

DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

FACULTY OF ENGINEERING AND TECHNOLOGY

SECOND YEAR (EC/ECT/E&C/IE) ENGINEERING

Sr.No	Semester-I Subject Code	Contact Hrs/Week				Examination Scheme (Marks)					
		L	T	P	Total	CT	TH	TW	P	Total	Duration of Theory Examination
Part-I											
BSH201	Engineering Maths-III	4	-	-	4	20	80	-	-	100	3 Hrs.
EXD201	Electronic Devices & Circuits-I	4	-	-	4	20	80	-	-	100	3 Hrs.
EXD202	Network Analysis	4	-	-	4	20	80	-	-	100	3 Hrs.
EXD203	Communication Engineering	4	-	-	4	20	80	-	-	100	3 Hrs.
EXD204	Data Structure & Numerical Computations	4	-	-	4	20	80	-	-	100	3 Hrs.
EXD221	Lab-1 Electronic Devices & Circuits-I	-	-	2	2	-	-	-	50	50	
EXD222	Lab -2 Network Analysis	-	-	2	2	-	-	-	50	50	
EXD223	Lab-3 Communication Engg.	-	-	2	2	-	-	-	50	50	
EXD224	Lab-4 Data Structure & Numerical Computations	-	-	2	2	-	-	50	-	50	
EXD225	Lab-5 Electronic Workshop -I	-	-	2	2	-	-	50	-	50	
Total of Part - I		20		10	30	100	400	100	150	750	

L: Lecture hours per week

T: Tutorial Hours per week

P: Practical hours per week

CT: Class Test

TH: University Theory Examination

TW: Term Work

P: Practical / Oral Examination

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SECOND YEAR (EC/ECT/E&C/IE) ENGINEERING

Sr.No	Semester-II	Contact Hrs/Week				Examination Scheme (Marks)					
		L	T	P	Total	CT	TH	TW	P	Total	Duration of Theory Examination
Part-II (Second Term)											
BSH252	Engineering Math-IV	4	-	-	4	20	80	-	-	100	3 Hrs.
EXD251	Electronic Devices & Circuits-II	4	-	-	4	20	80	-	-	100	3 Hrs.
EXD252	Digital Logic Design	4	-	-	4	20	80	-	-	100	3 Hrs.
EXD253	Signals & Systems	4	-	-	4	20	80	-	-	100	3 Hrs.
EXD254	Electrical Machines & Instrumentation	4	-	-	4	20	80	-	-	100	3 Hrs.
EXD271	Lab-1 Electronic Devices & Circuits-II	-	-	2	2	-	-	-	50	50	
EXD272	Lab- 2 Digital Logic Design	-	-	2	2	-	-	-	50	50	
EXD273	Lab- 3 Signals & Systems	-	-	2	2	-	-	-	50	50	
EXD274	Lab-4 Electrical Machines & Instrumentation	-	-	2	2	-	-	50	-	50	
EXD275	Lab-5 Communication Skill	-	-	2	2	-	-	50	-	50	
Total of Part - II		20	-	10	30	100	400	100	150	750	

L: Lecture hours per week

T: Tutorial Hours per week

P: Practical hours per week

CT: Class Test

TH: University Theory Examination

TW: Term Work

P: Practical / Oral Examination

SEMESTER-I

BSH201: ENGINEERING MATHEMATICS-III

<u>Teaching Scheme</u>		<u>Examination Scheme</u>	
Theory	: 04 hrs/week	Theory Examination	: 80 Mark
		Class Test	: 20 Marks
Unit 1			
<u>Linear Differential Equations :</u>			06
Linear Differential Equations with constant coefficients General method, shortcut methods to find particular integral, Homogenous Linear differential equations (Cauchy's & Legendre's form), method of variation of parameters.			
Unit 2			
<u>Application of LDE:</u>			06
To Electrical circuits & to Mechanical system (Analogous study of two systems), To Civil Engineering, Free oscillations / vibrations, Forced oscillation /vibrations, Damped Free oscillations / vibrations, Damped Forced oscillations / vibrations.			
Unit 3			
<u>Statistics & Probability:</u>			08
Measures of Dispersion, Moments, coefficient of skewness and Kurtosis, Probability distribution for random variables, Binomial, Poisson and Normal distributions, Curve fitting: Principle of least squares, Fitting of linear curve, parabola, exponential curve.			
Unit 4			
<u>Vector Differentiation:</u>			06
Differentiation of vectors, Gradient of scalar point function, Directional derivative, Divergence of vector point function, Curl of a vector point function. Irrotational and solenoidal vector field.			
Unit 5			
<u>Vector Calculus (Integral calculus):</u>			06
The line integral, Surface integral, volume integral, Gauss Divergence theorem, Stoke's theorem, Green's theorem			
Unit 6			
<u>Numerical Methods:</u>			08
Solution of transcendental equations by Newton Raphson method, Gauss Seidel method to solve simultaneous linear equations, Lagranges Interpolation formula for unequal intervals, Numerical Differentiation: - Newton's forward and Newton's Backward difference formulae, Solution of ordinary differential equation by Euler's modified method, and Runge-Kutta IV th order method			

Text Books:

1. **A Text Book of Engineering Mathematics (Volume-I, II, III)** by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
2. **Higher Engineering Mathematics** by B. S. Grewal, Khanna Publications, New Delhi.
3. **Advanced Engineering Mathematics** by H.K. Das, S. Chand & Company.

Reference Books:

1. **Higher Engineering Mathematics** by B.V. Ramana (Tata McGraw-Hill).
2. **Advanced Engineering Mathematics by Erwin Kreyszig, Wiley Eastern Ltd.**
3. **Engineering Mathematics A Tutorial Approach** by Ravish R Singh, Mukul Bhat ,Mc Graw Hill

Section A: Unit 1, 2, 3

Section B: Unit 4,5,6

PATTERN OF QUESTION PAPER

Six units in the syllabus shall be divided in to equal parts i.e. three units in each part. Question paper shall be set having two sections A and B, as per weightage of units. Section A question shall be set on first part and section B on second part. Question paper should cover entire syllabus.

