PUNJAB TECHNICAL UNIVERSITY

Scheme& Syllabus of
B. Tech. Electronics & Telecommunication Engineering [ETE]

Batch 2011

By

Board of Studies Electronics & Communication Engineering

Third Semester **Contact Hours: 29 Hrs.**

Course Code	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BTAM-301	Engineering Mathematics-III	4	1	-	40	60	**100**	**5**
BTCS-305	Object Oriented Programming using C++	3	1	-	40	60	**100**	**4**
BTEC-301	Analog Devices & Circuits	3	1	-	40	60	**100**	**4**
BTEC-302	Digital Circuit and Logic Design	3	1	-	40	60	**100**	**4**
BTEC-303	Network Analysis and Synthesis	3	1	-	40	60	**100**	**4**
BTEC-304	Lab Analog Devices & Circuits	-	-	2	30	20	**50**	**1**
BTEC-305	Lab Digital Circuit and Logic Design	-	-	2	30	20	**50**	**1**
BTCS-309	Lab Object Oriented Programming	-	-	4	30	20	**50**	**2**
Workshop Training *					60	40	**100**	
	TOTAL	**16**	**5**	**8**	**350**	**400**	**750**	**25**

***The marks will be awarded on the basis of 4 weeks workshop training conducted after 2nd Semester**

Third Semester

BTAM301 Engineering Mathematics-III

Unit I Fourier Series: Periodic functions, Euler's formula. Even and odd functions, half range expansions, Fourier series of different wave forms.

Unit II Laplace Transforms: Laplace transforms of various standard functions, properties of Laplace transforms, inverse Laplace transforms, transform of derivatives and integrals, Laplace transform of unit step function, impulse function, periodic functions, applications to solution of ordinary linear differential equations with constant coefficients, and simultaneous differential equations.

Unit III Special Functions: Power series solution of differential equations, Frobenius method, Legendre's equation, Legendre polynomial, Bessel's equation, Bessel functions of the first and second kind. Recurrence relations, equations reducible to Bessel's equation.

Unit IV Partial Differential Equations: Formation of partial differential equations, Linear partial differential equations, homogeneous partial differential equations with constant coefficients.

Unit V Applications of PDEs: Wave equation and Heat conduction equation in one dimension. Two dimensional Laplace equation in Cartesian Coordinates, solution by the method of separation of variables.

Unit VI Functions of Complex Variable: Limits, continuity and derivative of the function of complex variable, Analytic function, Cauchy-Riemann equations, conjugate functions, harmonic functions; Conformal Mapping: Definition, standard transformations, translation, rotation, inversion, bilinear. Complex Integration: Line integrals in the complex plane, Cauchy's theorem, Cauchy's integral formula and derivatives of analytic function. Taylor's and Laurent's expansions (without proofs), singular points, poles, residue, Integration of function of complex variables using the method of residues.

Suggested Readings/ Books:

- Kreyszing, E., Advanced Engineering Mathematics, Eighth edition, John Wiley, New Delhi.
- Grewal, B. S., Higher Engineering Mathematics, Khanna Publishers, New Delhi.
- Ian N. Sneedon, Elements of Partial Differential Equations, McGraw- Hill, Singapore, 1957.
- Peter. V. O'Nil, Advanced Engineering Mathematics, Wadsworth Publishing Company.
- Taneja, H. C., Engineering Mathematics, Volume-I & Volume-II, I. K. Publisher.
- Babu Ram, Advance Engineering Mathematics, Pearson Education.
- Bindra, J. S., Applied Mathematics, Volume-III, Kataria Publications.
- Advanced Engineering Mathematics, O'Neil, Cengage Learning.

BTCS 305 Object Oriented Programming Using C++

Unit I Object-Oriented Programming Concepts: Introduction, comparision between procedural programming paradigm and object-oriented proramming paradigm, basic concepts of object-oriented programming — concepts of an object and a class, interface and implementation of a class, operations on objects, relationship among objects, abstraction, encapsulation, data hiding, inheritance, overloading, polymorphism, messaging.

Unit II Standard Input/Output: Concept of streams, hierarchy of console stream classes, input/output using overloaded operators >> and << and memberv functions of i/o stream classes, formatting output, formatting using ios class functions and flags, formatting using manipulators.

