4

ELECTRICAL ENGINEERING

4.1 S.Y. B.Tech. (Electrical). In Electrical Engineering

Academic Scheme and Syllabus

Sem.III & IV

2015-16

Scheme for S.Y.B.Tech. in Electrical Engineering, (Semester - III) Effective from the Academic Year 2015-2016.

Sr. No.	Course	Code	Course Plan for Each Week (Hrs)			Credits	Evaluation (Marks)						Total
			Lectures	Laboratory	Tutorial		Test 1	Test 2	End Semester		End Semester Weightage (%)	In Semester Evaluation	
									Marks	Duration (Hrs)			
1	Engineering Mathematics III	BTE201	4	--	--	4	20	20	100	3	60	--	100
2	Electronics Circuits	BTE202	4	--	--	4	20	20	100	3	60	--	100
3	Electrical Networks	BTE203	4	--	2	5	20	20	100	3	60	25	125
4	Integrated Circuits	BTE204	4	--	--	4	20	20	100	3	60	--	100
5	Electrical Machines I	BTE205	4	-	--	4	20	20	100	3	60	--	100
6	Numerical Techniques	BTE206	4	--	--	4	20	20	100	3	60	--	100
	Laboratory Work												
1	Electronics Circuits	BTE252	--	2	--	1	--	--	--	--	--	25#	25#
2	Integrated circuits	BTE254	--	2	--	1	--	--	--	--	--	25#	25#
3	Electrical Machines I	BTE255	--	2	--	1	--	--	--	--	--	50#	50#
4	Numerical Techniques	BTE256	--	2	--	1	--	--	--	--	--	25#	25#
Total			**24**	**8**	2	**29**	**120**	**120**	**600**	**--**	**--**	**150**	**750**

1. Test 1, Test 2 and End semester weightage marks will be added and shown as the theory marks in the mark sheet.Duration of Test 1, Test 2 is of 1 hour.
2. For passing in theory courses, Student must secure minimum 40% marks in each course with all heads of passing taken together and minimum 40% marks in the end semester examination
3. Laboratory work is considered as separate head and student must secure 40 % of marks for passing.
4. # Distribution of marks for in semester evaluation will be as under, Attendence - 20 %, practical Performed during semester and graded assignment submission/ – 40 %, /Practical Examination/ mini project – 40 %

Scheme for S.Y.B.Tech. In Electrical Engineering, (Semester - IV)) Effective from the Academic Year 2015-2016.

Sr. No.	Course	Code	Course Plan for Each Week (Hrs)			Credits	Evaluation (Marks)						Total
			Lectures	Laboratory	Tutorial		Test 1	Test 2	End Semester		End Semester Weightage (%)	In Semester Evaluation	
									Marks	Duration (Hrs)			
1	Engineering Mathematics IV	BTE226	4	--	--	4	20	20	100	3	60	--	100
2	Analog Circuits	BTE227	4	--	--	4	20	20	100	3	60	--	100
3	Electrical and Electronics Measurements	BTE228	3	--	--	3	20	20	100	3	60	---	125
4	Elements of Power System	BTE229	4	--	2	5	20	20	100	3	60	25	100
5	Signals and Systems	BTE230	3	--	--	3	20	20	100	3	60	--	100
6	Microprocessor and Microcontroller	BTE231	4	--	--	4	20	20	100	3	60	---	100
7	Organisational Communication and Interpersonal Skills.	BTE232	2	--	2	3	10	10	50	2	60	50	100
	Laboratory Work												

1	Analog Circuits	BTE277	--	2	--	1	--	--	--	--	--	25#	25#
2	Electrical and Electronics Measurements	BTE278	--	2	--	1	--	--	--	--	--	25#	25#
3	Signals and Systems	BTE280	--	2	--	1	--	--	--	--	--	25#	25#
4	Microprocessor and Microcontroller	BTE281	--	2	--	1	--	--	--	--	--	25#	25#
Total			**28**	**8**	**2**	**30**	**130**	**130**	**650**	**--**	**--**	**175**	**825**

