S Y L L A B U S

BACHELOR OF TECHNOLOGY

ELECTRONICS & COMMUNICATION

(Semester Scheme)

Four Year Degree Course

B.Tech., Second Year Examination, 2010 / 2011
B.Tech., Third Year Examination, 2011 / 2012
B.Tech., Fourth Year Examination, 2012 / 2013

JODHPUR NATIONAL UNIVERSITY
JODHPUR

Jodhpur National University, Jodhpur

Teaching & Examination Scheme

B.Tech II Year (Electronics & Communication Engg.)

III Semester

Course Code	Subject	Hrs./Week			Max. Marks		
		L	T	P	Exam	Int. A.	Total
A. Theory Paper							
EC-301	Advanced Engg. Mathematics –I	3	1	-	80	20	100
EC-302	Electronic Devices & Circuit – I	3	1	-	80	20	100
EC-303	Circuit Analysis & Synthesis	3	1	-	80	20	100
EC-304	Digital Electronics	3	1	-	80	20	100
EC-305	Electronic Measurements & Instrumentation	3	1	-	80	20	100
EC-306	Data Structures & Algorithms	3	0	-	80	20	100
GE 307 *	Special Mathematics-I**	3	1	-	80*	20*	100*
B. Practical & Sessional							
EC-307	EDC- I Lab	-	-	3	40	60	100
EC-308	DE Lab	-	-	3	40	60	100
EC-309	EMI Lab	-	-	2	40	60	100
EC-310	DSA Lab	-	-	2	40	60	100
	Grant Total	**21**	**5**	**10**	**640**	**360**	**1000**
	Co- Curricular Activity	Grade shall be awarded : A – Out Standing, B – Very Good, C – Good, D – Fair and E - Poor					

Jodhpur National University, Jodhpur

Teaching & Examination Scheme

B.Tech II Year (Electronics & Communication Engg.)

IV Semester

Course Code	Course Title	Hrs./Week			Max. Marks		
		L	T	P	Exam	Int. A.	Total
A. Theory Paper							
EC-401	Advanced Engg. Mathematics – II	3	1	-	80	20	100
EC-402	Electronic Devices & Circuit - II	3	1	-	80	20	100
EC-403	Electro Magnetic Field Theory	3	1	-	80	20	100
EC-404	Microprocessor & Interfaces	3	1	-	80	20	100
EC-405	Transmission Line Theory & Application	3	1	-	80	20	100
EC-406	Object Oriented Prog.	3	-	-	80	20	100
GE-407 *	Special Mathematics-II**	3	1	-	80*	20*	100*
A. Practical & Sessional							
EC-407	EDC – II Lab	-	-	3	40	60	100
EC-408	Microprocessor Lab	-	-	2	40	60	100
EC-409	OOPs Lab	-	-	2	40	60	100
EC-410	Electronic workshop	-	-	3	40	60	100
	Grant Total	**21**	**5**	**10**	**640**	**360**	**1000**
	Co- Curricular Activity	Grade shall be awarded : A – Out Standing, B – Very Good, C – Good, D – Fair and E - Poor					

** Sessional Exam: marks shall not be counted for awarding division.

Jodhpur National University, Jodhpur

Teaching and Examination Scheme
III B. Tech. Electronics & Communication Engineering (4 Year Course)

V Semester

Course Code	Course Title	Hrs./Week			Max. Marks		
		L	T	P	Exam	Int. A.	Total
Theory Paper							
EC-501	Signals & Systems	3	1	-	80	20	100
EC-502	Linear Integrated Ckts.	3	1	-	80	20	100
EC-503	Telecommunication Engg.	3	-	-	80	20	100
EC-504	Analog Communication Theory	3	1	-	80	20	100
EC-505	Microwave Engg. – I	3	-	-	80	20	100
EC-506 EC-506.1 EC-506.2 EC-506.3	**Elective** Biomedical Instrumentation Intellectual Property Right Advance Data Structure	3	-	-	80	20	100
Practical & Sessional							
EC-507	Signal & System Lab (MatLab)	-	-	2	40	60	100
EC-508	Communication Lab	-	-	3	40	60	100
EC-509	Microwave Engg Lab	-	-	3	40	60	100
EC-510	Electronics Engg Design Lab	-	-	2	40	60	100
	Grant Total	18	3	10	**640**	**360**	**1000**
	Co- Curricular Activity	Grade shall be awarded : A – Out Standing, B – Very Good, C – Good, D – Fair and E - Poor					

Jodhpur National University, Jodhpur

Teaching and Examination Scheme
III B. Tech. Electronics & Communication Engineering (4 Year Course)

VI Semester

Course Code	Course Title	Hrs./Week			Max. Marks		
		L	T	P	Exam	Int. A.	Total
Theory Paper							
EC-601	Microwave Engg. –II	3	-	-	80	20	100
EC-602	Advanced Microprocessor	3	-	-	80	20	100
EC-603	Industrial Electronics	3	-	-	80	20	100
EC-604	Digital Communication	3	1	-	80	20	100
EC-605	Control System	3	1	-	80	20	100
EC-606 EC-606.1 EC-606.2 EC-606.3	**Elective (any one of the following)** Neural Networks Parallel Computing & Computer Architecture Optimization Tech.	3		-	80	20	100
Practical & Sessional							
EC-607	Digital Communication Lab	-	-	3	40	60	100
EC-608	Advanced Microprocessor Lab	-	-	3	40	60	100
EC-609	Humanity	-	-	3	40	60	100
EC-610	Industrial Electronics Lab	-	-	2	40	60	100
	Grant Total	18	2	11	**640**	**360**	**1000**
	Co- Curricular Activity	Grade shall be awarded : A – Out Standing, B – Very Good, C – Good, D – Fair and E - Poor					

Jodhpur National University, Jodhpur

Teaching and Examination Scheme
IV B. Tech. Electronics & Communication Engineering (4 Year Course)