For 80 Marks papers:

- 1) Minimum 10 questions
- 2) Five questions in each section
- 3) Question no.1 from section A and question no.6 from section B having weightage of 10 marks each be made compulsory and should have atleast eight bits of two marks out of which five to be solved.
- 4) Two questions from remaining questions from each section A and B be asked to solve each having weightage of 15 marks

SEMESTER-I

EXD201: ELECTRONICS DEVICES AND CIRCUITS-I

<u>Teaching Scheme</u>		<u>Examination Scheme</u>	
Theory	: 04 hrs/week	Theory Examination	: 80 Mark
Practical	: 02 hrs/week	Class Test	: 20 Marks
		Practical/Oral	: 50 Marks
Unit 1			
<u>Semiconductor Diodes:</u> Band structure of PN junction, Quantitative theory of PN junction diode, Volt-amp characteristics, Temperature dependence, Transistion and Diffusion capacitance of PN junction ,Zener and Avalanche Breakdown,Varactor diode, Point Contact Diode and Solar cells, their construction and Characteristics(no Derivation) Diode Rectifiers: Half wave,Full wave and Bridge rectifiers,Types of Filters,Ripple factor and Regulation characteristics.			04
Unit 2			
<u>BJT Biasing and small signal models:</u> Necessity of BJT biasing,Transistor biasing methods,Stability factor,Thermal stabilization,Thermal runaway and Compensation circuits,Transistor as an Amplifier,h-parameter model,Analysis of Transistor Amplifier circuits using h-parameters,CB,CE and CC Amplifier configurations and performance factors,Analysis of Single Stage Amplifier,RC coupled Amplifiers,Effects of bypass and coupling capacitors,Frequency response of CE amplifier,Emitter follower,Cascaded Amplifier,Darlington configuration, Boot strapping.			08
Unit 3			
<u>Field Effect Transistor and MOSFET:</u> JFET and its characteristics, Pinch off voltage, Drain saturation current, JFET amplifiers,CS,CD,CG amplifiers ,their analysis using small signal JFET model ,Biasing the FET, The FET as VVR Overview of DMOSFET,EMOSFET,Power MOSFET,n MOSFET,pMOSFET and CMOS devices,Handling precautions of CMOS devices,MOSFET as an Amplifier and Switch, Biasing in MOSFET, Small signal operation and models,Single stage MOS amplifier, Introduction to MOSFET as VLSI device- VI characteristics equation in terms of W/L ratio, MOSFET capacitances,CMOS Inverter,Comparison of FET with MOSFET and BJT w.r.t. to device and Circuit parameter.			08
Unit 4			
<u>Frequency response of Amplifiers and analysis:</u> High frequency equivalent circuits for BJT and FET amplifier, Calculation of lower and Higher cutoff frequencies, Bode plot of frequency response, relation bandwidth and rise time, Compensation to improve the low frequency response of amplifier, Video amplifiers, Optocouplers, Hetrojunction Bipolar transistor, BJT modeling.			08
Unit 5			
<u>Feedback and Oscillators:</u> Principle of Negative feedback in electronic circuits, Voltage series, Voltage shunt, Current series, Current shunt types of Negative feedback, Typical transistor circuits effects of Negative feedback on Input and Output impedance, Voltage and Current gains, Bandwidth, Noise and Distortion. Principle of Positive feedback, Concept of Stability in electronics circuits, Barkhausen criteria for oscillaton, RC, Clapp, WienBridge, Colpitt, Hartley, Tuned LC ,UJT Relaxation oscillators(working and derivation of frequency of oscillators)			08
Unit 6			
<u>Transistor at High Frequencies:</u>			04

Hybrid π CE amplifier, Hybrid π conductance, Hybrid π capacitance, Validity at Hybrid π model, Variation of Hybrid π parameters, CE short circuit current gain, Current gain with resistive load, Single stage CE transistor amplifier response, Gain bandwidth product, Emitter follower at high frequency.

Text Books:

1. Milliman's Electronics Devices and Circuits, Jacob Milliman, Christos C Halkias, Satyabrata Jit (Third Edition), Tata McGraw Hill.
2. Electronics Devices and Circuit Theory, Robert L. Boylestad, Louis Nashelsky, (Tenth Edition) Pearson Education, Inc.
3. "Electronics Devices and Circuits", David A. Bell, (Fifth Edition), Oxford Press.
4. "Basic VLSI Design" Pucknell, Kamran, (Third Edition), PHI.

Reference Books:

1. "Electronics Devices and Circuits", Allen Mothershead .
2. "Electronics Devices and Circuits", Dharma Raj Cheruka and B.T. Krishna, Pearson Education.
3. "Microelectronics Circuits" A.S. Sedra and K.C. Smith, (Fifth edition), Oxford University Press (India)

LIST OF PRACTICALS:

1. To plot VI characteristics of Junction Diode and Zener Diode.
2. For a Half wave rectifier with capacitor filter and to find the line and load regulation and ripple factor.
3. For a bridge rectifier with capacitor filter and to find line and load regulation and ripple factor.
4. To determine voltage gain, Current gain, Input Impedance, and Out impedance of Common Emitter amplifier.
5. Determine h-parameter for CE configuration.
6. Measurement of Input and output impedance and voltage gain of Darlington circuit with and without bootstrapping.
7. Plot characteristic of CSFET. Determine amplification factor, transconductance and dynamic resistance.
8. Determine Input & output impedance and voltage gain and current gain for CSFET.
9. To plot characteristics of CS DMOS FET.
10. To observe effect of Bypass capacitor on frequency response of single stage CE amplifier.
11. To perform any one RC and LC oscillator.
12. To perform voltage series, voltage shunt and current shunt feedback topologies.