Unit III Classes and Objects: Specifying a class, creating class objects, accessing class members, access specifiers, static members, use of *const* keyword, friends of a class, empty classes, nested classes, local classes, abstract classes, container classes, bit fields and classes**.**

Unit IV Pointers and Dynamic Memory Management: Declaring and initializing pointers, accessing data through pointers, pointer arithmetic, memory allocation (static and dynamic), dynamic memory management using *new* and *delete* operators, pointer to an object, *this* pointer, pointer related problems - dangling/wild pointers, null pointer assignment, memory leak and allocation failures**.**

Unit V Constructors and Destructors: Need for constructors and destructors, copy constructor, dynamic constructors, explicit constructors, destructors, constructors and destructors with static members, initializer lists.

Unit VI Operator Overloading and Type Conversion: Overloading operators, rules for overloading operators, overloading of various operators, type conversion - basic type to class type, class type to basic type, class type to another class type.

Unit VII Inheritance: Introduction, defining derived classes, forms of inheritance, ambiguity in multiple and multipath inheritance, virtual base class, object slicing, overriding member functions, object composition and delegation, order of execution of constructors and destructors.

Unit VIII Virtual functions & Polymorphism: Concept of binding - early binding and late binding, virtual functions, pure virtual functions, abstract clasess, virtual destructors.

Unit IX Exception Handling: Review of traditional error handling, basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism, rethrowing an exception, specifying exceptions.

Unit X Templates and Generic Programming: Template concepts, Function templates, class templates, illustrative examples.

Unit XI Files: File streams, hierarchy of file stream classes, error handling during file operations, reading/writing of files, accessing records randomly, updating files.

Suggested Readings/ Books:

- Lafore R., **Object Oriented Programming in C++**, Waite Group.
- E. Balagurusamy, **Object Oriented Programming with C++**, Tata McGraw Hill.
- R. S. Salaria, **Mastering Object-Oriented Programming with C++**, Salaria Publishing House.
- Bjarne Stroustrup, **The C++ Programming Language**, Addison Wesley.
- Herbert Schildt, **The Complete Reference to C++ Language**, McGraw Hill-Osborne.
- Lippman F. B, **C++ Primer,** Addison Wesley.

BTEC301 Analog Devices & Circuits

Unit I Semiconductor diode Theory of PN junction diode, Band structure of open circuited PN junction, Volt Ampere Characteristics, Temperature Dependence of PN diode, LED, LCD and Photo- diodes, Tunnel diode, Zener diode as Voltage Regulator.

Unit II Transistors, Characteristics and Biasing Transistor, Types of Transistor, Transistor current components, Transistor as an Amplifier, Transistor characteristics in CB, CE and CC modes. Operating point, bias stability, various biasing circuits, stabilization against Ico, V_{BE} and beta, Construction, Characteristics & applications of Junction Field Effect Transistor (JFET), UJT and MOSFET.

Unit III Large Signal Amplifiers: Class A direct coupled with resistive load, Transformer coupled with resistive load, harmonic distortion, variation of output power with load, Push-Pull Amplifiers, operation of class- B push-pull amplifier, crossover distortion, transistor phase inverter, complementary- symmetry amplifier.

Unit IV Feedback Amplifiers and Oscillator: Feedback Concept, Effect of negative feedback on gain, bandwidth, stability, distortion and frequency Response, Sinusoidal Oscillators, Sinusoidal oscillators; criterion for oscillation, Different types of oscillators: RC Phase Shift, Wein Bridge, Hartley, Colpitts and Crystal Oscillators. Derivation of expression for frequency and amplitude of these oscillators.

Unit V Low & High Frequency Transistor Model: Transistor Hybrid Model, h parameter equivalent circuit of transistor, Analysis of transistor amplifier using h-parameters in CB, CE and CC configuration, The high frequency T model, hybrid pi CE transistor model, hybrid pi conductance in terms of low frequency h parameters.

Suggested Readings/ Books:

- Electronic Devices & Circuits by Millman- Halkias, Tata Mcgraw Hill
- Electronic Devices & Circuits Theory by Boylested, Pearson Education.
- Electronic Fundamentals & Application, by J.D. Ryder, PHI.
- Electronic Devices, by Floyd, Pearson Education.
- Electronics Devices & Circuits by J.B.Gupta, Katson.