VII Semester

Course Code	Course Title	Hrs./Week			Max. Marks		
		L	T	P	Exam	Int. A.	Total
Theory Paper							
EC-701	Antenna & Wave Propagation	3	1	-	80	20	100
EC-702	Digital Signal Processing	3	1	-	80	20	100
EC-703	Wireless Communications	3	1	-	80	20	100
EC-704	IC Technology	3	-	-	80	20	100
EC-705	VLSI Design	3	1	-	80	20	100
EC-706 EC-706.1 EC-706.2 EC-706.3	**Elective (any one of the following)** Artificial Intelligence & Expert System Image Processing & Pattern Recognition Multi Media	3	-	-	80	20	100
Practical & Sessional							
EC-707	DSP Lab	-	-	3	60	40	100
EC-708	Wireless Communications Lab	-	-	3	60	40	100
EC-709	Practical Training Seminar	-	-	2	60	40	100
EC-710	Project Stage – I	-	-	2	60	40	100
	Grant Total	18	4	10			
						Grant Total	**1000**
	Discipline & extra Curricular Activity	Grade shall be awarded : A – Out Standing, B – Very Good, C – Good, D – Fair and E - Poor					

Jodhpur National University, Jodhpur

Teaching and Examination Scheme
IV B. Tech. Electronics & Communication Engineering (4 Year Course)

VIII Semester

Course Code	Course Title	Hrs./Week			Max. Marks		
		L	T	P	Exam	Int. A.	Total
Theory Paper							
EC-801	Computer Networks	3	1	-	80	20	100
EC-802	Radar & TV Engineering	3	1	-	80	20	100
EC-803	Optical Communication	3	1	-	80	20	100
EC-804 EC-804.1 EC-804.2 EC-804.3	**Elective (any one of the following)** VHDL Microcontroller and Embedded Systems Satellite Communication	3	-	-	80	20	100
Practical & Sessional							
EC-805	Computer Network Programming Lab	-	-	3	40	60	100
EC-806	Industrial & Economic Management	-	-	2	40	60	100
EC-807	VLSI & Optical Communication Lab	-	-	3	40	60	100
EC-808	Project Stage – II	-	-	3	80	120	200
EC-809	Topic Seminar	-	-	3	40	60	100
		12	3	13			
						Grant Total	**1000**
	Discipline & extra Curricular Activity	Grade shall be awarded : A – Out Standing, B – Very Good, C – Good, D – Fair and E - Poor					

205 FUNDAMENTAL OF ELECTRONICS ENGG.

Teaching Hrs. **Exam. Hrs. – 3 Hrs.**
L-3 T-0 P-0 **Marks Theory Exam -80 Term Test – 20 Total 100**

CONTENTS OF SYLLABUS

Unit	Topics	Details of Coverage	
I	**Passive Components:**		
	• **Resistors:**	Concepts of fixed & variable resistors, metal film resistors, construction, power rating, tolerance, colour code, standard values, wire wound resistors, fixed & variable, construction, power rating & tolerance. different types.	
	• **Capacitors:**	Construction of mica and ceramic capacitors (disc & tubular), colour code, electrolytic (Teflon) capacitors, typical range of values and voltage ratings of different types of capacitors.	
	• **Inductors:**	Construction of single layer, multilayer and variable inductors, principle of low power transformers.	
II	**Semi Conductor Devices:**		**Lectures Req: 8**
	• **Diode:**	PN junction diodes, typical doping concentration, formation of barrier potential, forward and reverse biasing. V-I characteristics, dynamic & static resistance, principle of working and V-I characteristics of Zener diode, principle of Photo diode, Solar cell, & LED	
	• **Rectifiers & Power supply:**	Block diagram description of a dc power supply, rectifying action of diodes. Circuit diagram & working of half-wave & full wave (including bridge) rectifier, final equations of Vrms, Vdc ripple factor & peak inverse voltage in each case, principle of working of series inductor and shunt capacitor filters, need of voltage regulator, working of simple zener voltage regulator.	
III	**Semi Conductor Devices:**		**Lectures Req: 8**
	• **Bipolar junction transistors:**	NPN & PNP transistors, structure, typical doping, working of NPN transistor, concepts of common base, common emitter & common collector configurations. Current gain, input & output characteristics of all configuration, concepts of Input & output resistances, comparison of three configurations with reference to voltage & current gain, input & output resistances**.**	
	• **Thyraster:**	Operation , construction & characteristics of 4 Layer Devices…UJT, SCR, DIAC, TRAIC & their application as voltage & current controller.	
IV	**Digital Electronics:**		**Lectures Req: 6**
	• **Binary Systems:**	Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, Complements, Binary Codes, Binary Logic Integrated Circuits	
	• **Boolean Algebra:**	Basic Definitions Axiomatic Definition of Boolean Algebra Basic Theorems and Properties of Boolean Algebra Boolean Function Digital Logic Gates	
	• **Logic Gates:**	Truth table and symbol of AND, OR, NOT, NAND, NOR and EX-OR gates, Half and Full Adders.	
V	**Communication System**		**Lectures Req: 8**
	• **Types of Signals:**	Analog and Digital Signals.	
	• **Communication System:**	Information, Transmitter, Channel, Noise & Receiver.	
	• **Modulation:**	General Concept of modulation, Need for modulation.	
	• **Amplitude Modulation:**	Defination, Modulation Index, Frequency spectrum of the AM wave, Representation of AM wave, Power content in AM wave.	
	• **Angle Modulation:**	Concept of Angle modulation, Defination of FM & PM, Frequency deviation, Mathematical representation of FM.	
	• **Bandwidth Requirements:**	Sinewave and Fourier series review, Frequency spectra of non-sinusoidal waves, like AM FM, and their bandwidth requirements	
	• **Television:**	Introduction to television, Block diagram, Television systems and standards.	
	• **Elementary concept of:**	Block Diagram Approach only with explanation of each block of Superheterodyne Receiver, Optical Fibre Communication System, Satellite Communications and Mobile Communications.	