Note: Minimum eight experiments shall be performed from the above list. It is advised to conduct the practicals on Bread board.

Section A: Unit 1, 2, 3

Section B: Unit 4,5,6

PATTERN OF QUESTION PAPER

Six units in the syllabus shall be divided into equal parts i.e. three units in each part. Question paper shall be set having two sections A and B, as per weightage of units. Section A question shall be set on first part and section B on second part. Question paper should cover entire syllabus.

For 80 Marks papers:

1. Minimum 10 questions
2. Five questions in each section
3. Question no.1 from section A and question no.6 from section B having weightage of 10 marks each be made compulsory and should have at least eight bits of two marks out of which five to be solved.
4. Two questions from remaining questions from each section A and B be asked to solve each having weightage of 15 marks

SEMESTER-I

EXD202: NETWORK ANALYSIS

<u>Teaching Scheme</u>		<u>Examination Scheme</u>	
Theory	: 04 hrs/week	Theory Examination	: 80 Mark
Practical	: 02 hrs/week	Class Test	: 20 Marks
		Practical/Oral	: 50 Marks
Unit 1			
<u>Basics and Network Theorem</u> Types of Networks, Voltage & Current sources & their types, Star Delta transformation, Loop & Node analysis for DC, AC, Dependent & Independent Sources, Coupled networks. Network Theorems: Superposition Theorem, Thevenins Theorem, Nortans Theorem, Maximum Power Transfer theorem , Reciprocity Theorem, Millmans Theorem, Application of Theorem to DC and AC network with dependent and Independent sources.			08
Unit 2			
<u>Network Topology</u> Graph of Network, Concept of Tree and Co tree, Incident matrix, Tie set and Cut set matrix, formulation of equilibrium equations in matrix form, Solution of resistive networks, Principles of duality.			04
Unit 3			
<u>Filters and Attenuator & Equalizers</u> Parameters of Filters, Unit of Attenuation-Decibel and Neper, propagation constant, Classification of filter, Basic filter network, Design of Constant K filter & M Derived filters (Low pass, High Pass, Band Pass and Band Stop filters. Attenuators:, Symmetrical & Asymmetrical attenuators, two terminal & four Terminal equalizers.			08
Unit 4			
<u>Two Port Networks</u> Z, Y, ABCD, H parameter, Interconnection of Two port networks			06
Unit 5			
<u>Transient Response</u> Behavior of ckt under switching condition and their representation, Initial and final condition, Convolution integral, transform RLC ckt for AC and DC excitation , step, Ramp and impulse function and their Laplace Transform, waveform synthesis.			08
Unit 6			
<u>Resonance</u> Series and parallel resonance, variation of I, V with frequency in RLC ckt, frequency response of series and parallel ckt, Q factor, selectivity and Bandwidth of Series and Parallel Ckt.			06
<u>Text Books:</u>			
<ol style="list-style-type: none"> 1. Circuit theory by A. Chakrabarti ,Dhanpat Rai & Co. 2. Circuit theory & application by Sudhkar Palli 3. Networks & System by D.Roy Choudhary , New age international publication 4. Theory & Problem of Electric Circuit by A.Bruce Carlson, TMH 5. Electric circuit Analysis by S.N. Sivanandam,Vikas publication House 			

Reference Books:

1. Circuit analysis & Application by William D. Stanley, Pearson
2. Circuit analysis by M.E. Van Valkenburs ,PHI

LIST OF PRACTICALS:

1. Study of Series Resonance
2. Study of Parallel Resonance
3. Study of Super Position Theorem
4. Study of Maximum Power Transfer Theorem
5. Study of Thevenin's Theorem
6. Study of Norton's Theorem
7. Study of Two Port Network Parameter
8. Study of Attenuator Circuit
9. Study of equalizer circuit

Note: Minimum eight experiments shall be performed from the above list.

Section A: Unit 1, 2, 3

Section B: Unit 4,5,6

PATTERN OF QUESTION PAPER

Six units in the syllabus shall be divided in to equal parts i.e. three units in each part. Question paper shall be set having two sections A and B, as per weightage of units. Section A question shall be set on first part and section B on second part. Question paper should cover entire syllabus.

For 80 Marks papers:

- 1) Minimum 10 questions
- 2) Five questions in each section
- 3) Question no.1 from section A and question no.6 from section B having weightage of 10 marks each be made compulsory and should have atleast eight bits of two marks out of which five to be solved.
- 4) Two questions from remaining questions from each section A and B be asked to solve each having weightage of 15 marks