BTEC302 Digital Circuit and Logic Design

Unit I Number System and Binary Code: Introduction, Binary, Octal and Hexadecimal Number System (Conversion, Addition & Subtractions). Signed and unsigned numbers, Binary Subtractions using 1's and 2's compliment, ASCII code, Excess 3 code, Grey code, BCD code and BCD additions.

Unit II Minimization of logic function: OR, AND,NOT,NOR,NAND,EX-OR, EX-NOR, Basic theorem of Boolean Algebra, Sum of Products and Product of Sums, canonical form, Minimization using K-map and Q-M method.

Unit III Combinational Circuits: Introduction, Combinational circuit design, Encoders, decoders, Adders, Sub tractors and Code converters. Parity checker, seven segment display, Magnitude comparators. Multiplexers, De-multiplexer, Implementation of Combinational circuit using MUX.

Unit IV Sequential Circuits: Introduction, flip flops, Clocked flip flops, SR, JK, D, T and edge triggered flip-flops. Excitation tables of Flip flops. Shift Registers, Type of Shift Registers, Counter, Counter types, counter design with state equation and state diagrams.

Unit V D/A and A/D Converters: Introduction, Weighted register D/A converter, binary ladder D/A converter, steady state accuracy test, D/A accuracy and resolution, parallel A/D converter, Counter type A/D converter Successive approximation A/D converter. Single and dual slope A/D converter, A/D accuracy and resolution.

Unit VI Semiconductor Memories: Introduction, Memory organisation, Classification and characteristics of memories, Sequential memories, ROMs, R/W memories. Content addressable memories. PLA and PAL.

Unit VII Logic Families: RTL, DCTL, DTL, TTL, ECL, CMOS and its various types, Comparison of logic families.

Suggested Readings / Books:

- Morris Mano, **Digital Design**, Prentice Hall of India Pvt. Ltd
- Donald P.Leach and Albert Paul Malvino, **Digital Principles and Applications**, 5 ed., Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
- R.P.Jain, Modern **Digital Electronics**, 3 ed., Tata McGraw–Hill publishing Company limited, New Delhi, 2003.
- Thomas L. Floyd, **Digital Fundamentals**, Pearson Education, Inc, New Delhi, 2003
- Ronald J. Tocci, Neal S. Widmer, Gregory L. Moss, **Digital System -Principles and Applications**, Pearson Education.
- Srivastava/Srivastava/Srivastava**, Digital Design: HDL Based Approach,** Cengage Learning.
- Roth, **Fundamentals of Logic Design,** Cengage Learning

BTEC301 Network Analysis and Synthesis

Unit I Circuit Concepts: Independent and dependent sources, Signals and wave forms: Periodic and singularity voltages, step, ramp, impulse, doublet, loop currents and loop equations, node voltage and node equations, Network Theorems: Superposition, Thevenin's, Norton's, Maximum Power Transfer, and Reciprocity.

Unit II Time and Frequency Domain Analysis: Representation of basic circuits in terms of generalized frequency and their response, Laplace transform of shifted functions, transient and steady response, Time domain behaviors from poles and zeros, Convolution Theorem.

Unit III Network Synthesis: Network functions, Impedance and admittance function, Transfer functions, Relationship between transfer and impulse response, poles and zeros and restrictions, Network function for two terminal pair network, Sinusoidal network in terms of poles and zeros, Real liability condition for impedance synthesis of RL and RC circuits, Network synthesis techniques for 2-terminal network, Foster and Cauer forms.

Unit IV: Classification of filters, characteristics impedance and propagation constant of pure reactive network, Ladder network, T-section, π-section, terminating half section, Pass bands and stop bands, Design of constant-K, m-derived filters, Composite filters.

Suggested Readings/ Books:

- Bird John, *Electrical Circuit Theory and Technology*, 2nd Ed., Newnes.
- Chakraborty, Abhijit, *Circuit Theory*, 2nd Edition, Dhanpat Rai, 2001.
- Chaudhury D. Roy, *Networks and Synthesis*, New Age International.
- Edminister J.A., *Electric Circuits*, 4th Edition, Tata McGraw Hill, 2002.
- Iyer T.S.K.V., *Circuit Theory*, Tata McGraw Hill, 2006.
- Mohan, Sudhakar Sham, *Circuits and Networks Analysis and Synthesis*, 2nd Edition, Tata Mc Graw Hill, 2005.
- Van Valkenberg, M.E., *Network Analysis and Synthesis*, PHI learning, 2009.