Value added course on PLC programming and applications

1. Test 1, Test 2 and End semester weightage marks will be added and shown as the theory marks in the mark sheet. Duration of Test 1, Test 2 is of 1 hour.
2. For passing in theory courses, Student must secure minimum 40% marks in each course with all heads of passing taken together and minimum 40% marks in the end semester examination
3. Laboratory work is considered as separate head and student must secure 40 % of marks for passing.
4. Distribution of marks for in semester evaluation will be as under, Attendence - 20 %, practical Performed during semester and graded assignment submission/ – 40 %, /Practical Examination/ mini project – 40 %

SEMESTER-III	**CLASS:S.Y. B. Tech. (Electrical)**		
CODE:BTE201	**COURSE: Engineering Mathematics-III**		
Period per week (each of 60 minutes)	Lecture	04	
	Laboratory	-	
	Tutorial	---	
Scheme of Evaluation		Hours	Marks
	In Semester	01	20*2
	End Semester*	03	100
	Practical	---	---
	Laboratory Work(Journal)	---	---
	TOTAL	---	100

*60%Weightageforendsemester

Course Objectives:

1. Introduce Laplace & Inverse Laplace transforms and its application to solve differential equations.
2. Introduction to Complex integration (Cauchy's theorem)
3. Introduce fourier series orthogonal orthonormal functions.
4. Introduce vector integration, Green's Stoke's & Gauss theorems.

Course Outcomes:

Upon successful completion of the course, students should be able to

1. Solve problems based on Laplace and inverse Laplace transform.
2. Solve integration of complex valued functions.
3. Solve the problem based on fourier series expansion.
4. Solve problems on vector integration.

Module	Details	Hrs.
1.	**Laplace Transform:** Functions of bounded variations. Laplace Transforms of $1, t^n, e^{at}$, sinat, cosat, sinhat, coshat, erf(t). Linearity property of L.T. First shifting theorem Second shifting theorem. $L\{t^n f(t)\}$, $L\{f(t)/t\}$, $L\{\int f(u)du\}$, $L\{d^n/dt^n f(t)\}$.Change of scale property of L.T. Unit step function, Dirac delta	**07**
2.	**Inverse Laplace Transform:** Evaluation of inverse L.T, Partial fractions method, Using derivative &integration method, convolution theorem. Applications to solve initial and boundary value problems involving ordinary diff.Equation with one	**07**
3.	**Fourierseries:**Orthogonal&orthonormalfunctions.Expressionforthefunctioninaseriesoforthogonalfunctions.Dirichlet's conditions for Fourier series. Fourier series of periodic functions with period 2π or $2l$. Fourier series over period $(-\pi, \pi)$ (-I,l)Fourier series for even &Odd functions. Half range sine & cosine series.	**10**

4.	**Fourier transform:** Fourier sine &cosine transform Properties of Fourier transforms(Linearity,change of scale,shifting) Convolution theorem(only statement)	**04**

Course Contents

5.	**Vector Analysis:** Scalar and vector point functions, curl, gradient and divergence, Line Integral, Conservative force field and work done	**05**
6.	**Vector Analysis:** Green's theorem in plane. Stoke's theorem, Gauss's divergence theorem (without proof) related identities and problems.	**05**
7.	**Complex Variables:** Line Integral of function of complex variable. Cauchy's theorem for analytical function (with proof). Cauchy's Goursat theorem (with proof). Properties of line integral, Cauchy's Integral formula and deduction. Singularities and poles: Taylor's and Laurent's development (without proof), residue at isolated singularity and it's evaluation. Cauchy's residue theorem &application to evaluate real integrals of type. $\int_0^{2\pi} f(cos\square, sin\square)d\square$ and $\int_{-\infty}^{+\infty} f(x)dx$	**10**

Text Books;

G.V kumbhojkar "Applied Mathematics-III", C.Jamanadas 1st Edition.

Reference Books:

1. Complex variables byChurchill,(TataMcGrawHill.)
2. Theory of function Complex VariablebyShantiNarayan(S.Chand&co.)
3. Advanced Engineering MathematicsbyJain,Iyengar(NarosaPublishing)

SR.NO.	EXAMINATION	MODULE
1.	T1	1,2
2.	T2	3,4
3.	ENDSEMESTER	1TO7

SEMESTER-III	**CLASS: S.Y. B.Tech. (Electrical)**		
CODE:BTE202	**COURSE: Electronic Circuits**		
Period per week (each of 60 minutes)	Lecture	04	
	Laboratory	---	
	Tutorial	---	
Scheme of Evaluation		Hours	Marks
	In Semester	01	20*2
	End Semester*	03	100
	Practical	---	----
	Laboratory Work(Journal)		
	TOTAL		100

*60%Weightageforendsemester

Course Objectives:

1. Introduce Clipping and Clamping Circuits.
2. Discuss various transistors and its biasing techniques.
3. Introduce configurations and applications of Differential amplifier.
4. Discuss Op-amp and its practical applications.
5. Discuss basics of analog and digital converter circuits.