SEMESTER-I

EXD203: COMMUNICATION ENGINEERING

<u>Teaching Scheme</u>		<u>Examination Scheme</u>	
Theory	: 04 hrs/week	Theory Examination	: 80 Mark
Practical	: 02 hrs/week	Class Test	: 20 Marks
		Practical/Oral	: 50 Marks
Unit 1			
<u>Need Importance & overview of subject</u> Amplitude Modulation , Base band & Carrier communication, Generation of AM (DSBFC) & its spectrum, Power relations applied to sinusoidal signals ,DSBSC-Multiplier Modulator ,Non linear generation, Switching modulator, Ring modulator & its spectrum Modulation index, SSBSC,ISB & VSB, their generation methods & comparison ,AM Broadcast technical standards			08
Unit 2			
<u>Angle Modulation</u> Instantaneous frequency, Concept of Angle Modulation, Frequency spectrum, Narrow band & wide band FM, Modulation Index, Bandwidth, Phase Modulation Bessel's Function and its mathematical analysis, Generation of FM (Direct & indirect Method), Comparison of FM and PM			06
Unit 3			
<u>AM and FM Receivers</u> Block diagram of AM and Receivers,Super heterodyne Receiver, Performance characteristics: Sensitivity, Selectivity, Fidelity, Image frequency rejection, IFRR, Tracking, De-emphasis, Mixers, AM Detection: Rectifier Detection, Envelope Detection, Demodulation of DSBSC; Synchronous detection, Demodulation of SSBSC: Envelope detector, FM Detection using PLL.			06
Unit 4			
<u>Noise</u> Sources of Noise, Types of Noise, White Noise, Thermal noise, shot noise, partition noise, Low frequency or flicker noise burst noise, avalanche noise, Signal to Noise Ratio, SNR of tandem connection, Noise Figure, Noise Temperature, Friss formula for Noise Figure, Noise Bandwidth			06
Unit 5			
<u>Behavior of Analog Systems in Presence of Noise</u> Base band systems, Amplitude modulated systems–DSBSC & AM, Angle modulated systems-Phase modulation, Frequency modulation, Threshold in angle modulation, Pre emphasis & De emphasis in FM, Comparison of performance of AM & FM systems,			08
Unit 6			
<u>Digital Transmission of Analog Signals</u> Band limited & time limited signals, Narrowband signals and systems, Sampling theorem in time domain, Nyquist Criteria, Types of Sampling-idea, natural, flat top, Band limited & time limited signals, Narrowband signals and systems, Sampling Aliasing & Aperture effect, Pulse Analog modulation: PAM, PWM & PPM, PCM-Generation & reconstruction, Bandwidth requirement of PCM, Differential PCM, Delta Modulation & Adaptive			06

DM.(Only Block diagram treatment).

Text Books:

- T1. B.P.Lathi: Modern Digital and Analog. Communication Systems : Oxford Press Publication (Third Edition)
T2. Dennis Roddy & Coolen-Electronic Communication, PHI (Fourth Edition)

Reference Books:

- R1. Simon Haykin: Communication Systems, John Wiley & Sons (Fourth Edition)
R2. Taub & Schilling: Principles of Communication Systems, Tata McGraw-Hill
R3. Leon W.Couch,
2: Digital and Analog Communication Systems, Person Education (Seventh Edition)

LIST OF PRACTICALS:

1. Study generation of SSB using balanced modulator
2. To find modulation index of an AM wave.
3. To find modulation index of an FM wave.
4. Study of AM Demodulators.
5. Study of FM Demodulators.
6. Fault finding in an AM Rx.
7. To find performance parameter like Sensitivity, Selectivity, and Fidelity.
8. Study of FM Tx & Rx.
9. Study & perform PAM, PWM & PPM.
10. Verification of sampling theorem using flat top sampling.
11. Study of PCM generation & detection.

Note: Minimum eight experiments shall be performed from the above list.

Section A: Unit 1, 2, 3

Section B: Unit 4,5,6

PATTERN OF QUESTION PAPER

Six units in the syllabus shall be divided in to equal parts i.e. three units in each part. Question paper shall be set having two sections A and B, as per weightage of units. Section A question shall be set on first part and section B on second part. Question paper should cover entire syllabus.

For 80 Marks papers:

1. Minimum 10 questions
2. Five questions in each section
3. Question no.1 from section A and question no.6 from section B having weightage of 10 marks each be made compulsory and should have atleast eight bits of two marks out of which five to be solved.
4. Two questions from remaining questions from each section A and B be asked to solve each having weightage of 15 marks

SEMESTER-I

EXD204: DATA STRUCTURE AND NUMERICAL COMPUTATIONS

<u>Teaching Scheme</u>		<u>Examination Scheme</u>	
Theory	: 04 hrs/week	Theory Examination	: 80 Mark
Practical	: 02 hrs/week	Class Test	: 20 Marks
		Practical/Oral	: 50 Marks
Unit 1			
<u>Introduction to data structure & Advance concepts in 'C'</u>			
Introduction to theory of data structures & its data types, Primitive and Non-Primitive data structures, Abstract data structure. Arrays: one dimensional & two dimensional arrays, Arrays as an ADT Insertion, deletion and traversals of arrays. Pointers: Basic concept, Concept of Functions & its types, Structures: Array of structures, passing structure to function, storage classes.			06
Unit 2			
<u>Stacks & Queues</u>			
Stack, stack as an ADT, representation using arrays & linked list, Applications of stack, Concept of infix, postfix and prefix expressions .The Queue and its representation, queue as an ADT, Circular Queue, priority queue , Applications of queue			06
Unit 3			
<u>Linked List</u>			
Definition, concept, operation on singly linked list, Circular linked lists, doubly linked lists, Operations like insertion, deletion, searching, Updating, Applications of linked lists such as polynomial manipulation, Comparison of singly linked, circularly linked & doubly linked list			08
Unit 4			
<u>Graphs and Trees</u>			
Definitions, basic terminology, representation & implementation of graphs, graph traversals, DFS, BFS, Shortest path, Spanning tree, Minimum cost spanning trees Definition, Basic terminology, operation on binary trees, linked storage representation for binary search trees, Basic operation on binary search tree such as creating a binary search tree, searching, tree traversals ,in-order, pre-order, post-order, tree application for expression evaluation & for solving sparse matrices.			08
Unit 5			
<u>Sorting & searching</u>			
Different sorting tech, selection sort, bubble sort, merge sort, quick sort, heap sort, shell sort, radix sort, comparisons between different sorting techniques, Sequential searching, binary Searching, B trees, B+ trees,			04
Unit 6			
<u>Numerical methods:</u>			
Solution of transcendental and polynomial equations bisection method, Newton Raphson, Secant, Successive approximation method, Solution of linear simultaneous equations using Gauss Elimination, Gauss Jordan methods, Gauss Seidel method, Interpolation using Newton's forward and backward difference formula, Lagrange's interpolation, Numerical integration and differentiation; Trapezoidal rule, Simpson's 1/3 and 3/8 rule, Euler's methods, Runge-Kutta methods			08