Total Lectures: 36

Books:
1. Communication Theory by G Kennedy, TMH.
2. Electronics Devices & Ckts by V K Mehta
3. Digital Electronics by Morris Mano
4. Integrated Electronics by Miliman – Halkias, TMH
5. Roody – Collins

EC-301 ADVANCE ENGG. MATHEMATICS-I

Teaching Hrs. **Exam. Hrs. – 3 Hrs.**
L-3 T-1 **Marks Theory Exam -80 Term Test – 20 Total 100**

CONTENTS OF SYLLABUS

Unit	Topics	Details of Coverage
I	**LAPLACE TRANSFORM**	**Lectures Required:** Laplace transform with its simple properties, applications to the solution of ordinary and partial differential equations having constant co-efficient with special reference to the wave and diffusion equations.
II	**FOURIER SERIES & Z TRANSFORM**	**Lectures Required:** Expansion of simple functions in Fourier series. Half range series, Change of intervals, Harmonic analysis. Z TRANSFORM - Introduction, Properties, Inverse Z Transform.
III	**FOURIER TRANSFORM**	**Lectures Required:** Complex form of Fourier Transform and its inverse, Fourier sine and cosine transform and their inversion. Applications of Fourier Transform to solution of partial differential equations having constant co-efficient with special reference to heat equation and wave equation.
IV	**COMPLEX VARIABLES**	**Lectures Required:** Analytic functions, Cauchy-Riemann equations, Elementary conformal mapping with simple applications, Line integral in complex domain, Cauchy's theorem. Cauchy's integral formula.
V	**COMPLEX VARIABLES**	**Lectures Required:** Taylor's series Laurent's series poles, Residues, Evaluation of simple definite real integrals using the theorem of residues. Simple contour integration.

Recommended Books:

1. Chandrika Prasad:
   (a) Mathematics for Engineers : Prasad Mudralay.
   (b) Advanced Mathematics for Engineers: Prasad Mudralay.
2. B.S. Grewal - Higher Engineering Mathematics: Khanna Publication.
3. M. Ray, J.C.Chaturvedi & H.C.Saxena - A Text book of differential equation; Students Friends & Co.
4. J.N. Kappoor & H.C. Saxena - Mathematics; S.Chand & Co.
5. Gokhroo et al: Higher Engg Math - III Unique Books, Ajmer.
6. Gaur & Kaul - Engineering Mathematics Vol 1 & 11; J PH.
7. Johnson - Probability and statistics for Engineers Pearson education.

EC-302 - ELECTRONIC DEVICES & CIRCUITS - I

Teaching Hrs. **Exam. Hrs. – 3 Hrs.**
L-3 T-1 **Marks Theory Exam -80 Term Test – 20 Total 100**

CONTENTS OF SYLLABUS

Unit	Topics	Details of Coverage
I	**Semiconductors**	**Lectures Required:** Review of band theory of solids, intrinsic semiconductors, generation & recombination of electrons & holes, thermal equilibrium. Doped semiconductors n + P types Fermi level and carrier concentrations of n and P type semiconductors. Carrier mobility & conductivity, diffusion, continuity equation. Hall effect and its application.
II	**Semiconductors diodes**	**Lectures Required:** Band structure of P-n junction, quantitative theory of p-n diode. Volt ampere characteristics and its temperature dependence. Load-line concept. Transition & diffusion capacitance of p-n junction diodes. Breakdown of junction on reverse-bias. Zener & avalanche breakdowns. Clipping & clamping circuits, voltage multipliers.
III	**Junction Transistor**	**Lectures Required:** Transistor as a device in CB, CE and CC configurations & their characteristics Current components. Current gains: alpha and beta, operating point. Hybrid model, h-parameter equivalent circuits. Ebers-moll model. Biasing & Stablisation techniques. Thermal runaway, thermal stability. DC and AC analysis of CE, CB & CC amplifier transistor.
IV	**Field Effect Transistors**	**Lectures Required:** JFET, & its characteristics, MOSFET: enhancement, depletion modes. Equivalent circuits and biasing of JFET's & MOSFET's. low frequency CS and CD JFET amplifiers. FET as a voltage variable resistor.
V	**Small signal Amplifiers at Low Frequency**	**Lectures Required:** Analysis of BJT and FET, DC and RC coupled amplifiers frequency response mid band gain, gain as low and high frequency. miller's theorem. Cascading transistor amplifiers, Darlington pair, emitter follower, source follower. Analysis of DC and differential amplifier.

Recommended Books:

1. J. Millman & C.C. Halkias - Integrated Electronics; Tata Mc-Graw Hill. Pearson Education.
2. Robert Boylestad & L. Nashelsky - Electronic Devices and Circuit Theory.
3. Floyd- Electronic Devices. Pearson Education.
4. Y.N. Bapat: Electronics Devices & Ckts, Discrete & Integrated.
5. S. Salivaachaner, A. Vallav Araj: Electronics Devices & Circuits Mc-Graw Hill

EC303- CIRCUIT ANALYSIS & SYNTHESIS

Teaching Hrs. **Exam. Hrs. – 3 Hrs.**
L-3 T-1 **Marks Theory Exam -80 Term Test – 20 Total 100**

CONTENTS OF SYLLABUS

Unit	Topics	Details of Coverage
I	**NETWORK THEOREMS AND ELEMENTS**	**Lectures Required:** Thevenin's, Norton's, Reciprocity, Superposition, Compensation, Miller's, Tellegen's and maximum power transfer theorems. Networks with dependent sources. Inductively coupled circuits – mutual inductance, coefficient of coupling and mutual inductance between portions of same circuits and between parallel branches. Transformer equivalent, inductively and conductively coupled circuits.
II	**TRANSIENTS ANALYSIS**	**Lectures Required:** Impulse, step, ramp and sinusoidal response Analysis of first order and second order circuits. Time domain & transform domain (frequency, Laplace) analysis. Initial and final value theorems. Complex periodic waves and their analysis by Fourier analysis. Different kind of symmetry. Power in a circuit.
III	**NETWORK FUNCTIONS**	**Lectures Required:** Terminals and terminal pairs, driving point impedance transfer functions, poles and zeros. Procedure of finding network functions for general two terminal pair networks. Stability & causality.
IV	**TWO PORT NETWORKS**	**Lectures Required:** Two port parameters and their interrelations – z-parameters, Yparameters, h-parameters, ABCD parameters. Equivalence of two ports, transformer equivalent, interconnection of two port networks. Image parameters. Attenuation & phase shift in symmetrical T and p networks.
V	**NETWORK SYNTHESIS**	**Lectures Required:** Hurwitz polynomial, positive real function, RL & RC networks synthesis, Foster First & Second form, Cauer forms.

