BEANT COLLEGE OF ENGINEERING & TECHNOLOGY, GURDASPUR

Scheme& Syllabus of
B. Tech.
Electronics & Communication Engineering [ECE]
Batch 2015 onwards

Department of Academics
BEANT COLLEGE OF ENGINEERING & TECHNOLOGY
GURDASPUR

B. Tech 3rd Sem ECE — 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	3	1	-	40	60	100	4
BTCS-305	Object Oriented Programming using C++	3	1	-	40	60	100	4
BTEC-301	Analog Devices & Circuits	4	1	-	40	60	100	5
BTEC-302	Electronic Measurement and Instrumentation	4	1	-	40	60	100	5
BTEC-303	Network Analysis and Synthesis	4	1	-	40	60	100	5
BTEC-304	Lab Analog Devices & Circuits	-	-	2	30	20	50	1
BTEC-305	Lab Electronic Measurement and Instrumentation	-	-	2	30	20	50	1
BTCS-309	Lab Object Oriented Programming	-	-	2	30	20	50	1
BTEC-306	Institutional Practical Training *				60	40	100	1
TOTAL		18	5	6	350	400	750	27

***The marks will be awarded on the basis of 04 weeks Institutional Practical Training conducted after 2nd Semester**

B. Tech 4th Semester ECE — Contact Hours: 29 Hrs.

Course Code	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BTEE-402	Linear Control Systems	4	1	-	40	60	100	5
BTEC-401	Analog Communication Systems	4	1	-	40	60	100	5
BTEC-402	Pulse wave shaping and Switching	3	1	-	40	60	100	4
BTEC-403	Digital Circuit & Logic Design	3	1	-	40	60	100	4
BTEC-404	Linear Integrated Circuit	4	1	-	40	60	100	5
BTEC-405	Lab Analog Communication Systems	-	-	2	30	20	50	1
BTEC-406	Lab Digital Circuit & Logic Design	-	-	2	30	20	50	1
BTEC-407	Lab Linear Integrated Circuit	-	-	2	30	20	50	1
BTGF-400	General Fitness				100	NA	100	1
TOTAL		18	5	6	390	360	750	27

B. Tech 5th Semester ECE — Contact Hours: 28 Hrs.

Course Code	Course Title	Load Allocation			Marks Distribution		Total	Credits
		L	T	P	Internal	External		
BTEC-501	Digital Communication System	3	1	-	40	60	100	4
BTEC-502	Digital Signal Processing	4	1	-	40	60	100	5
BTEC-503	Micro processors & Micro controllers	4	1	-	40	60	100	5
BTEC-504	Electromagnetics and Antennas	4	1	-	40	60	100	5
	Open Elective-I	3	-	-	40	60	100	3
BTEC-505	Lab Digital Communication System	-	-	2	30	20	50	1
BTEC-506	Lab Digital Signal Processing	-	-	2	30	20	50	1
BTEC-507	Lab Hardware Programme& Interfacing	-	-	2	30	20	50	1
BTEC-508	Industrial Training *				60	40	100	1
TOTAL		18	4	6	350	400	750	26

***The marks will be awarded on the basis Industrial Training conducted after 4th Semester**

B. Tech 6thSem ECE — Contact Hours: 28 Hrs.

Course Code	Course Title	Load Allocation			Marks Distribution		Total	Credits
		L	T	P	Internal	External		
BTEC-601	Microwave & Radar Engineering	4	1	-	40	60	100	5
BTEC-602	Wireless Communication System	4	1	-	40	60	100	5
BTEC-603	Embedded System	4	1	-	40	60	100	5
	Open Elective-II	3	-	-	40	60	100	3
BTEC-XXX	Dept. Elective -I	3	1	-	40	60	100	4
BTEC-604	Lab Microwave Engineering	-	-	2	30	20	50	1
BTEC-605	Lab Embedded System	-	-	2	30	20	50	1
BTEC-606	Minor Project*	-	-	2	30	20	50	1
BTGF-600	General Fitness				100	NA	100	1
TOTAL		18	4	6	390	360	750	26

*The project work will be carried out in parts as minor project in 6th semester and major project in 7th/8th semester. The literature survey, problem formulation, assessment for viability of project, objectives and methodology for the project shall be decided in 6th semester. The same project problem is to be extended in the major project in 7th/8th semester. The minor project may be carried out by a group of students (2 to 3 students).