Course Outcomes:

1. Able to select appropriate electronic devices to design clippers and clampers
2. Able to understand various biasing techniques for bjt and fet.
3. Able to understand differential amplifier
4. Select appropriate electronic components to design
5. To design various opamp circuit depending on application required.
6. Understand and use appropriately ADCs and DACs

Course Contents:

Module	Details	Hrs.
	Prerequisite:-P-N junction diode, BJT, FET characteristics.	
1	**Application of diodes:** Clippers,Clampers	**04**
2	**Bipolar Junction Transistor:** Different biasing techniques, Introduction to h-parameter equivalent circuit, Introduction to StabilityFactors.	**06**
3	**Field Effect Transistor:** Different biasing techniques, Introduction to ac equivalent circuit. Introduction to MOSFET	**06**
4	**Differential Amplifier Circuit Configuration:** Introduction to DIBO, DISO, SIBO, SISO. Differential amplifier with swamping resistors, constant current bias and current mirror.	**04**
5	**Operational amplifier(Op-amp):**Block diagram representation of typical op-amp, equivalent circuit	**06**

6	**Op-amp applications:** (i)Summing, scaling and averaging amplifiers, instrumentation amplifier, V to I converter(with floating load and grounded load), (ii) I to V converter, differentiator, integrator, Precision rectifier -half wave and ful wave, comparator, zero crossing detector, Schmitt trigger, clipper, clamper, Peak Detector**.**	**14**
7	**A/D and D/A converters** Introduction, Basic A to D conversion techniques, Basic D to A conversion Techniques.	**08**

Text books

1. Robert Boylestad and Louis Nashelsky, 'Electronic devices and circuits',Prentice Hall of India 7 th Edition, London.
2. DavidBell,'Electronic Devices and Circuits',5thEdition, Oxford University Press
3. Allen Mottershead,"Electronic Devices and Circuits an introduction",PrenticeHall of India,2004.
4. Donald A. Neamen, "Electronic Circuit Analysis and Design", Tata McGraw-Hill Publishing Company Limited, second edition,2002.

References:

1. Bhargava, Kulshreshtha, Gupta: 'Basic Electronics and Linear Circuits' TTTI Chandigarh, Tata McGrawHill, New Delhi.1984
2. K.R.Botkar,"Integrated Circuits",KhannaP.ublication,10thEdition,2006
3. D.Roy Choudhari and Shail B.Jain,"Linear Integrated Circuits", 3rd Edition New age International Publishers.
4. Gayakwad Ramakant," Op-Amps and Linear Integrated Circuits", 4thEdition, PHI publication

SR.NO.	EXAMINATION	MODULE
1.	T1	1,2,3
2.	T2	4,5,6(i)
3.	ENDSEMESTER	1TO7

SEMESTER-III	CLASS: S.Y. B.Tech. (Electrical)		
CODE:BTE252	COURSE: Electronic Circuits Lab		
Period per week (each of 60 minutes)	Lecture		
	Laboratory	02perbatch	
	Tutorial	---	
Scheme of Evaluation		Hours	Marks
	In Semester	-	25
	End Semester*	-	-
	Practical	02	-
	Laboratory Work (Journal)	---	-
	TOTAL	---	25

Course Objectives:

1. Understand diode as a Clipper and Clamper.
2. Learn characteristics of transistors
3. Understand working of Differential amplifier.
4. Learn practical applications of Op-amp .
5. Learn instrumentation amplifier.