Recommended Books:

1. Kuo, Franklin F.- Network analysis and synthesis, II ed, 1999 Jhon Wiley & Sons.
2. Desoer, C. And Kuh, E.S.- Basic circuit theory, Mc Graw Hill.
3. Van Valkenburg, M.E. - Network Analysis, Prentice Hall, India.
4. Schaum's Outline series on circuit analysis.
5. Hayt, W. and Kimmerly - Engineering circuit analysis, Mc Graw Hill, Inc.
6. Sudhakar, A and Shyam Mohan, S.P.-Circuits and Network, Tata Mc Graw Hil, India.

EC 304-DIGITAL ELECTRONICS

Teaching Hrs. **Exam. Hrs. – 3 Hrs.**
L-3 T-1 **Marks Theory Exam -80 Term Test – 20 Total 100**

CONTENTS OF SYLLABUS

Unit	Topics	Details of Coverage
I	**NUMBER SYSTEMS, BASIC LOGIC GATES & BOOLEAN ALGEBRA**	**Lectures Required:** Binary Arithmetic & Radix representation of different numbers. Sign & magnitude representation, complement notation, various codes & arithmetic in different codes & their inter conversion. Features of logic algebra, postulates of Boolean algebra. Theorems of Boolean algebra. Boolean function. Derived logic gates: Exclusive-OR, NAND, NOR gates, their block diagrams and truth tables. Logic diagrams from Boolean expressions and vica-versa. Converting logic diagrams to universal logic. Positive, negative and mixed logic. Logic gate conversion.
II	**DIGITAL LOGIC GATE CHARACTERISTICS**	**Lectures Required:** TTL logic gate characteristics. Theory & operation of TTL NAND gate circuitry. Open collector TTL. Three state output logic. TTL subfamilies. MOS & CMOS logic families. Realization of logic gates in RTL, DTL, ECL, C-MOS & MOSFET. Interfacing logic families to one another.
III	**MINIMIZATION TECHNIQUES**	**Lectures Required:** Minterm, Maxterm, Karnaugh Map, K map upto 4 variables. Simplification of logic functions with K-map, conversion of truth tables in POS and SOP form. Incomplete specified functions. Variable mapping. Quinn-Mc Klusky minimization techniques.
IV	**COMBINATIONAL SYSTEMS**	**Lectures Required:** Combinational logic circuit design, half and full adder, substractor. Binary serial and parallel adders. BCD adder. Binary multiplier. Decoder: Binary to Gray decoder, BCD to decimal, BCD to 7-segment decoder. Multiplexer, demultiplexer, encoder. Octal to binary, BCD to excess-3 encoder. Diode switching matrix. Design of logic circuits by multiplexers, encoders, decoders and demultiplexers.
V	**SEQUENTIAL SYSTEMS**	**Lectures Required:** Latches, flip-flops, R-S, D, J-K, Master Slave flip flops. Conversions of flip-flops. Counters : Asynchronous (ripple), synchronous and synchronous decade counter, Modulus counter, skipping state counter, counter design. Ring & Johnson counter. Counter applications. Registers: buffer register, shift register. Mealy & moore Machines.

Recommended Books:

1. A.P. Malivno & D.P. Leach-Digital Principles & Applications, Tata Mc-Graw Hill, Delhi.
2. Morris Mano- Digital Circuit & Logic Design; Prentice of India.
3. Tocci- Degital Systems, Pearson Education.
4. Green- Digital Electronics, Pearson Education
5. Mano - Digital Design, Pearson Education.
6. Bartee - Digital Computer Fundamentals, Tata Mc Graw Hill

EC305- ELECTRONIC MEASUREMENTS & INSTRUMENTATION

Teaching Hrs. **Exam. Hrs. – 3 Hrs.**
L-3 T-1 **Marks Theory Exam -80 Term Test – 20 Total 100**

CONTENTS OF SYLLABUS

Unit	Topics	Details of Coverage
I	**THEORY OF ERRORS**	**Lectures Required:** Accuracy & precision, Repeatability, Limits of errors, Systematic & random errors Modeling of errors, Probable error & standard deviation, Gaussian error analysis, Combination of errors.
II	**ELECTRONIC INSTRUMENTS FOR MEASURING BASIC PARAMETERS**	**Lectures Required:** Electronic Voltmeter, Electronic MultiMeter, Digital Voltmeter, Component Measuring Instruments, Q meter, Vector Impedance meter, RF Power & Voltage Measurements. Measurement of frequency. Introduction to shielding & grounding
III	**OSCILLOSCOPES**	**Lectures Required:** CRT Construction, Basic CRO circuits, CRO Probes, Oscilloscope Techniques of Measurement of frequency, Phase Angle and Time Delay, Multibeam, multi trace, storage & sampling Oscilloscopes. Curve tracers.
IV	**SIGNAL GENERATION**	**Lectures Required:** Sine wave generators, Frequency synthesized signal generators, Sweep frequency generators. Signal Analysis - Measurement Technique, Wave Analyzers, Frequency - selective wave analyser, Heterodyne wave analyser, Harmonic distortion analyser, Spectrum analyser.
V	**TRANSDUCERS**	**Lectures Required:** Classification, Selection Criteria, Characteristics, Construction, Working Principles, Application of following Transducers- RTD, Thermocouples, Thermistors, LVDT, RVDT, Strain Gauges, Bourdon Tubes, Bellows. Diaphragms, Seismic Accelerometers, Tachogenerators, Load Cell, Piezoelectric Transducers, Ultrasonic Flow Meters.

Recommended Books:

1. H.S. Kalsi- "Electronic Inst. & Measurement, Tata Mc. Hill.
2. W.D. Cooper - "Electronic Inst. & Measurement Techniques, Prentice Hall of India.
3. A.K. Sawhney-"Electrical & Electronic Measurement & Inst. Dhanpat Rai & Sons.
4. F.E. Terman & J.M.Pettit- " Electronic Measurements". McGraw Hill Book Co.
5. S. Talbar & Upadhyay - Electronic Instrumentation, Dhanpat Rai Sons.