Text Books:

- 1) E Balgurusamy - Programming in ANSI C, Tata McGraw-Hill
- 2) 'Data structure through C' by Yashwant P Kanetkar
- 3) Principals of Data structure using C and C++ by G.S.Baluja

Reference Books:

- 1) Yedidyah Langsam, Moshe J Augenstein, Aaron M Tenenbaum - Data structures using C and C++ - PHI Publications (2nd Edition).
- 2) Data structure using C by Tanenboun
- 3) Numerical Analysis by S.S.shasrti
- 4) Numerical Methods for engineers by Chhapra

LIST OF PRACTICALS:

- 1) Write a 'C' Programme for Merging of two arrays
- 2) Write a 'C' Programme using function and pointers
- 3) Write a 'C' Programme to implement stack
- 4) Write a 'C' Programme to implement Queue
- 5) Write a 'C' Programme to implement circular link list
- 6) Write a 'C' Programme to implement graph traversal
- 7) Write a 'C' Programme to implement binary search tree
- 8) Write a 'C' Programme to implement merge and quick sort
- 9) Write a 'C' Programme to implement Newton Raphson method
- 10) Write a 'C' Programme to implement interpolation

Section A: Unit 1, 2, 3

Section B: Unit 4,5,6

PATTERN OF QUESTION PAPER

Six units in the syllabus shall be divided in to equal parts i.e. three units in each part. Question paper shall be set having two sections A and B, as per weightage of units. Section A question shall be set on first part and section B on second part. Question paper should cover entire syllabus.

For 80 Marks papers:

- 1) Minimum 10 questions
- 2) Five questions in each section
- 3) Question no.1 from section A and question no.6 from section B having weightage of 10 marks each be made compulsory and should have atleast eight bits of two marks out of which five to be solved.
- 4) Two questions from remaining questions from each section A and B be asked to solve each having weightage of 15 marks

SEMESTER-I

EXD225: ELECTRONICS WORKSHOP

<u>Teaching Scheme</u>	<u>Examination Scheme</u>
<p>Theory : ----</p> <p>Practical : 02 hrs/week</p>	<p>Theory Examination : ---</p> <p>Class Test : ---</p> <p>Term Work : 50 Marks</p>
Unit 1	
<p>1. Mini Project:- Students have to select any topic and complete mini project on it. He has to perform PCB designing, component selection, mounting, soldering and testing of mini project. It is expected by the student to submit printed report of mini project and deliver power point presentation and demo.</p>	
Unit 2	
<p>2. Case Study:- Survey of optoelectronics devices.</p>	
Unit 3	
<p>3. Case Study:- Applications of different frequencies in the frequency spectrum.</p>	
Unit 4	
<p>4. Case Study:- Students have to study any industry and submit the report regarding the organization processes and activities.</p>	
Unit 5	
<p>5. Case Study:- Implementation of small electronic circuit by using circuit simulation tools (eg. Circuit maker, pSpice, multisim, Orcad, etc.)</p>	
Reference Books:	
<p>1 M. H. Rashid 'Introduction to P-spice using OrCAD for circuits and Electronics' – Pearson Edition</p> <p>2 User manuals of PROTEL, PROTEUS, OrCAD, Microcap</p> <p>3 W.C. Bosshart 'Printed Circuit Boards-Design & Technology'–Tata McGraw-Hill Publication</p> <p>Students are also advised to refer the latest internet search engines for the survey of the different topics of case studies.</p>	
<p>Students have to perform following activities under the guidance of subject teacher. Students have to submit report on case studies. They have to take reference from Internet searching and available reference books.</p>	

SEMESTER-II

BSH252: ENGINEERING MATHEMATICS-IV

<u>Teaching Scheme</u>		<u>Examination Scheme</u>	
Theory	: 04 hrs/week	Theory Examination	: 80 Mark
		Class Test	: 20 Marks
Unit 1			
<u>Function of complex variable (Differential calculus):</u>			
Introduction, Analytic function Cauchy Riemann equations in Cartesian and Polar form, Harmonic function, Taylor's series & Laurent's series (without proof), Conformal mapping (geometrical representation of function of complex variable), bilinear transformation.			04
Unit 2			
<u>Function of complex variable: (Integral calculus):</u>			
Line integral, contour integral: Cauchy's integral theorem, Cauchy's integral formula (without proof), Residues, Cauchy's residue theorem, Integration along unit circle and along upper half of semi circle.			08
Unit 3			
<u>Z Transform:</u>			
Definition, Z transform of elementary functions, properties of Z transform, Inverse Z transform, Solution of difference equation by Z transform.			08
Unit 4			
<u>Laplace Transform:</u>			
Definition, Transforms of elementary functions, Properties & theorems of Laplace transforms(without proof), transforms of periodic function, Heaviside unit step function, displaced unit step function, Dirac delta function, error function, Bessel' function of zero order.			08
Unit 5			
<u>Inverse Laplace Transform and its applications :</u>			
Inverse Laplace transforms by using i) properties, ii) partial fractions, iii) Convolution theorem, Applications to solve linear differential equations with constant coefficients (Initial value problems), Simultaneous Linear differential equations .			08
<u>Fourier Transform and its applications:</u>			
Fourier integral, Fourier sine and cosine integral, complex form of Fourier integral, Fourier transforms Fourier sine and cosine transform and inverse Fourier transforms Finite Fourier sine and cosine transforms. Solutions of one dimensional heat equation by using Fourier transform.			04
<ol style="list-style-type: none"> 1. A Text Book of Engineering Mathematics (Volume-I, II, III) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune. 2. Higher Engineering Mathematics by B. S. Grewal, Khanna Publications, New Delhi. 3. Advanced Engineering Mathematics by H.K. Das, S. Chand & Company. 4. Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill). 5. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley Eastern Ltd. 6. Engineering Mathematics A Tutorial Approach by Ravish R Singh, Mukul Bhat ,TMH 			