B. Tech 7th Semester ECE — Contact Hours: 30 Hrs.

Course Code	Course Title	Load Allocation			Marks Distribution		Total	Credits
		L	T	P	Internal	External		
BTCS-403	Computer Network-1	3	1	-	40	60	100	4
BTEC-701	Digital System Design	3	1	-	40	60	100	4
BTEC-702	Optical Communication	3	1	-	40	60	100	4
BTEC-YYY	Dept. Elective -II	3	1	-	40	60	100	4
BTEC-ZZZ	Dept. Elective -III	3	1	-	40	60	100	4
BTEC-703	Lab Wireless and Optical Systems & Networks	-	-	2	30	20	50	1
BTEC-704	Lab Digital System Design	-	-	2	30	20	50	1
BTEC-705	Major Project**		-	6	100	50	150	3
BTGF-800	General Fitness				100	NA	100	1
TOTAL		15	5	10	460	390	850	26

**The problem of major project formulated during the 6th semester is to be extended and executed in major project by the same group of students in the 7th/8th semester. However under special circumstances HOD may allow the change of project title on the recommendation of project guide in the start of the semester. The design/construction/fabrication/ computer modeling/experimentation etc. is to be carried out. The result and analysis followed by discussion regarding sustainability/non-sustainability of the project or any positive gain in the project made with conclusions and recommendations for future extension of project must be covered.

B. Tech 8th Semester ECE

Industrial Training (One semester)	**Course Component**	**Internal Marks**	**External Marks**	**Total Marks**	**Credits**
BTEC-801	Industrial Training#	**450**	**300**	**750**	**24**

The students are required to undergo Industrial Training atleast 36 hrs/week during the semester.

Departmental Elective – I (Common Code XXX)

BTEC-911 Relational Data Base Management System
BTEC-912 Micro Electronics
BTEC- 913 Industrial Electronics
BTEC- 914 VLSI
BTEC- 915 Intellectual property rights & patent systems
BTEC-916 Intelligent Instrumentation
BTEC- 917 Information Theory& Coding

Departmental Elective –II (Common Code YYY)

BTEC- 931 CMOS based design
BTEC- 932 Biomedical signal processing
BTEC- 933 Satellite Communication
BTEC- 934 Artificial Intelligence Techniques & Applications
BTEC- 935 Speech & image Processing
BTEC- 936 Human Resource Management
BTEC- 937 Computer organization and Architecture

Departmental Elective – III (Common Code ZZZ)

BTEC- 941 Electromagnetic interference & compatibility
BTEC- 942 Neural Networks & Fuzzy logic
BTEC- 943 Robotics
BTEC- 944 Operation Research
BTEC- 945 Mobile Computing
BTEC- 946 Wireless Sensor network
BTEC- 947 Numerical Methods

Open Electives to be Offered to other departments

Open Elective-I

BTEC- -951 Electronics Measurements & Instrumentation
BTEC- -952 Reliability Engineering

Open Elective-II

BTEC-961 Principles of Communication Engineering
BTEC- 962 Micro-Controllers & Embedded Systems

List of Open electives to be offered by other departments to the 5th semester ECE students

Course Code	Subject Name
BTAS-951	Physics of Nano Materials
BTAS-952	Advance Engineering Mathematics
BTAS-953	Entreprenurship Development
BTBT-951	Industrial waste management
BTBT-952	Bioinformatics
BTCH-951	Corrosion Engineering
BTCH-952	New & Renewable Energy Sources
BTCS-951	Data Structures
BTCS-952	Web Technologies
BTCS-953	Information Security
BTIT-951	Concept of Computer and Networking
BTIT-952	Operating System
BTME-951	Industrial Safety and Environment
BTME-952	Energy Conservation and Management

List of Open electives to be offered by other departments to the 6th semester ECE students

Course Code	Subject Name
BTAS-961	Human Resource Management
BTBT-961	Biomedical Instrumentation
BTBT-962	Human Disease and Control
BTCH-961	Environment Impact Assessment
BTCH-962	Hydrocarbon Engineering
BTCS-961	Computer Networks - I
BTCS-962	Operating systems
BTCS-963	Microprocessor and Assembly Language Programming
BTCS-964	Software Engineering
BTME-961	Entrepreneurship
BTME-962	Management Information System
BTME-963	Material Management
BTIT-961	Programming in Java
BTIT-962	Software Engineering

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Third Semester

BTAM-301 Engineering Mathematics - III

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Internal Marks: 40
External Marks: 60
Total Marks: 100

Objectives: To make students familiar with some specific mathematical concepts and tools to understand and analyze the electronics and communication based engineering problems. The exposure of these tools will enhance the analytical ability to deal with engineering problems.