EC-306 DATA STRUCTURES & ALGORITHMS

Teaching Hrs. **Exam. Hrs. – 3 Hrs.**
L-3 T- **Marks Theory Exam -80 Term Test – 20 Total 100**

CONTENTS OF SYLLABUS

Unit	Topics	Details of Coverage
I	**PERFORMANCE MEASUREMENT**	**Lectures Required:** Space complexity and Time complexity, big oh, omega and theta notations and their significance. Linear Lists - Array and linked representation, Singly & Doubly linked lists. Concept of circular linked lists.
II	**ARRAY & MATRICES**	Row and Column Major mapping & representation, irregular 2D array, Matrix operations, Special matrices: diagonal, tri-diagonal, triangular, symmetric. Sparse matrices representation and its transpose.
III	**STACKS**	Representation in array & linked lists, basic operation, Applications of stacks in parenthesis matching, towers of Hanoi etc. Queues - Representation in array & linked lists, applications, circular queues.
IV	**TREES**	Binary Tree, representation in array & linked lists, basic operation on binary trees, binary tree traversal (preorder, post order, in order).Search Trees - Binary search tree, indexed-binary search tree, basic operation, AVL tree, B-tree.
V	**GRAPHS**	Representation of un weighted graphs, BFS, DFS, Minimum cost spanning trees, Single source shortest path. Sorting - Bubble sort, insertion sort, merge sort, selection sort, quick sort, heap sort.

Recommended Books:

1. Harowitz & Sawhni: Data Structure in Pascal (BPB Publication)
2. Harowitz & Sawhni: Data Structures in C & C++ (BPB Publication)
3. Langran, Augenstein & tenenbaum : Data structures using C & C++, Prentice Hall of India.
4. Trembly & Sovensen: Data structures (Mc Graw Hill International)
5. Ano AV, JE Horproft, JD Vilman - Data structures Algorithms (Addision Wesley) Pearson Education.
6. Kruse, Leung & Tondo: Data Structures & Program Design in C, Pearson Education.

GE 307* Special Mathematics** I

(Common for all branches CSE/ECE/IT/ME/CSE/CIVIL for Diploma Holders)

Teaching Hrs. Exam Hrs. 3 Hrs.
3L + 1T Total-100

Unit	Topics	
I	**Trigonometry**	Trigonometric functions, simple identities, range and values of trigonometric functions, inverse functions, De movier's theorem, Euler's theorem. **Lectures Req : 6**
II	**Basic Algebra**	Binomial theorem for positive and negative index, logarithmic and simple properties, exponential, Logarithmic and trigonometric series. **Lectures Req : 6**
III	**Differential Calculus:**	Function, single variable and multivariable function, polynomial, trigonometric, logarithmic and exponential fun's, derivative of a function, elementary formulae. **Lectures Req : 6**
IV	**Differential Calculus:**	Derivative of sum and difference of two functions, derivative of product and quotient of two functions, logarithmic differentiation, partial differentiation. **Lectures Req : 6**
V	**Integral Calculus:**	Integration of a function standard integrals and properties, integration by substitution, Integration by parts, definite integral and properties. **Lectures Req : 6**

Total Lectures Req : 30

**** It will be sessional paper: marks shall not be counted for awarding division.**

EC-307 ELECTRONICS DEVICES & CIRCUITS - I LAB

Teaching Hrs. **Exam. Hrs. – Practical**
P - 3 **Marks Practical Exam - 40 Sessional – 60 Total 100**

LIST OF EXPERIMENT

1. 1. Study the following Instrument:
   (a) Study of analog CRO, measurement of time period, amplitude, frequency & phase angle using. Lissajous figures.
   (b) Function/Signal generators.
   (c) Digital Multimiters.
2. (a) To study and draw V-I characteristics of junction diode (Ge, Si).
   (b) Also calculate cut-in voltage reverse saturation current, static & dynamic resistance.
3. (a) To study and draw reverse characteristics of zener diode.
   (b) Study of zener diode as voltage regulator observe the effect of load changes & load cionils of voltage regulations.
4. Application of diode as clipper and clamper.
5. To draw i/p and o/p characteristics of common-emitter transistor.
6. To draw i/p and o/p characteristics of common-base transistor.
7. To draw i/p and o/p characteristics of common-collector transistor.
8. To study the rectifier (half wave, full wave and bridge) and filter circuit. Also calculate theoretical & practical ripple factor for all configurations the.
9. To draw characteristics curve of JFET and measure of Idss & Vp
10. To draw characteristics curve of MOSFET
11. (a) To calculate the gain and plot the frequency response of single stage amplifier.
    (b) To calculate the gain & plot the frequency response of double stage RC coupled amplifier.

EC-308 DIGITAL ELECTORNICS LAB

Teaching Hrs. **Exam. Hrs. – Practical**

P - 3 **Marks Practicle Exam - 40 Sessional – 60 Total 100**

LIST OF EXPERIMENT

1. To study and perform the following experiments.
   (a) Operation of digital multiplexer and demultiplexer.
   (b) Binary to decimal encoder.
2. To study and perform experiment- Compound logic functions and various combinational circuits based on AND/NAND and OR/NOR Logic blocks.
   a. Half Adder & Full Adder
   b. Half Subtracter Full Subtracter
   c. Code Converter
3. To study and perform experiment -Digital to analog and analog to digital converters.
4. To study and perform experiment- Various types of counters and shift registers.
5. To study and perform experiment- BCD to binary conversion on digital IC trainer.
6. Design 2 bit binary up/down binary counter on bread board.

EC – 309 ELECTRONIC MEASUREMENT & INSTRUMENTATION LAB

Teaching Hrs. **Exam. Hrs. – Practical**

P - 2 **Marks Practical Exam - 40 Sessional – 60 Total 100**

LIST OF EXPERIMENT

1. Measure earth resistance using fall of potential method.
2. Plot V-I characteristics & measure open circuit voltage & short circuit current of a solar panel.
3. Measure unknown inductance capacitance resistance using following bridges
   (a) Anderson Bridge (b) Maxwell Bridge
4. To measure unknown frequency & capacitance using Wein's bridge.
5. Measurement of the distance with the help of ultrasonic transmitter & receiver.
6. Measurement of displacement with the help of LVDT.
7. Draw the characteristics of the following temperature transducers:
   (a) RTD (Pt-100) (b) Thermistors (c) Thermocouple
8. Draw the characteristics between temperature & voltage of a K type thermocouple.
9. Measure the speed of a Table Fan using stroboscope.
10. Measurement of strain/ force with the help of strain gauge load cell.
11. Study the working of Q-meter and measure Q of coils.
12. To study the working of Spectrum analyzer and determine the bandwidth of different signals.