SEMESTER-II

EXD251: ELECTRONICS DEVICES AND CIRCUITS-II

<u>Teaching Scheme</u>		<u>Examination Scheme</u>	
Theory	: 04 hrs/week	Theory Examination	: 80 Mark
Practical	: 02 hrs/week	Class Test	: 20 Marks
		Practical/Oral	: 50 Marks
Unit 1			
Special Purpose Diodes Laser diode, Schottky diode, Gunn diode, Tunnel diode, Read diode, IMPATT diode, TRAPATT diode, BARITT diode, CCDs (Construction, Working principle, Characteristics, Applications)			06
Unit 2			
Power amplifiers Introduction, classification of power amplifiers -A, B, AB, C and D, , RC coupled, transformer coupled and direct coupled, Class B push pull and complementary symmetry amplifier, efficiency, calculation of power output, power dissipation, cross over distortion and its elimination methods, need of heat sink and its design , calculation of actual power handling capacity of transistor with and without heat sink, collector dissipation curve and its importance, harmonic distortion in power amplifiers. Introduction to pulse amplifier, need of pulse amplifier, types, ideal pulse amplifier, Response-Time domain and frequency domain,			08
Unit 3			
Differential amplifiers Introduction, Differential amplifier configuration, DC and AC analysis, Constant current bias, Current mirror circuit, Level shifter, Introduction to operational amplifier (Block diagram) and its features, Ideal characteristics and their significance, case study of IC 741C.			06
Unit 4			
Wave Shaping Circuits Integrator and differentiator using passive components and their response for sine wave, square wave input. Diode clipper: Positive clipper, Negative clipper, biased clipper. Diode clampers: Unbiased and Biased types.			06
Unit 5			
Multivibrators Multivibrators: Monostable, Astable, Bistable, Collector coupled and emitter coupled, a fixed bias and self bias transistors binary, commutating capacitors, symmetrical and asymmetrical triggering, Schmitt trigger			06
Unit 6			
Blocking oscillators and time based generator Transistorize blocking oscillator- base and emitter timing methods for controlling pulse duration of blocking oscillator, diode control and RC control blocking oscillator, applications. Voltage time based generator-General feature of time base signal, methods of generating time based waveform, miller and boot strap time based generator. Current time based generator: A simple current sweep, a transistor current time base generator.			08

Text Books:

- 1 A Monograph on electronics Design Principles, N.C.Goyal and R.K.khetan, Khanna Publication.
- 2 Electronic Devices and Circuits, Theodore F. Bogart, Jeffrey S. Beasley, Guillermo Rico, Pearson publication.

Reference Books:

- 1) Pulse Digital and Switching Waveform, Millman J and Taub H., Mc Graw Hill International.
- 2) Electronics Devices and Circuits Theory, Boylestead Nashelsky, PHI Publication.
- 3) Electronic Devices and Circuits, Theodore F. Bogart, Jeffrey S. Beasley, Guillermo Rico, Pearson publication.
- 4) Electronic Devices and Circuits, Jacob Millman, Christos halkias, Satyabrata Jit, Mc Graw Hill International.
- 5) Microwave devices & circuits, Samuel Liao, Printice Hall of India, Third Edition.

LIST OF PRACTICALS:

1. Study of RC integrator and differentiator for sine, square and pulse input.
2. Study of Clipper – positive, negative and biased type.
3. Study of clamper – Biased and unbiased type.
4. Study of transistorized astable multivibrator.
5. Study of transistorized monostable multivibrator.
6. To study of frequency response of RC coupled amplifier.
7. To study of frequency response of transformer coupled amplifier.
8. To study of frequency response of push pull / complimentary symmetry amplifier.
9. Study of Miller and Bootstrap time base generator.
10. Study of transistorized differential amplifier.

Note: Minimum 8 experiments shall be performed and it is advised to conduct on Bread board.

Section A: Unit 1, 2, 3

Section B: Unit 4,5,6

PATTERN OF QUESTION PAPER

Six units in the syllabus shall be divided in to equal parts i.e. three units in each part. Question paper shall be set having two sections A and B, as per weightage of units. Section A question shall be set on first part and section B on second part. Question paper should cover entire syllabus.

For 80 Marks papers:

- 1) Minimum 10 questions
- 2) Five questions in each section
- 3) Question no.1 from section A and question no.6 from section B having weightage of 10 marks each be made compulsory and should have atleast eight bits of two marks out of which five to be solved.
- 4) Two questions from remaining questions from each section A and B be asked to solve each having weightage of 15 marks