Unit I Fourier Series:

Periodic functions, Euler's formula. Even and odd functions,half range expansions, Fourier series of different wave forms (6)

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 equation. (8)

Unit III Special Functions:

Power series solution. of differential equations, Frobeniusmethod, Legendre's equation, Legendre polynomial, Bessel's equation, Bessel functions of the first and second kind. Recurrence relations, equations reducible to Bessel's equation. (8)

Unit IV Partial Differential Equations:

Formation of partial differential equations,Linear partial differential equations, homogeneous partial differential equations with constant coefficients,Solution by the method of separation of variables. (8)

Unit V Functions of Complex Variable:

Limits, continuity and derivative of thefunction of complex variable, Analytic function, Cauchy-Riemann equations, conjugate functions, harmonic functions; Conformal Mapping: Definition, standard transformations, translation, rotation, inversion, bilinear. (6)

Suggested Readings / Books:

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

BTCS-305 OBJECT ORIENTED PROGRAMMING USING C++

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Internal Marks: 40
External Marks: 60
Total Marks: 100

Objectives: To understand the basic concepts of object oriented programming languages and to learn the techniques of software development in C++.

Object-Oriented Programming Concepts:
Introduction, comparison between procedural programmingparadigm and object-oriented programming 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. (5)

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. (4)

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. (4)

Pointers and Dynamic Memory Management:
Declaring and initializing pointers, accessing data throughpointers, 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**.** (6)

Constructors and Destructors:
Need for constructors and destructors, copy constructor, dynamicconstructors, explicit constructors, destructors, constructors and destructors with static members, initialize lists. (2)

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.(4)

Inheritance:
Introduction, defining derived classes, forms of inheritance, ambiguity in multiple and multipathinheritance, virtual base class, object slicing, overriding member functions, object composition and delegation, order of execution of constructors and destructors. (5)

Virtual functions & Polymorphism:
Concept of binding - early binding and late binding, virtual functions, pure virtual functions, abstract classes, virtual destructors. (3)

Exception Handling:
Review of traditional error handling, basics of exception handling, exception handlingmechanism, throwing mechanism, catching mechanism, reshowing an exception, specifying exceptions. (2)

Templates and Generic Programming:
Template concepts, Function templates, class templates, illustrativeexamples. (2)

Files:
File streams, hierarchy of file stream classes, error handling during file operations, reading/writing of files, accessing records randomly, updating files. (3)

Suggested Readings/ Books:

1. Lafore R., Object Oriented Programming in C++, Waite Group.
2. E. Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill.
3. R. S. Salaria, Mastering Object-Oriented Programming with C++, Salaria Publishing House.
4. BjarneStroustrup, The C++ Programming Language, Addison Wesley.
5. Herbert Schildt, The Complete Reference to C++ Language, McGraw Hill-Osborne.
6. Lippman F. B, C++ Primer, Addison Wesley.
7. Farrell- Object Oriented using C++,Cengage Learning.

BTEC-301 ANALOG DEVICES & CIRCUITS

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4 1 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

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. (6)

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, VBE and beta, Construction, Characteristics & applications of Junction Field Effect Transistor (JFET), UJT and MOSFET. (11)

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. (9)

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. (10)

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. (4)

Suggested Readings/ Books: ·

1. Electronic Devices & Circuits by Millman- Halkias, Tata Mcgraw Hill
2. Electronic Devices & Circuits Theory byBoylested, Pearson Education.
3. Electronic Fundamentals & Application, by J.D. Ryder, PHI.
4. Electronic Devices, by Floyd, Pearson Education.
5. Electronics Devices & Circuits by J.B.Gupta, Katson.

BTEC-302 ELECTRONICS MEASUREMENTS AND INSTRUMENTATION

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Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit I Fundamentals:

Generalized instrumentation system – Units and Standards, Calibration Methods, Standards of measurements, Classification of errors, error analysis. Static Characteristics- Accuracy, Precision, sensitivity, linearity, resolution, hysteresis, threshold, input impedance, loading effects etc.Dynamic Characteristics. (7)

Unit II Electronic Meters:

Electronic Analog voltmeter: DC voltmeters-Choppers type-DC amplifier, solid state voltmeter, Differential voltmeter, peak responding voltmeter, True RMS voltmeter, calibration of DC voltmeters. Digital Voltmeter:- Introduction, Ramp Techniques, dual slope, integrating type DVM, Successive approximation type DVM, Resolution and sensitivity of digital meters, general specification of a DVM. CRO's study of various stages in brief, measurement of voltage, current phase and frequency, special purpose oscilloscope. (8)