Course Outcomes:

1. Able select components to design clippers and clampers
2. Able to calculate parameters of transistors from characteristics.
3. Able to calculate CMRR of differential amplifier
4. Select appropriate electronic components to design various opamp circuit depending on application required.
5. Understand and use instrumentation amplifier

Term work List of Experiments

1. Diode as clipper
2. Diode as clamper
3. Differential Amplifier
4. Transfer Characteristics of op-amp.
5. V to I converter
6. Schmitt Trigger
7. Integrator
8. Differentiator
9. Instrumentation Amplifier

SEMESTER-III	**CLASS: S.Y. B.Tech. (Electrical)**		
CODE: BTE203	**COURSE: Electrical Networks**		
Period per week (each of 60 minutes)	Lecture	04	
	Laboratory	---	
	Tutorial	02perbatch	
Scheme of Evaluation		Hours	Marks
	In Semester	01	20*2
	End Semester*	03	100
	Practical	---	---
	Laboratory Work (Journal)	---	25
	TOTAL		125

*60%Weightageforendsemester

Course objective

1. Analysis of basic electrical circuits using various network theorems.
2. Introduction to the concept of graph theory and network topology.
3. Detailed study of RL, RC and RLC circuits and network analysis using Laplace transform.
4. Introduction to special signal waveform analysis, complex frequency and its response.
5. Overview of network functions and network synthesis.
6. Introduction to MATLAB software for circuit analysis.
7. Synthesize a network function.

Course Outcome:

Upon successful completion, a student should able to:

1. Explain basic circuit concepts and responses.
2. Model passive elements and sources.
3. Use analytical techniques in electrical circuits energized by DC/AC voltage and current sources.
4. Understand the concept of network topology.
5. Evaluate Laplace Transform of a given function.
6. Analyze given electrical network using Laplace transform.
7. Understand realization of a network system from network function.
8. Acquire skills in using electrical measuring devices.
9. Evaluate a given circuit using simulation software and laboratory experiments.

Course Contents:

Module	Details	Hrs
1.	**Network Theorems on networks with AC circuits, networks with Dependent Sources:** Nodal, mesh and loop analysis. Supermesh, Super node Analysis. Superposition, source transformation, Thevenin's & Norton's theorem. Maximum transfer theorem, reciprocity theorem.	**08**
2.	**Graph Theory and NetworkTopology:** Concept of Graph of a Network, Tree, co-tree, Incidence, cutest and tieset matrices, their relation to the Kirchoff's Laws.Concept of Duality.	**04**
3.	**RL, RC and RLC Circuits:** (i)Source free RL, RC Circuit Analysis using First Order differential equations-General and Particularsolutions,Properties of exponential response, Time constants, integrating factor, Initial Conditions in elements, Geometrical interpretation of derivatives, Procedure for evaluatinginitialconditions,InitialStateofanetwork.Networksexcited by external EnergySourceslikestep,ramp,impulseandsinusoidal source.(ii)Source-free series,parallelRLCcircuits.Overdamped,critical and under damped RLCcircuit,Lossless LC circuits, Series Resonance, Parallel Resonance, Networks excited by external Energy Sources like step,ramp,impulse and sinusoidal source.	**16**
4.	**(i)Application of Laplace Transform to Network Analysis** R,L and C in s domain ,Nodal and Mesh Analysis in s-Domain,Transient and steady state response of simple R-L-C network to step,ramp,impulse and sinusoidal input function.**(i)Analysis of special signal wave forms:** Shifted unit step, ramp and impulse functions Waveform synthesis* (ii)**Complex frequency and frequency response:** Complex frequency. Frequency response as af unction of sigma, Complex frequency plane,	**09**
5.	**Network Functions; poles and zeros:** Terminal pairs or ports ,Network functions for one port and two port. Calculation of network functions for general networks .Concept of poles& zeros. Restrictions on poles &zeros for driving point function and transfer functions. Time domain behavior from pole-zeroplots.Stability of active network	**04**
6.	**Two Port Network:** Network configuration. Z,Y parameters. Input,output impedance in terms of two port parameters.	**03**
7.	**Network synthesis:** Properties of positive real function testing of positive real functions Driving point synthesis of LC,RC and R Lnetworks,Foster and Cauer forms.	**04**

***:Emphasis on simulation during lab session.**

Term work: The term work shall consist of at least five experiments/ computer simulations using software such as MATLAB as well as at least seven tutorials covering the whole syllabus.