SEMESTER-II

EXD252: DIGITAL LOGIC DESIGN

<u>Teaching Scheme</u>		<u>Examination Scheme</u>	
Theory	: 04 hrs/week	Theory Examination	: 80 Mark
Practical	: 02 hrs/week	Class Test	: 20 Marks
		Practical/Oral	: 50 Marks
Unit 1			
<u>Logic Families:</u>			08
Characteristics of digital IC's, Bipolar logic families: Resistor-Transistor logic (RTL), Direct coupled Transistor logic (DCTL), Integrated Injection logic (I ² L), Diode – Transistor Logic (DTL), High Threshold logic (HTL), Transistor-Transistor logic (TTL), Schottky Transistor-Transistor logic, Emitter Coupled logic(ECL).Unipolar logic Families: PMOS, NMOS, and CMOS. BiCMOS Logic Family, Tri-State Logic.			
Unit 2			
<u>Combinational logic design:</u>			06
Standard representation for Logic functions: Sum-of-Products and Product-of-Sums methods. Simplification of Logic functions using Karnaugh Map, Don't care conditions, Quine-McClusky minimization technique, Design examples on Arithmetic building blocks: Half-adder, Full-adder, Half-subtractor, Full-subtractor, the binary adder-subtactor, Binary to Gray and Gray to Binary code converters.			
Unit 3			
<u>Data-Processing Circuits:</u>			06
Parallel Adder (IC7483), Arithmetic logic Unit (IC 74181), Multiplexers, Demultiplexers, 1-of-16 Decoder, BCD-to-Decimal Decoders, Seven-segment Decoders, Encoders, Exclusive-OR Gates, Parity Generators and Checkers, Magnitude Comparator, Read - only Memory, Programmable Array Logic, Programmable Logic Arrays. Introduction to HDL			
Unit 4			
<u>Sequential Logic Circuit:</u>			08
Flip-Flops: RS, JK, Race around condition, Master-slave JK, D, T. Edge triggered flip-flops, clocked flip-flop design, excitation table, flip-flop conversion, flip-flop characteristics, bounce elimination switch, design of Asynchronous (ripple) counter using flip-flop using IC's, 4 bit up/down counter (positive and negative edge triggered), Shift register (modes of operation), 4-bit bidirectional using D/J-K, universal shift register, application of shift registers (Ring counter, sequence generator, Johnson's counter) IC7495/74195			
Unit 5			
<u>Synchronous sequential machines:</u>			06
Design of synchronous counter using ICs, 4 bit up/down, mod N counters, Moore and Mealy machines, representation techniques, state diagram, state table, state reduction, state assignment, implementation using flip-flops, Applications like sequence generator and detection.			

Unit 6	
<u>Semiconductor Memories & convertor:</u> Memory organization and operation, Expanding memory size, classification and characteristics of memory, RAM, ROM, EPROM, EEPROM, NVRAM, SRAM, DRAM, flash memory, A to D and D to A convertors.	06
<u>Text Books:</u>	
<u>Reference Books:</u> <ol style="list-style-type: none">1. Donald P Leach, Albert Paul Malvino, Goutam Saha “Digital Principles and Applications”, Mc Graw Hill2. R.P. Jain “Modern Digital Electronics”, Mc Graw Hill3. Morris Mano “Digital Logic & Computer Design”, Pearson.4. Ronald J. Tocci, Neal S. Widmer, Gregory L. Moss “ Digital Systems, Principles and Applications”, Pearson, Tenth Edittion	
<u>LIST OF PRACTICALS:</u> <ol style="list-style-type: none">1. Study of basic logic gates.2. Operation of Arithmetic building blocks3. Study of Arithmetic logic unit (ALU IC 74181)4. Code conversion operations: Binary to Gray, Gray to Binary5. Multiplexers6. Demultiplexers, Decoders & Encoders7. Study of flip-flops: RS, JK, MSJK, D & T.8. Counter Design9. Shift registers10. Study of A to D & D to A Convertors	
Section A: Unit 1, 2, 3 Section B: Unit 4,5,6	
<u>PATTERN OF QUESTION PAPER</u> Six units in the syllabus shall be divided in to equal parts i.e. three units in each part. Question paper shall be set having two sections A and B, as per weightage of units. Section A question shall be set on first part and section B on second part. Question paper should cover entire syllabus.	
<u>For 80 Marks papers:</u> <ol style="list-style-type: none">1) Minimum 10 questions2) Five questions in each section3) Question no.1 from section A and question no.6 from section B having weightage of 10 marks each be made compulsory and should have atleast eight bits of two marks out of which five to be solved.4) Two questions from remaining questions from each section A and B be asked to solve each having weightage of 15 marks	

SEMESTER-II

EXD253: SIGNALS AND SYSTEMS

<u>Teaching Scheme</u>		<u>Examination Scheme</u>	
Theory	: 04 hrs/week	Theory Examination	: 80 Mark
Practical	: 02 hrs/week	Class Test	: 20 Marks
		Practical/Oral	: 50 Marks
Unit 1			
<u>Introduction to Signals:</u>			
Definition of signal, Classification of signals: continuous time and discrete time, Analog and digital, periodic and non periodic, deterministic and non deterministic, even and odd, energy and power.			
Basic signals and operations on signals: cosine, sine, exponential, unit step, unit impulse, ramp, triangular, rectangular, Amplitude scaling, addition, multiplication, differentiation, integration, time scaling, time shifting and folding.			
Representation of continuous time signals by its sample – Sampling theorem- Reconstruction of a signals from its samples, aliasing – discrete time processing of continuous time signals, sampling of band pass signals.			
Unit 2			
<u>System:</u> Definition, types of systems, Classification of CT and DT system: linear and non-linear, Time variant and time invariant, casual and non causal, static and dynamic, Stable and unstable, shift variant and invariant, Invertibility,			
Unit 3			
<u>System Analysis:</u>			
System modeling: input output relation, impulse response, block diagram, integro-differential equations. Introduction to LTI Systems, state space representation, Convolution integral, properties of convolution integral, linear convolution, different methods of convolutions, system properties in terms of impulse response.			
Unit 4			
<u>CT and DT system analysis using FT</u>			
Definition and necessity of CT and DT Fourier series and Fourier transforms. CT Fourier series, CT Fourier transforms and its properties. Problem solving using properties. Limitations of Fourier Transform. Analogy between CT FS and DT FS and its properties. Response of LTI system to exponential signals, periodic signals, application of Fourier series and Fourier transforms to the system analysis.			
Unit 5			
<u>Correlation:</u>			
Definition of correlation and correlogram. Introduction-correlation and correlogram, the correlation function: analogy between correlation and convolution, Conceptual basis, energy signals, power signals, auto-correlation: relation to signal energy and signals power, properties of auto-correlation, Cross-correlation: properties of cross correlation.			