Unit III Measuring Instruments:

Principle of operation of galvanometer, PMMC, Moving Iron instruments, Resistance measurements using Wheatstone bridge, Kelvin Double Bridge, Ohm meter, AC bridges: Maxwell bridge, Maxwell wein bridge, Hey's Bridge, Schering Bridge, Anderson Bridge, Campbell Bridge. (8)

Unit IV Instrumentation for Generation and Analysis of Waveforms:

Signal generators: Fixed and variable AF oscillators, AF sine and square wave generator, Function generator: Square and pulse generator, Sweep generator, wave analyzer, harmonic distortion analyzer, spectrum analyzer, spectrum analysis. (5)

Unit V Storage and Display Devices:

Necessity of recorders, recording requirements, graphic recorders, strip chart recorders, magnetic tape recorders, digital tape recorders. Electronic indicating instruments, seven segment display, fourteen segmental display Nixie tube. (6)

Unit VI Transducers and DATA Acquisition Systems:

Strain gauge, LVDT, thermocouple, piezoelectric, crystal and photoelectric transducers and their applications. Data acquisition systems. (8)

Unit VII Telemetry:

Introduction, method of data transmission, types of telemetry systems and applications. (3)

Suggested Readings / Books:

1. Electrical and Electronic Measurements and Instrumentation, by K. Sawhney.
2. Electronic Instrumentation and Measurement Techniques, by D Cooper.
3. Electronic Instrumentation, by H.S. Kalsi, Tata McGraw Hill
4. Applied Electronics Instrumentation and measurement, David Buchla, Wayne Melachlan:
5. Electronics Measurement and Instrumentation,Oliver by B.H and Cag J.M. McGrawHill.
6. Element of Electronic Instrumentation &Measurment, by Carr, Pearson Education.
7. Electronic Measurments& Instrumentation, by Kishore, Pearson Education.
8. Process Control Systems and Instrumentation, Bartelt, Cengage Learning

BTEC-303: NETWORK ANALYSIS & SYNTHESIS

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Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit I

Circuit Concepts:

Introduction toIndependent and dependent sources, Loop and Mesh Analysis of D.C and A.C Networks, Network Theorems: Superposition, Thevenin's, Norton's, Maximum Power Transfer, Reciprocity &Tellegan Theorem. Applications of Theorems for the analysis of DC & AC network.(13)

Unit II

Steady Stae& Transient Analysis:

Introduction to Signals: Step Signal, Ramp Signal, Impulse Signal,Exponential Signal. Shifted Signals.Synthesis of Gate Signals & Triangular Signals in terms of Step & Ramp Signals. Unit ImpuseTrain.Laplace Transform of Functions& Signals, Inverse Laplace Transform. Application of Laplace Transform for finding transient and steady response of Networks subjected to different input signals like D.C Signal, Gate Signal, Triangular Signal. (12)

Unit III

Network Synthesis:

Network functions;Impedance and admittance functions, Transfer functions. Relationship between transfer & impulse response, poles and zeros and restrictions for network functions and transfer functions. Hurwitz Polynomail, Positive Real Functions. Realizability condition for synthesis of LC,RL and RC circuits, Foster and Cauer synthesis of LC, RL & RC networks. (11)

Unit IV

Passive Filters:

Classification of passive filters, characteristics impedance and propagation constant of pure reactive network, Ladder network, T-section, π-section, Pass bands and stop bands, Design of constant-K, m-derived filters & Composite filters. (9)

Suggested Readings/ Books:

1. Van Valkenberg, M.E., *Network Analysis and Synthesis*, PHI learning.
2. Mohan, Sudhakar Sham, *Circuits and Networks Analysis and Synthesis*, Tata McGraw Hill.
3. Chakraborty, Abhijit, *Circuit Theory*, 2nd Edition, DhanpatRai.
4. Chaudhury D. Roy, *Networks and Synthesis*, New Age International.
5. Edminister J.A., *Electric Circuits*,Tata McGraw Hill.
6. Iyer T.S.K.V., *Circuit Theory*, Tata McGraw Hill.