Proposed MATLAB simulations:

- Verification of different Network Theorems
- R-L, R-C, R-L-C Transient Analysis
- Analysis of special signal waveforms

Textbooks:

1. M.E. Van Valkenburg: Network Analysis. Prentice-Hall ofIndiaPvt. Limited., EasternEconomyEdition,1999.
2. W.H.Hayt,Jr.andJ.E.Kemmerly:EngineeringCircuitsAnalysis,Tata-McGRAW-HILLPublication,Fifthedition,1993.
3. ChakrabartiA.:CircuitTheory(Analysis&Synthesis),DhanpatRai&Co.
4. RoyChaudharyD.:Networks&Systems,NewAgeInternationalPublisher.

References:

1. Schaum'sOutlineSeries:Electricalnetworks.1990
2. M.E. VanValkenburg: Introduction toModern Network Synthesis, WileyEastern Limited,Fifth Reprint,1986.

SR.NO.	EXAMINATION	MODUL
1.	T1	1,2,3(I)
2.	T2	3(II),4,5
3.	ENDSEMESTER	1TO7

SEMESTER-III	**CLASS: S.Y. B.Tech. (Electrical)**		
CODE:BTE204	**COURSE: Integrated Circuits**		
Period per week (each of 60 minutes)	Lecture	04	
	Laboratory	-	
	Tutorial	---	
Scheme of Evaluation		Hours	Marks
	In Semester	01	20*2
	End Semester*	03	100X01
	Practical	---	---
	Laboratory Work (Journal)	---	-
	TOTAL		100

*60%Weightageforendsemester

Course Objectives:

1. Understand the number systems and coding.
2. Discuss the features of combinational circuits.
3. Understand flip flops and their applications.
4. Remember different logic families, their interfacing and memories

Course Outcomes:

1. Differentiate between number systems and classify different binary codes.
2. Analyze and design combinational circuits.
3. Design of sequential circuits and registers using Flip Flops.
4. Classify different logic families and memories.

Course Contents:

Module	Details	Hrs.
1.	**Number System and Codes:** Binary, Octal, Hexadecimal number systems, Conversion from one system to another, Binary Arithmetic, BCD, GRAY, Alphanumeric codes, Error detecting codes-odd and even parity, error detecting and correcting codes-Hamming codes.	**05**
2.	**Combinational circuits:** Derive Gates, Max terms, Min terms, SOP and POS implementation, K-Maps and their use in simplifying Boolean expressions, Implementing a logic function using universal gates.	**05**
3.	**Combination Logic Circuit Design:** (i) Adders, Subtractors(Half and Full), carry look ahead adder, serial adder, magnitude comparators (ii) Arithmetic logic units, multiplexers, demultiplexers parity encoder, code converter, Hazards in Combinational circuits.	**12**
4.	**Sequential Logic Circuits:** Comparison of combinational and sequential circuits, Flip-flops: SR, T, D, JK, Master-slave JK, converting one flip flop to another, debounce switch, Counter: Ripple counter,updowncounter,Scynchronous counter,designing of counters, state transition diagram,ring counter,twisted ring counter, Un used states and locked conditions.	**16**

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5.	**Registers:** SISO,SIPO,PISO,PIPO registers, pseudorandom sequence generator.	**04**
6.	**Logic Families:** TTL,C-MOS logic families and their interfacing.	**04**
7.	**Introduction to memories.**	**02**

Text Books

1. JainR.P."ModernDigitalElectronics"TataMcgrawHill,thirdedition,1984
2. MorrisMano,"DigitalDesign",PrenticeHallInternational,thirdedition.

Reference Books

1. AlanB.Macrovitz,"IntroductiontoLogicDesign",McGrawHillInternational, 2002
2. MalvinoandLeach,"DigitalPrincipalandApplication",TataMcGrawHill,sixth edition,2006
3. BignellJamesandDonovanRobert," Digital Electronics", Delmar,Thomas Learning2001
4. SalivahananS.Digital circuits andDesign, VikasPublication house Pvt. Ltd., thirdedition,2007

SR.NO.	EXAMINATION	MODULE
1.	T1	1,2,3(I)
2.	T2	3(II),4
3.	ENDSEMESTER	1TO7

SEMESTER-III	**CLASS: S.Y. B.Tech. (Electrical)**		
CODE:BTE254	**COURSE: Integrated Circuits Lab**		
Period per week (each of 60 minutes)	Lecture		
	Laboratory	02perbatch	
	Tutorial	---	
Scheme of Evaluation		Hours	Marks
	In Semester		25
	End Semester*		
	Practical	---	---
	Laboratory Work (Journal)	---	
	TOTAL		25

Course Objectives:

1. Understand the basics of circuit making on bread board
2. Test the working of the circuit
3. Introduce simulation using software

Course Outcomes:

1. Design given circuits using discrete components
2. Understand the basics of simulation.
3. Test the designed circuit to get required output.