Unit 6 <u>Energy Spectral Density and Power Spectral Density</u> Definition of Spectral density, ESD, Properties of ESD, Physical interpretation of the ESD Numerical on ESD. PSD, Properties of PSD, Correlation, cross correlation and auto-correlation of CT energy signals and its properties. Numerical on PSD. Applications, interrelation between auto-correlation and ESD. Sampling theorem and its proof, effect of under sampling, sampling of band pass signals	08
<u>Text Books:</u>	
<u>Reference Books:</u> 1) Roberts M.J. : Signals and Systems TMH 2) Luider : Signals and Systems 3) B.P.Lathi : Linear Systems and signals 4) Signals and Systems : Y. Ravinder, C.K. Kharate. 5) B.P. Lathi : Signals and Systems 6) Symon hykin : signals and systems 7) I.J.Nagrath : signals and systems (TMH)	
<u>LIST OF PRACTICALS:</u> 1) Program for sampling continuous time signal 2) Program for folding, shifting of digital signal 3) Program to generate impulse, unit step, ramp, sine wave, exponential signals, 4) Program for convolution and correlation 5) Program for compute magnitude and phase spectrum of given signals. 6) Program for Jury's stability criteria 7) Program for circular convolution 8) Program to study the properties of Fourier transform 9) Program for linear convolution using DFT 10) Program to compute impulse response of systems 11) Program to compute even & odd part of given signals 12) Program o compute FFT. Note: Minimum eight experiments shall be performed from the above list. It is advised to conduct the practicals. Perform any Ten programs with the help of any computational software like Matlab/OCTAVE Based experiments.	
Section A: Unit 1, 2, 3 Section B: Unit 4,5,6 <u>PATTERN OF QUESTION PAPER</u> Six units in the syllabus shall be divided in to equal parts i.e. three units in each part. Question paper shall be set having two sections A and B, as per weightage of units. Section A question shall be set on first part and section B on second part. Question paper should cover entire syllabus. <u>For 80 Marks papers:</u> 1) Minimum 10 questions 2) Five questions in each section 3) Question no.1 from section A and question no.6 from section B having weightage of 10 marks each be made compulsory and should have atleast eight bits of two marks out of which five to be solved. 4) Two questions from remaining questions from each section A and B be asked to solve each having weightage of 15 marks	

SEMESTER-II

EXD254: ELECTRICAL MACHINES AND INSTRUMENTATION

<u>Teaching Scheme</u>		<u>Examination Scheme</u>	
Theory	: 04 hrs/week	Theory Examination	: 80 Mark
Practical	: 02 hrs/week	Class Test	: 20 Marks
		Practical/Oral	: 50 Marks
Unit 1			
D.C. Machines: DC Machines, Construction, working principle (motor/generator), EMF equation of generator. Types and applications of DC generators, DC Motors and its characteristics, significance of back emf; applications of DC Motors, speed control methods and starters.			05
Unit 2			
Polyphase induction motors and Synchronous Motors: Three-phase induction motors, principle of operation, construction, types, Torque equation, Torque-Speed characteristics, power stages, losses and efficiency, speed control, starters and applications. Construction of synchronous machines, principle of operation, starting methods, effect of load, effect of excitation on armature current and power factor, Hunting.			10
Unit 3			
Special Machines: Working principle and applications of: Stepper motor, variable reluctance motor, FHP motor, Hysteresis motor, repulsion motor, Servomotors (AC and DC).			05
Unit 4			
Sensors and Transducers: Classification and selection of transducers, Strain gauges, LVDT, temperature transducers, piezoelectric, photosensitive transducers. Need of signal conditioning and types, interfacing techniques of transducers with microprocessors/microcontrollers.			06
Unit 5			
Industrial measurements and Industrial Applications: Measurement of vibration, Electrical telemetry, thickness, Humidity, thermal conductivity and gas analysis. Emission Computerized tomography. Smoke and fire detection, burglar alarm. Object counter, level measurement, ON/OFF timers, RTC sound level meter, tachometer, VAW meter.			09
Unit 6			
I/O Devices and Displays: Recorders-X-Y Plotters its applications, Optical Oscillograph, cold cathode display, Florescent display, LED, LCD, Alphanumeric display, Bar graph displays.			05

Text Books:

Reference Books:

- 1) B.L. Thereja Vol-II
- 2) Ashpaque Teussin, Electrical Machine
- 3) Nagnath Kothari
- 4) P.S. Bhimbra
- 5) A.K. Sawhney
- 6) S.S. Kalsi
- 7) Handbook of polymers in Electronics by B.D. Malhotra

LIST OF PRACTICALS:

A. Experiments (any four)

1. Speed control of DC motor.
2. Load test on DC shunt motor (T/I_q, T/N, N/f_q) characteristics.
3. Torque slip characteristics of three phase induction motor.
4. Load test on 3-phase induction motor.
5. Speed control of 3-phase induction motor.
6. Study of different types of starters of induction motor.

B. Experiments (any four)

1. Study of potentiometer displacement transducer.
2. Study of strain gauge.
3. Study of temperature transducers.
4. Study of burglar alarm.
5. Liquid level measurement.
6. Sound level meter.

Note: Minimum eight experiments shall be performed from the above list. It is advised to conduct the practicals.

Term work shall consist of any eight experiments based on syllabus or from the list.

Assessment: Actual performing in the lab.

Laboratory journal should contain clearly the objectives of the experiment.

Section A: Unit 1, 2, 3

Section B: Unit 4,5,6

PATTERN OF QUESTION PAPER

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For 80 Marks papers:

- 1) Minimum 10 questions
- 2) Five questions in each section
- 3) Question no.1 from section A and question no.6 from section B having weightage of 10 marks each be made compulsory and should have at least eight bits of two marks out of which five to be solved.
- 4) Two questions from remaining questions from each section A and B be asked to solve each having weightage of 15 marks