BTEC-304 LAB ANALOG DEVICES & CIRCUITS

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Internal Marks: 30
External Marks: 20
Total Marks: 50

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-305 ELECTRONIC MEASUREMENT & INSTRUMENTATION

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Internal Marks: 30
External Marks: 20
Total Marks: 50

1. Measurement of Inductance by Maxwell's Bridge.
2. Measurement of small resistance by Kelvin's Bridge.
3. Measurement of Capacitance by Schering Bridge.
4. Measurement of Frequency by Wein Bridge.
5. Measurement of medium resistance by Wheat Stone's Bridge.
6. Determination of frequency & phase angle using C.R.O.
7. To find the Q of a coil using LCR-Q meter.
8. To determine output characteristic of a LVDT and determine its sensitivity.
9. Study characteristics of temperature transducer like Thermocouple, Thermistor and RTD with implementation of small project using signal conditioning circuit.
10. Study characteristics of Light transducer like Photovoltaic cell, Phototransistor and Pin Photodiode with implementation of small project using signal conditioning circuit.
11. To study input- output characteristics of a potentiometer and to use two potentiometers as an error detector.
12. To study transmitter- receiver characteristics of a synchro set to use the set as control component.

BTCS-309 OBJECT ORIENTED PROGRAMMING USING C++ LAB

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Internal Marks: 30
External Marks: 20
Total Marks: 50

OBJECTIVES: Hands on experience of Object Oriented Programming Concepts with C++, Preparedness to study independently any other Object Oriented Programming language and apply to variety of real time problem scenarios

1. **[Classes and Objects]** Write a program that uses a class where the member functions are definedinside a class.
2. **[Classes and Objects]** Write a program that uses a class where the member functions are definedoutside 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 andparameterized 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 anddecrement 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 managementoperators.
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. Thename 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.
24. **[File Handling]** Write a program to demonstrate the reading and writing of objects.

COURSE OUTCOMES (CO): The student is expected to:

1. Conceptualize the given problem and transform it in to an Object Oriented system.
2. Implement coding standard and verification practices
3. Build expertise in Object Oriented programming language

Beant College of Engineering & Technology, Gurdaspur

Fourth Semester

BTEE- 402 LINEAR CONTROL SYSTEMS

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Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit I

Introductory Concepts:
Plant, Systems, Servomechanism, regulating systems, disturbances, Open loop control system, closed loop control systems, linear and non-linear systems, time variant and invariant, continuous and sampled-data control systems, Block diagrams, some illustrative examples. (2)

Unit II

Modeling:

Formulation of equation of linear electrical, mechanical, thermal, pneumatic and hydraulic system, electrical, mechanical analogies. Transfer function, Block diagram representation, signal flow graphs and associated algebra, characteristics equation. (8)

Unit III

Time Domain Analysis:

Typical test – input signals, Transient response of the first and second order systems. Time domain specifications, Dominant closed loop poles of higher order systems.Steady state error and coefficients, pole-zero location and stability, Routh-Hurwitz Criterion. (10)

Unit IV

Root Locus Technique:
The extreme points of the root loci for positive gain. Asymptotes to the loci, Breakaway points, intersection with imaginary axis, location of roots with given gain and sketch of the root locus plot. (9)

Unit V

Frequency Domain Analysis:
Closed loop frequency response, Bode plots, stability and loop transfer function. Frequency response specifications, Relative stability, Relation between time and frequency response for second order systems. Log. Magnitude versus Phase angle plot, Nyquist criterion for stability. (9)

Unit VI

Compensation:
Necessity of compensation, series and parallel compensation, compensating networks, applications of lag and lead-compensation. (4)

Unit VII
Control Components: Error detectors – potentiometers and synchros, servo motors, a.c. and d.c. techno generators, Magnetic amplifiers. (3)

Suggested Readings / Books

1. Dorf Richard C. and Bishop Robert H., Modern Control System, Addison –Wesley, Pearson New Delhi
2. Ogata K., Modern Control Engineering‖, Prentice Hall, □Kuo B. C., Automatic Control System‖, Prentice Hall
3. Nagrath I.J. and Gopal M., Control System Engineering, Wiley Eastern Ltd.
4. Singh / Janardhanan, Modern Control Engineering, Cengage Learning
5. Kilian, Modern Control Technology: Components and Systems, Cengage Learning

BTEC-401 ANALOG COMMUNICATION SYSTEMS

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4 1 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit I Base Band Signals and Systems:

Introduction, Elements of communication system, Noise & its types; Noise Figure & noise factor, Noise equivalent temperature. Modulation & Demodulation, Mixing; Linear & Nonlinear, need of modulation, types of modulation systems, basic transmission signals, Frequency multiplexing technique. (4)

Unit II Analog Modulation Techniques:

Introduction, theory of amplitude modulation; AM powercalculations, AM current calculations, AM modulation with a complex wave, theory of frequency modulation; mathematical analysis of FM, spectra of FM signals, narrow band of FM, Wide band FM, Theory of phasemodulation, phase modulation obtained from frequency modulation, comparison of AM & FM, Comparison of PM & FM. (5)

Unit III AM Transmission & Reception:

Introduction, generation of Amplitude Modulation, Low level and high level modulation, basic principle of AM generation; square law modulation, Amplitude modulation in amplifier circuits, suppressed carrier AM generation (Balanced Modulator) ring Modulator, Product Modulator/balanced Modulator.