EC – 310 DSA LAB

Teaching Hrs. **Exam. Hrs. – Practical**

P - 2 **Marks Practical Exam - 40 Sessional – 60 Total 100**

1. Simple array and sorting algorithm implementations.
2. Addition, multiplication and transpose of sparse matrices represented in array form.
3. Polynomial addition, multiplication (8th degree polynomials), using array & linked lists.
4. Implementation of stack and queue using array & linked lists.
5. Implementation of circular queue using array.
6. Infix to postfix/prefix conversion.
7. Binary search tree creation and traversing.
8. Generation of spanning trees for a given graph using BFS & DFS algorithms.
9. AVL tree implementation (creation, insertion, deletion).
10. Symbol table organization (Hash Table).

EC-401 ADVANCE ENGG MATHEMATICS-II

Teaching Hrs. **Exam. Hrs. – 3 Hrs.**
L-3 T-1 **Marks Theory Exam -80 Term Test – 20 Total 100**

CONTENTS OF SYLLABUS

Unit	Topics	Details of Coverage
I	NUMERICAL ANALYSIS	**Lectures Required:** Finite differences – Forward, Backward and Central differences. Newton's forward and backward differences, interpolation formulae. Stirling's formula, Lagrange's interpolation formula.
II	NUMERICAL ANALYSIS-INTEGRATION-	**Lectures Required:** Trapezoidal rule, Simpson's one third and three-eighth rules. Numerical solution of ordinary differential equations of first order - Picard's mathod, Euler's and modified Euler's methods, Miline's method and Runga-Kutta fourth order method., **Differentiation**
III	SPECIAL FUNCTIONS	**Lectures Required:** Bessel's functions of first and second kind, simple recurrence relations, orthogonal property of Bessel's , Transformation, Generating functions, Legendre's function of first kind. Simple recurrence relations, Orthogonal property, Generating function.
IV	STATISTICS AND PROBABILITY	**Lectures Required:** Elementary theory of probability, Baye's theorem with simple applications, Expected value, theoretical probability distributions-Binomial, Poisson and Normal distributions. Lines of regression, co-relation and rank correlation.
V	CALCULUS OF VARIATIONS	**Lectures Required:** Functional, strong and weak variations simple variation problems, the Euler's equation.

Recommended Books:

1. Chandrika Prasad
   (a) Mathematics for Engineers; Prasad Mudralaya
   (b) Advanced Mathematics for Engineers; Prasad Mudralaya
2. B.S. Grewal - Higher Engineering Mathematics; Khanna Pub.
3. Gaur & Kaul - Engineering Mathematics Vol. I & II; JPH

EC-402 – ELCTRONICS DEVICES & CIRCIUTS-II

Teaching Hrs. **Exam. Hrs. – 3 Hrs.**
L-3 T-1 **Marks Theory Exam -80 Term Test – 20 Total 100**

CONTENTS OF SYLLABUS

Unit	Topics	Details of Coverage
I	FEEDBACK AMPLIFIERS	**Lectures Required:** Classification, Feedback concept, Transfer gain with feedback, General characteristics of negative feedback amplifiers. Analysis of voltage-series, voltage-shunt, current-series and current-shunt feedback amplifier. Stability criterion.
II	OSCILLATORS	**Lectures Required:** Classification. Criterion for oscillation. Tuned collector, Hartley, Colpitts, RC Phase shift, Wien bridge and crystal oscillators, Astable, monostable and bistable Multivibrators. Schmitt trigger. Blocking oscillators.
III	HIGH FREQUENCY AMPLIFIERS	**Lectures Required:** Hybrid Pi model, conductance and capacitances of hybrid-Pi model, high frequency analysis of CE amplifier, gain-bandwidth product. Emitter follower at high frequencies.
IV	TUNED AMPLIFIER	**Lectures Required:** Band Pass Amplifier, Parallel resonant Circuits, Band Width of Parallel resonant circuit. Analysis of Single Tuned Amplifier, Primary & Secondary Tuned Amplifier with BJT & FET. Double Tuned Transformer Coupled Amplifier. Stagger Tuned Amplifier. Pulse Response of such Amplifier. Shunt Peaked Circuits for Increased Bandwidth.
V	POWER AMPLIFIERS	**Lectures Required:** Power amplifier circuits, Class A output stage, class B output stage and class AB output stages, class C amplifiers, push pull amplifiers with and without transformers. Complementary symmetry & quasi complimentary symmetry amplifiers

Recommended Books:

1. J. Millman & C.C. Halkias- Integrated Electronics; Tata Mc-Graw Hill.
2. Robert Boylestad & L. Nasheisky - Electronics Devices and Circuit Theory; Pearson Equation.
3. Sedra Smith- Microelectronics circuits, Oxford Press, India.

EC-403 ELECTROMAGNETIC FIELD THEORY

Teaching Hrs. **Exam. Hrs. – 3 Hrs.**
L-3 T-1 **Marks Theory Exam -80 Term Test – 20 Total 100**

CONTENTS OF SYLLABUS

Unit	Topics	Details of Coverage
I	**INTRODUCTION**	**Lectures Required:** Vector Relation in rectangular, cylindrical, spherical and general curvilinear coordinate system. Concept and physical interpretation of gradient, Divergence and curl, Green's & Stoke's theorems.
II	**ELECTROSTATICS**	**Lectures Required:** Electric field intensity & flux density. Electric field due to various charge configurations. The potential functions and displacement vector. Gauss's law. Poisson's and Laplace's equation and their solution. Uniqueness theorem. Continuity equation. Capacitance and electrostatics energy. Field determination by method of images. Boundary conditions. Field mapping and concept of field cells.
III	**MAGNETOSTATICS**	**Lectures Required:** Magnetic field intensity, flux density & magnetization, Faraday's Law, Bio-Savart's law, Ampere's law, Magnetic scalar and vector potential, self & mutual inductance, Energy stored in magnetic field, Boundary conditions, Analogy between electric and magnetic field, Field maping and concept of field cells.
IV	**TIME VARYING FIELDS**	**Lectures Required:** Displacement currents and equation of continuity. Maxwell's equations, Uniform plane wave in free space, dielectrics and conductors, skin effect sinusoidal time variations, reflection & refraction of Uniform Plane Wave, standing wave ratio. Pointing vector and power considerations.
V	**RADIATION, EMI AND EMC**	**Lectures Required:** Retarded Potentials and concepts of radiation, Radiation from a small current element. Radiation resistance**:** Introduction to Electromagnetic Interference and Electromagnetic compatibility, EMI coupling modes, Methods of eliminating interference, shielding, grounding, conducted EMI, EMI testing: emission testing, susceptibility testing.