BTEC303 Lab Analog Devices & Circuits

1. Study of Zener regulator as voltage regulator
2. Study of Half wave, full wave & Bridge rectifiers.
3. To plot the input and output characteristics of CE configuration.
4. To study the characteristics of a Class- A amplifier.
5. To study the characteristics of Class- B amplifier.
6. To study the characteristics of Class- B push-pull amplifier.
7. To study the characteristics of complementary symmetry amplifier.
8. To study the response of RC phase shift oscillator and determine frequency of oscillation.
9. To study the response of Hartley oscillator and determine frequency of oscillation.
10. To study the response of Colpitt's oscillator and determine frequency of oscillation.
11. To study the response of Wien Bridge oscillator and determine frequency of oscillation

BTEC-304 Lab Digital Circuit and Logic Design

1. Study of Logic Gates: Truth-table verification of OR, AND, NOT, XOR, NAND and NOR gates; Realization of OR, AND, NOT and XOR functions using universal gates.
2. Realization Half Adder / Full Adder using Logic gates.
3. Realization Half Subtractor / Full Subtractor using Logic gates
4. Design 4-Bit Binary-to-Gray & Gray-to-Binary Code Converter.
5. Design 4-Bit magnitude comparator using logic gates.Multiplexer: Truth-table verification and realization of Half adder and Full adder using MUX.
6. Demultiplexer: Truth-table verification and realization of Half subtractor and Full subtractor using DEMUX.
7. Flip Flops: Truth-table verification of RS, JK , D, JK Master Slave Flip Flops.

8. Design MOD-7 Synchronous up-counter using JK/RS/D Flip Flops.
9. Shift Register: Study of shift right, SIPO, SISO, PIPO, PISO & Shift left operations using IC7495 chip.

BTCS 309 Object Oriented Programming Using C++ Lab

1. **[Classes and Objects]** Write a program that uses a class where the member functions are defined inside a class.
2. **[Classes and Objects]** Write a program that uses a class where the member functions are defined outside a class.
3. **[Classes and Objects]** Write a program to demonstrate the use of static data members.
4. **[Classes and Objects]** Write a program to demonstrate the use of const data members.
5. **[Constructors and Destructors]** Write a program to demonstrate the use of zero argument and parameterized constructors.
6. **[Constructors and Destructors]** Write a program to demonstrate the use of dynamic constructor.
7. **[Constructors and Destructors]** Write a program to demonstrate the use of explicit constructor.
8. **[Initializer Lists]** Write a program to demonstrate the use of initializer list.
9. **[Operator Overloading]** Write a program to demonstrate the overloading of increment and decrement operators.
10. **[Operator Overloading]** Write a program to demonstrate the overloading of binary arithmetic operators.
11. **[Operator Overloading]** Write a program to demonstrate the overloading of memory management operators.
12. **[Typecasting]** Write a program to demonstrate the typecasting of basic type to class type.
13. **[Typecasting]** Write a program to demonstrate the typecasting of class type to basic type.
14. **[Typecasting]** Write a program to demonstrate the typecasting of class type to class type.
15. **[Inheritance]** Write a program to demonstrate the multilevel inheritance.
16. **[Inheritance]** Write a program to demonstrate the multiple inheritance.
17. **[Inheritance]** Write a program to demonstrate the virtual derivation of a class.
18. **[Polymorphism]** Write a program to demonstrate the runtime polymorphism.
19. **[Exception Handling]** Write a program to demonstrate the exception handling.
20. **[Templates and Generic Programming]** Write a program to demonstrate the use of function template.
21. **[Templates and Generic Programming]** Write a program to demonstrate the use of class template.

22. **[File Handling]** Write a program to copy the contents of a file to another file byte by byte. The name of the source file and destination file should be taken as command-line arguments,
23. **[File Handling]** Write a program to demonstrate the reading and writing of mixed type of data.