Receiver Parameters; Selectivity, Sensitivity, Fidelity, Tuned Ratio Frequency (TRF) Receiver, Super heterodyne Receiver; Basic elements of AM super heterodyne Receiver; RF Amplifier, Neutralization of RF Amplifiers, Class of operation of RF Amplifiers, High power RF Amplifiers, Image Frequency Rejection, Cascade RF Amplifier, methods of increasing Bandwidth, frequency Conversion and Mixers; Additive Mixing, Bipolar Transistor Additive Mixer, self exicted Additive Mixers, multiplicative mixing, Multiplicative Mixer using dual gate MOSFET, Tracking & Alignment, IF Amplifier, AM detector; square law detector, Envelope or Diode detector, AM detector with AGC, Distortion in diode detectors, AM detector Circuit using Transistor, Double hetro-dyne receiver, AM receiver using a phase locked loop (PLL), AM receiver characteristics. (13)

Unit IV FM Transmission & Reception:

FM allocation standards, generation of FM by direct method, varactor diode Modulator, Cross by Direct FM Transmitter, Phase-Locked-Loop Direct FM Transmitter, Indirect generation of FM; Armstrong method, RC phase shift method, Frequency stabilised reactance FM transmitter.

Frequency demodulators, Tuned circuit frequency discriminators; Slope Detector, Balance Slope Detector, Foster Seeley discriminator, Ratio Detector, FM detection using PLL, Zero crossing detector as a Frequency Demodulator, quadrature FM demodulator, pre emphasis and de

emphasis, limiter circuits, FM Capture effect, FM receiver, FM stereo transmission and reception, Two way FM Radio Transmitter and Receiver. (9)

Unit V SSB Transmission & Reception:

Introduction, Single Side band systems, AM-SSB; Full carrier, Suppressed carrier , reduced carrier, Independent side band, and Vestigial side band, Comparison of SSB Transmission to conventional AM, Generation of SSB; Filter method, Phase Shift Method, Third Method. SSB Product Demodulator, Balanced Modulator as SSB Demodulator, Single Side band receivers; Single side band BFO Receivers, Coherent Single side band BFO Receivers, Single Side band Envelop detection receiver, Multi Channel Pilot Carrier SSB Receiver. (9)

Unit VI Pulse Modulation Transmissions and Reception:

Introduction, Sampling Theorem Pulse Amplitude Modulation (PAM), Natural PAM Frequency Spectra for PAM , Flat-top PAM, Sample and hold circuits, Time division Multiplexing, PAM Modulator Circuit, Demodulation of PAM Signals, Pulse Time Modulation (PTM); Pulse Width Modulation(PWM), Pulse Position Modulation (PPM), PPM Demodulator. (5)

Suggested / Recommended Books:

1. Electronic communication Systems by Kennedy & Davis, Tata Mcgraw Hill.
2. Analog Communication Systems by Manoj Kumar &Manisha, SatyaPrakashan, New Delhi, 2nd Edition.
3. Electronic Communication System, Tomasi, Pearson Education.
4. Electronic Communication, Roddy, Pearson Education.
5. Analog Communication Systems by SymonHykens, John Wiley &Sons .
6. Principles of Communication System, Taub& Schilling, Tata Mc-Graw Hill.

BTEC-402: PULSE WAVE SHAPING AND SWITCHING

L T P

Internal Marks: 40
External Marks: 60
Total Marks: 100

3 1 0

Unit I: Introduction to Basic Elements and Waveforms:
Passive and Active circuit elements, AC through inductor and capacitor, AC through Resistor-inductor and resistor- capacitor in series, Series and parallel resonance circuit, Different input signals, Average and RMS value. (6)

Unit II: Linear Wave Shaping:
Low pass RC Network, Response to standard waveforms circuits, Integrator High Pass RC circuits, Response to standard waveforms, Differentiator, Double differentiation, Attenuator.(7)