Distribution of marks for in semester evaluation will as under, Attendence - 20 %, practical Performed during semester and graded assignment submission/ – 40 %, /Practical Examination/mini project – 40 %

List of Experiments/Programs:

1. LogicExpressions simplification and implementation.
2. Half Adder and Half Subtractor using gate IC's.
3. CodeConverter:BinarytoGray,BCDtoXS-3.
4. IC7483as4bitadderandsubtractor
5. Multiplexer4:1usinggates.
6. Demultiplexer1:16usingTINAsoftware.
7. Flip-Flops:S-R,J-K,D,TusingonlyNANDgates.
8. BCDCounter
9. RingCounter,TwistedRingCounter.

SEMESTER-III	**CLASS: S.Y. B.Tech. (Electrical)**		
CODE:BTE205	**COURSE: Electrical Machines–I**		
Period per week (each of 60minutes)	Lecture	04	
	Laboratory	02perbatch	
	Tutorial	---	
Scheme of Evaluation		Hours	Marks
	In Semester	01	20*2
	End Semester*	03	100
	Practical	02	50
	Laboratory Work(Journal)	---	25
	TOTAL		175

*60%Weightageforendsemester

Course Objectives:

1] Introduction to magnetic properties of materials.
2] To understand the concepts of energy conversion.
3] Understand the principle and operation of Transformers, DC motors and 3-Ø induction motors.
4] Detailed study of the operating characteristics of the DC machines and induction machines.

Course Outcomes:

1] Necessary steps for interconnection of generators and transformers.
2] Choice of a motor for a given application or performance specifications.

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Course Contents:

Module	Details	Hrs.
1.	**Magnetics:** Magnetic properties of material,magnetic circuit, magnetic coupling.	**08**
2.	**Electromechanical Energy Conversion** Principle, Energy stored in magnetic field, Torque in singly and doubly excited magneticfield,Torque from energy and coenergy.	**06**
3.	**Transformers:** Principle of operation of single phase and three phase transformers, Equivalent circuit, Phasor diagram,O.C.andS.C.test:Efficiency and regulation,Transformer and Vector Groups, Parallel operation of transformers,.	**06**
4.	**Excitation phenomenon in transformers**: Transformer harmonics, Oscillating neutral, Transformer switching current transient, Autotransformers, Tap changing transformers	**06**
5.	**Three Phase Induction Machine:** (i)Construction and principle of operation of squirrel cage& slip ring Induction motor, (ii) Steady state analysis: Torque -speed characteristics,maximum torque,starting torque.	**08**
6.	Starting and speedcontrol, Cogging and crawling of motors, Induction Generator: Principle of operation.	**06**
7.	**DC Motors:** Construction,Commutator & process of commutation,Armature reaction,Emf and torque equations,Type of motors and their applications,Torque speed relations, Introduction to speed control and starting methods.	**08**

TextBooks:

1. P.C.Sen,PrinciplesofElectricMachinesandPowerElectronicsWileyIndiaPvtLtd, secondedition,January2007.
2. NagrathI.J.,KothariD.P.,ElectricMachines,TMHPublications,thirdedition,2004.
3. P.S.Bimbra, Electrical Machinery , by Khanna Publisher, 2009
4. P.S.Bimbra, Generalized theory of Electrical Machines, Khanna Publisher, 2009

Reference Books

1. M.G.Say,The Performance and Design of Alternating CurrentMachines, CBS PublishersandDistributors
2. A.E.Fritzerald and Charles KingsleyJr.,Stephen D.Umans, Electrical Machinery, TMHPublications.Sixthedition,October2002.