Recommended Books:

1. Griffths- Introduction to Electrodynamics. (2/e Prentice Hall of India)
2. V.V. Sarwate- Electromagnetic fields and waves, Willey Eastern, Ltd.
3. J.D. Kraus- Electromagnetic, McGraw Hill.
4. W.H. Hayt Jr. - Engineering Electromagnetic, Tata McGraw Hill.
5. Cheng - Field & wave Electromagnetic, Pearson Edudation.

EC-404 MICROPROCESSOR & INTERFACES

Teaching Hrs. **Exam. Hrs. – 3 Hrs.**
L-3 T-1 **Marks Theory Exam -80 Term Test – 20 Total 100**

CONTENTS OF SYLLABUS

Unit	Topics	Details of Coverage
I	**INTRODUCTION**	**Lectures Required:** Introduction to microprocessor, microcomputer & micro controller & their comparison. CPU, address bus, data bus & control bus. Buffers encoders, latches memory mapping, memory interfacing. Comparison of different factures in 8085 & 8086.
II	**8085 MICROPROCESSOR ARCHITECTURE**	**Lectures Required:** Schematic & pin diagram of 8085. Functional work diagram of 8085. Internal data operations and registers. Demultiplexing of AD_0-AD_7. Generation of control signals
III	**8085 MICROPROCESSOR INSTRUCTIONS**	**Lectures Required:** Instruction Classification & its format. Timing diagrams. Addressing modes. Writing assembly language programme & debugging.
IV	**8085 MICROPROCESSOR INTERFACING**:	**Lectures Required:** Interrupts of 8085. Interrupt structure & its classification. Stack & subroutine. Stack initialization & instructions related to stack. Counter & delay & their calculations.
V	**INTRODUCTION TO 8051 MICROCONTROLLER**:	**Lectures Required:** 8255(PPI), 8253 (PIT), 8057 (DMA), 8259 (PIC), 8279 (Kay board Display Controller) chips and their application. . Writing the initialization instructions. Introduction to microcontroller (8051).

Reference Books:

1. Ramesh Gaonkar.
2. B. Ram
3. J.P. Ayala

EC - 405 TRANSMISSION LINE THEORY & APPLICATIONS

Teaching Hrs. **Exam. Hrs. – 3 Hrs.**
L-3 T- **Marks Theory Exam -80 Term Test – 20 Total 100**

CONTENTS OF SYLLABUS

Unit	Topics	Details of Coverage
I	TRANSMISSION LINE	**Lectures Required:** Types of transmission lines, general transmission line equation, line constant, equivalent circuits, infinite line, and reflection on ::1 line, SWR of line with different type of terminations. Distortion less and dissipation less lines, Coaxial cables, Transmission lines at audio and radio frequencies, Losses in transmission line,. Characteristics of quarter wave, half wave and lines of other lengths,
II	TRANSMISSION LINE APPLICATIONS	**Lectures Required:** Smith chart and its application. Transmission line applications, Impedance matching Network. Single & double Stub matching. Measurement of parameters of transmission line, measurement of attenuation, insertion loss, reflection coefficient and standing wave ratio.
III	ATTENUATORS & FILTERS	**Lectures Required:** Elements of telephone transmission networks, symmetrical and Asymmetrical two port networks. Different Attenuators, 7t-section & T -section attenuators, stub matching, Transmission equalizers Filters, constant K-section, Ladder type, 7t-section, T-section filter, m-derived filter sections, Lattices filter section.
IV	TELEPHONE TRANSMISSION	**Lectures Required:** Telephone set, Touch tone dial types, two *wire* four wire' transmission, Echo suppressors & cancellors, cross talk. Multi-channel systems: Frequency division & time division multiplexing
V	AUTOMATIC TELEPHONY & TELEGRAPHY	**Lectures Required:** Trunking concepts, Grade of service, Traffic definitions, Introduction to switching networks, classification of switching systems. Principle of Electronic Exchange, EPABX and SPC Digital telephone Exchange, Numberig Plan, Fascimile services.

EC-406 OBJECT ORIENTED PROGRAMMING

Teaching Hrs. **Exam. Hrs. – 3 Hrs.**
L-3 T-1 **Marks Theory Exam -80 Term Test – 20 Total 100**

CONTENTS OF SYLLABUS

Unit	Topics	Details of Coverage
I	OOP FUNDAMENTALS	**Lectures Required:** Concept of class and object, attributes, public, private and protected members, derived classes, single & multiple inheritance
II	PROGRAMMING IN C++	**Lectures Required:** Enhancements in C++ over C, Data types, operators and functions. Inline functions, constructors and destructors. Friend function, function and operator overloading. Working with class and derived classes. Single, multiple and multilevel inheritances and their combinations, virtual functions, pointers to objects. Input output flags and formatting operations. Working with text files.
III	JAVA	**Lectures Required:** Variation from C++ to JAVA. Introduction to Java byte code, virtual machine, application & applets of Java, integer, floating point, characters, Boolean, literals, and array declarations.
IV	OPERATORS AND CONTROL STATEMENTS	**Lectures Required:** Arithmetic operators, bit wise operators, relational operators, Boolean logic operators, the assignment operators, ?: operators, operator precedence. Switch and loop statements.
V	PACKAGE AND INTERFACES	**Lectures Required:** Packages, access protection, importing & defining packages. Defining and implementing interfaces.