Unit III: Switching Characteristics of Devices:
Diode and transistor as electronic switch, Breakdown mechanism in diode, Effect of temperature on diode, Charge storage phenomena, Switching times in diode and transistor, Delay time, Rise time, Storage time and fall time, Use of Schotkey diode for reducing storage time. (5)

Unit IV: Non-Linear Wave Shaping:
Clipping circuits (diode & transistor), Diode comparators, Transistor differential comparator, clamping circuits, Practical clamping circuit, clamping circuit theorem. (7)

Unit V: Bi-stable Multi-vibrators:
Role of feedback in electronic circuits, Fixed bias and self-bias bi-stable multi-vibrator, Speed-up Capacitors, unsymmetrical and symmetrical triggering, Application of Trigger input at the base of OFF Transistor, Application of Trigger input at the base of ON Transistor, Bi-stable multi-vibrator as T Flip-Flop, Schmitt trigger circuit, Calculation of Upper Tripping Point and Lower Tripping Point. (8)

Unit VI: Mono-stable and A-stable Multi-vibrators:
Collector Couple and Emitter Coupled Mono-stable multi-vibrator, Expression for Gate width, A-stable Collector coupled and emitter coupled multi-vibrator, complementary Transistor A-stable multi-vibrator. (7)

Recommended Text Books:

1. Pulse and Digital Switching Circuits by Milliman, Taub; Tata Mcgraw Hill
2. Pulse and Digital Circuits by Mothiki S. Prakash Rao; Tata Mcgraw Hill
3. Pulse & Digital Circuits, by Rao K, Pearson Education.
4. Switching Theory & Logic Design, by Rao , Pearson Education.
5. Wave Generation and Shaping by Strauss McGraw Hill.
6. Pulse and Switching Circuits by Sanjeev Kumar; Dhanpat Rai & Company

BTEC-403 DIGITAL CIRCUIT & LOGIC DESIGN

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

Unit-I Number System and Binary Code: Introduction, Binary, Octal, Decimal 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. (06)

Unit-II Minimization of logic function: OR, AND,NOT,NOR,NAND,EX-OR, EX-NOR Gates, basic theorem of boolean algebra, sum of products and product of sums, canonical form, minimization using K-map and Q-M. (06)

Unit-III Combinational Circuits: Introduction, combinational circuit design, encoders, decoders, adders, subtractors and code converters, parity checker, seven segment display, magnitude comparators, multiplexers, de-multiplexer. Implementation of combinational circuit using MUX. (06)

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. (06)

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. (06)

Unit-VI Semiconductor Memories: Introduction, memory organisation, classification and characteristics of memories, sequential memories, ROMs, R/W memories. content addressable memories. PLA and PAL. (06)

Unit-VII Logic Families: Introduction to RTL, DTL, TTL, ECL, CMOS, comparison of logic families. (04)

Suggested Readings / Books:

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

BTEC-404 LINEAR INTEGRATED CIRCUIT

L T P
4 1 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

UNIT I: DIFFERENTIAL AND CASCADE AMPLIFIERS:

Introduction, Differential Amplifier, Differential Amplifier Circuit Configuration, Dual Input-Balanced output Differential Amplifier, Dual Input-Unbalanced output Differential Amplifier, Single Input-Balanced output Differential Amplifier, Single Input-unbalanced output Differential Amplifier with their DC and AC analysis, Differential Amplifier with swamping resistors, Constant current bias, Current Mirror, Cascaded differential Amplifier Stages, Level Translator, CE-CB configuration. (7)

UNIT II : INTRODUCTION TO OPERATIONAL AMPLIFIERS:

Block diagram of a typical Op-Amp, Schematic symbol, integrated circuits and their types, IC package types, Pin Identification and temperature range, Interpretation of data sheets, Overview of typical set of data sheets, Characteristics and performance parameters of and Op-Amp, Ideal Op-Amp, Equivalent circuit of an Op-Amp, Ideal voltage transfer curve, Open loop configurations : Differential, Inverting & Non Inverting. Practical Op-Amp: Input offset voltage, Input bias current, Input offset current, total output offset voltage, Thermal drift, Effcet of variation in power supply voltages on offset voltage, Change in Input offset voltage and Input offset current with time, Temperature and supply voltage sensitive parameters, Noise, Common Mode configuration and common mode rejection Ratio. Feedback configurations. (15)

UNIT III: APLICATIONS OF OP-AMP:

DC and AC amplifiers, Peaking Amp, Summing, Scaling and Averaging Amp, Instrumentation Amplifier, V to I and I and to V converter, Log and Antilog Amp, Integrator, Differentiator. Active filters: First order LP Butterworth filter, Second order LP Butterworth filter, First order HP Butterworth filter, Second order HP Butterworth filter, Higher order filters, Band pass filter, Band reject filters, All pass filter, Phase shift oscillator, Wein bridge oscillator, Quadrature oscillator, Square wave generator, Triangular wave generator, Sawtooth wave generator, Voltage controlled oscillator, Basic comparator, Zero crossing detector, Schmitt trigger, window detector, V to F and F to V converters, A to D and D to A converters, Peak Detector, Sample and Hold Circuit. (15)

UNIT IV : SPECIALIZED IC APPLICATIONS:

IC 555 Timer: Pin configuration, Block diagram, application of IC 555 as Monostable and AstableMultivibrator., Phase Lock Loops: Operating principles & applications of IC 565, Voltage Regulators: Fixed voltage regulators, Adjustable voltage regulators, Switching Regulators. (8)

Suggested Readings / Books

1. Op Amps & Linear Integrated circuits by RamakantGayakwad.
2. Op Amps & Linear Integrated circuits by Coughlin
3. Op Amps & Linear Integrated circuits by Ravi Raj Dudeja.

BTEC-405 LAB ANALOG COMMUNICATION SYSTEMS

L T P
0 0 2

Internal Marks: 30
External Marks: 20
Total Marks: 50

1. Generation of DSB & DSB-SC AM signal using balanced modulator & determine modulation Index & detection of DSB using Diode detector.
2. Generation of SSB AM signal & detection of SSB signal using product detector.
3. To generate a FM Signal using Varactor& reactance modulation.
4. Detection of FM Signal using PLL & foster seelay& resonant detector.
5. To Study Super heterodyne AM receiver and measurement of receiver parameters viz. sensitivity, selectivity & fidelity.
6. To study the circuit of PWM & PPM modulator & Demodulator
7. Study of Frequency Division Multiplexing / Demultiplexing with sinusoidal & audio inputs Using DSBSC.
8. Generation & study of Analog TDM at least 4 channels.
9. Sampling Theorem & Reconstruction of Signal from its samples using Natural Sampling, Flat Top Sampling & Sample & Hold Circuits & effect of duty cycle.
10. To study the circuit of PAM modulator & Demodulator

BTEC-406 LAB DIGITAL CIRCUIT & LOGIC DESIGN

L T P
0 0 2

Internal Marks: 30
External Marks: 20
Total Marks: 50

Note :

(a) A student is required to perform at-least ten experiments.
(b) The Lab teacher may introduce new experiments as per the need of the course.

List of Experiments:

1. Truth-table verification of OR, AND, NOT, XOR, NAND and NOR gates.
2. Realization of OR, AND, NOT and XOR functions using universal gates.
3. Realization of half adder / full adder using logic gates.
4. Realization of half subtractor / full subtractor using logic gates.
5. Design a 4-bit binary-to-gray & gray-to-binary code converter.
6. Design a 4-bit magnitude comparator using logic gates.
7. Truth-table verification and realization of half adder and full adder using MUX.
8. Truth-table verification and realization of half subtractor and full subtractor using DEMUX.
9. Truth-table verification of RS, JK , D & T flip flops.
10. Design a MOD-7 synchronous up-counter using JK/RS/D/T flip flops.
11. Study shift right /left operations SIPO, SISO, PIPO & PISO of a universal shift register.
12. Study the operations of D/A converter and A/D converters.

BTEC-407 LAB LINEAR INTEGRATED CIRUIT

L T P
0 0 2

Internal Marks: 30
External Marks: 20
Total Marks: 50

List of Experiments:

1. To study differential amplifier configurations.
2. To measure the performance parameters of an Op amp.
3. Application of Op amp as Inverting and Non Inverting amplifier.
4. To study frequency response of an Op Amp
5. To use the Op-Amp as summing, scaling & averaging amplifier.
6. To use the Op-Amp as Instrumentation amplifier
7. Design differentiator and Integrator using Op-Amp.
8. Application of Op Amp as Log and Antilog amplifier. Design Low pass, High pass and Band pass 1st order butterworth active filters using Op Amp.
9. Design Phase shift oscillator using Op-Amp.
10. Design Wein Bridge oscillator using Op-Amp.
11. Application of Op Amp as Sawtooth wave generator.
12. Application of Op Amp as Zero Crossing detector and window detector.
13. Application of Op Amp as Schmitt Trigger.
14. Design a delay circuit using 555.
15. To examine the operation of a PLL and to determine the free running frequency, the capture range and the lock in range of PLL.