semester:** Third  
**Course:** Life Skills I  
**Course Code:** 40B.101

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### **Course Objective:**

To impart basic skills of Professional Communication in English through intensive practice to the Students, so as to enable them to function confidently & effectively in that Language in the Professional Sphere of their life.

The student must have some basic command of English so that the Student must be able to:

- Write reasonably & grammatically
- Understand (if not use) at least some 2500 general purpose words of English
- Use some 2000 (at least 1500) general-purpose words of English to express himself/herself in writing & 1500 such words to talk about day-to-day events & experiences of life.
- Understand slowly-delivered spoken material in Standard Indian English, and
- Speak reasonably clearly (if not fluently) on routine matters with his fellow Students, with proper word stress, intonation pattern, accent and perfect articulation

### **UNIT- I Basic Grammar**

- Noun, Verb, Adverb, Adjective & Preposition
- Sentence
- Tense: Present ,Past & Future
- Voice
- Narration
- Concord
- English Modals
- Connectives
- Degree of Comparison
- Nominalization

### **UNIT -II Practice Exercise**

- Re-Writing Sentences
- Gap Filling
- Common Errors
- Phrases & Idioms
- Homophones ( Commonly Confused Words)
- Vocabulary Building
- Word Quiz

### **UNIT -III Written Communication Skills**

- Requisites of good sentence writing
- Effective sentence structure
- Sentence Building/ Sentence coherence
- Sentence Emphasis/theme
- Development of a paragraph
- Paragraph structure
- Principles of paragraph Writing

- Paragraph length/ coherence/ Division

#### **Unit -IV Etiquettes & manners**

- Dinning etiquettes
- Workplace etiquettes
- Professional Manners
- Social Etiquettes
- Group Behavior
- Tour & Travel Etiquettes

#### **Suggested Books & Readings:**

- *Monippally, Matthukutty. M. 2001. Business Communication Strategies. 11<sup>th</sup> Reprint. Tata McGraw-Hill. New Delhi*
- *Swets, Paul. W. 1983. The Art of Talking So That People Will Listen: Getting Through to Family, Friends and Business Associates. Prentice Hall Press. New York*
- *Lewis, Norman. 1991. Word Power Made Easy. Pocket Books*
- *Sen , Leena .Communication Skills ; Eastern Economy Edition*
- *Ghanekar , Dr. Anjali . Essentials of Business Communication Skills ; Everest Publishing House*
- *David Green . Contemporary English Grammar, Structure & Composition ; MacMillan*
- *Dictionary; Oxford*
- *Dictionary ; Longman*