Recommended Books:

1. Folk: File Structures : An Object Oriented Approach to C++, Pearson Education.
2. Patric Naughton: Java 2, Tata Mc-Graw Hill.
3. C Gottried: programming in C, Schaum Series, Tata Mc- Graw Hill.
4. Balaguruswamy: Object Oriented Programming in C++, Tata Mc - Graw Hill.
5. Booch G.: Object Orientd Analysis & Design, Benjamin- Commings.
6. Rumbaugh J. Et. al: Object Oriented Modelling & Design, Prentice Hall of India.
7. Deited: Java: How to Programme, Pearson Education.
8. Kelley : A Book on C. Pearson Education.

GE 407* Special Mathematics** II

(Common for all branches CSE/ECE/IT/ME/CSE/CIVIL for Diploma Holders)

Teaching Hrs. Exam Hrs. 3 Hrs.
3L + 1T Total-100

Unit	Topics	
I	**Differential equation of first Order**	Definition, order and degree of differential equation, Method of separation of variable, Homogeneous differential equation. **Lectures Req : 6**
II	**Differential equation of first Order**	Exact differential equation of first order, Reducible to exact form, Linear form, Reducible to linear form. **Lectures Req : 6**
III	**Differential equation of second Order**	Linear differential equation with constant coefficients, complementary function, particular integral **Lectures Req : 6**
IV	**Elementary Complex variable**	Complex Numbers, Real and imaginary parts of complex, complex conjugate, modulus and argument of complex number. Euler's theorem and De'moivre's theorem (only statement) polar form of complex number. **Lectures Req : 6**
V	**Matrices and Determinants**	Determinants and Matrices of order two and three properties of determinants, Evaluation of Determinants, Addition, Subtraction, Multiplication, Transpose, Adjoint and inverse of Matrix. **Lectures Req : 6**

Total Lectures Req : 30

**** It will be sessional paper: marks shall not be counted for awarding division.**

EC-407 ELECTRONICS DEVICES & CIRCUITS - II LAB

Teaching Hrs. **Exam. Hrs. – Practical**
P - 3 **Marks Practical Exam - 40 Sessional – 60 Total 100**

LIST OF EXPERIMENT

1. Plot gain-frequency characteristics of BJT amplifier with and without negative feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1kHz with and without negative feedback.
2. Study of series and shunt voltage regulators and measurement of line and load regulation and ripple factor.
3. Plot and study the characteristics of small signal amplifier using FET.
4. Study of push pull amplifier. Measure variation of output power & distortion with l load.
5. Study Wein bridge oscillator and observe the effect of variation in R & C on oscillator frequency
6. Study transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.
7. Study the following oscillators and observe the effect of variation of C on oscillator frequency:
   (a)Hartley
   (b) Colpitts
8. Design Fabrication and Testing of k-derived filters (LP/HP).
9. Study of a Digital Storage CRO and store a transient on it.
10. To plot the characteristics of UJT and UJT as relaxation.
11. To plot the characteristics of MOSFET and CMOS.

EC-408 MICROPROCESSOR LAB

Teaching Hrs. **Exam. Hrs. – Practical**
P - 3 **Marks Practical Exam - 40 Sessional – 60 Total 100**

LIST OF EXPERIMENT

1. To add true 8 bit nos & result may be (a) 7 bit (b) 16 bit.
2. To find largest of 2 nos , 3 nos & from array.
3. To find smallest of 2 nos , 3 nos & from array.
4. To transfer block of bytes from one set of memory location to another set of memory location (in same order (b) in reverse order.
5. To perform multi by to addition.
6. To perform multi by to subtraction.
7. To perform multi by to devisal addiction.
8. To generate 10 teems for fabonicci series.
9. To arrange gain data array in expending order.
10. To arrange gain data array in descending order.

EC - 409 OOPS LAB

Teaching Hrs. **Exam. Hrs. – Practical**
P - 3 **Marks Practical Exam - 40 Sessional – 60 Total 100**

LIST OF EXPERIMENT

Programs in C++

1. Write a program to perform the complex arithmetic.
2. Write a program to perform the rational number arithmetic.
3. Write a program to perform the matrix operations. (Transpose, addition, subtraction, multiplication, Test if a matrix is symmetric lower triangular/ upper triangular)
4. Implement Morse code to text conversion and vice-versa.
5. To calculate Greatest Common Divisor of given numbers.
6. To implement tower of Hanoi problem.

Program in Java

7. To implement spell checker using dictionary.
8. To implement a color selector from a given set of colors.
9. To implement a shape selector from a given set of shapes.
10. By mapping keys to pens of different colors, implement turtle graphics.
11. To implement a calculator with its functionality.
12. To implement a graph and display BFS/DFS order of nodes.

EC - 410 ELECTRONICS WORKSHOP

Teaching Hrs. **Exam. Hrs. – Practical**
P - 3 **Marks Practical Exam - 40 Sessional – 60 Total 100**

LIST OF EXPERIMENT

1. Identification, Study & Testing of various electronic components :
   (a) Resistances-Various types, Colour coding (b) Capacitors-Various types, Coding, (c) Inductors
   (d) Diodes (e) Transistors (f) SCRs (g) ICs (h) Photo diode (i) Photo transistor (j) LED (k) LDR
   (l) Potentiometers
2. Study of symbols for various Electrical & Electronic Components, Devices, Circuit functions etc.
3. To study and perform experiment on CRO demonstration kit.
4. Soldering & desoldering practice.
5. (a) To Design & fabricate a PCB for a Regulated power supply.
   (b) Assemble the Regulated power supply using PCB and test it.
6. To study and plot the characteristics of following Opto-Electronic devices –
   (a) LED (b) LDR (C) Photovoltatic cell (d) Opto-coupler
   (e) Photo diode (f) Photo transistor (g) Solar cell
7. To study the specifications and working of a Transistor radio kit and perform measurements on it.
8. To study the specifications and working of a Tape Recorder kit.
9. To prepare design layout of PCBs using software tools.
10. To fabricate PCB and testing of electronics circuit on PCB.
11. To design and test regulated power supply using ICs
12. To study the specifications and working of a VCD Player.
13. To study the specifications and working of color TV.