SR.NO.	EXAMINATION	MODULE
1.	T1	1,2
2.	T2	3,4,5(i)
3.	ENDSEMESTER	1TO7

SEMESTER-III	**CLASS: S.Y. B.Tech. (Electrical)**		
CODE:BTE255	**COURSE:Electrical Machines–I Lab**		
Period per week (each of 60 minutes)	Lecture	-	
	Laboratory	02perbatch	
	Tutorial	---	
Scheme of Evaluation		Hours	Marks
	In Semester	-	50
	End Semester*	-	-
	Practical	02	-
	Laboratory Work(Journal)		
	TOTAL		50

Distribution of marks for in semester evaluation will as under, Attendence - 20 %, practical Performed during semester and graded assignment submission/ – 40 %, /Practical Examination/mini project – 40 %

Course Objective

1] Introduction to magnetic properties of materials.

2] To understand the concepts of energy conversion.

3] Understand the principle and operation of Transformers, DC motors and 3-Ø induction motors.

4] Detailed study of the operating characteristics of the DC machines and induction machines.

Course

Course Outcomes

1] Necessary steps for interconnection of generators and transformers.
2] Choice of a motor for a given application or performance specifications

List of Experiments:

1] To perform load test on DC Shunt Motor.
2] To study speed control of DC Shunt Motor.
3] To study speed control of DC Series Motor.
4] To perform load test on 3 Phase Induction Motor.
5] To observe torque speed characteristic of Induction Motor by inserting different value starting resistances in rotor circuit.
6] To perform open circuit and short circuit test on 3 Phase Transformer.
7] To study parallel operation of two single phase transformer.
8] To study the effect of supply voltage variation on torque speed characteristic of 3 Phase Induction Motor.

SEMESTER-III	**CLASS: S.Y. B.Tech. (Electrical)**		
CODE:BTE206	**COURSE:Numerical Techniques**		
Period per week (each of 60 minutes)	Lecture	04	
	Laboratory		
	Tutorial	---	
Scheme of Evaluation		Hours	Marks
	In Semester	01	20*2
	End Semester*	03	100
	Practical	---	---
	Laboratory Work(Journal)	---	
	TOTAL		100

*60%Weightageforendsemester

Course Objectives

1. To introduce the concepts of numerical techniques.
2. To discuss different numerical methods used for finding roots of equations, solving systems of linear algebraic equations, curve fitting, solving numerical differentiation and integration, solving ordinary differential equations.
3. To understand the relevance of these numerical techniques to solve the real world problems of science and engineering.

Course Outcomes

Upon successful completion, a student should able to:

1. Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems
2. Apply numerical methods to obtain approximate solutions to mathematical problems.
3. Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations
4. Analyze and evaluate the accuracy of common numerical methods.

Course Contents:

7.	**Optimization:** One-dimensional unconstrained –Golden-section Search,Quadratic Interpolation, Newton'sMethod,Linear Programming–Graphical solution and simplex Method.	**06**

Text Books:

1. StevenC.Chapra,RaymondPCanale"NumericalMethodsofEngineering",TataMcGraw-HillPublishingCompanyLtd.,Fourthedition,2002
2. Robert J Schilling, Sandra L Harris, " Applied Numerical Methods for Engineers(UsingMatlabandC)",CengageLearning,Firstedition,2007.
3. S.D.ConteandCarldeBoor,"ElementaryNumericalAnalysis-AnAlgorithmic Approach",McGraw-HillBookCompanyLtd.,Thirdedition,1980.
4. E.Kreyszig, "Advancedengineeringmathematics", JohnWileyandSons,Ninth edition,2006.

Reference Books

1. A. Greenbaum and T. P. Chartier, "Numerical Methods", Princeton University Press, 2012.
2. W. Cheney and D. Kincaid, "Numerical Mathematics and Computing", Thomson, 2004.
3. NPTEL Notes and Video Lectures.

SR.NO.	EXAMINATION	MODULE
1.	T1	1,2,3
2.	T2	4,5,6(I)
3.	ENDSEMESTER	1TO7

Module	Details	Hrs.
1.	**Errors analysis:** Significant Figure, Accuracy and Precision, Error Definitions, Round Off Errors, Truncation Errors, Error Propagation, Blunders, Formulation Errors, Data Uncertainty.	**04**
2.	**Roots of Equations:** Bracketing Methods - The Bisection Method, The False Position Method. Open Methods – The Newton-Raphson Method, The Secant Method.	**06**
3.	**Linear Algebraic equations:** Gauss – Elimination Method- Technique, pitfalls, improvement, Gauss – Jordan Method, LU decomposition and matrix inversion, Gauss–Seide lMethod,Application:Solving resistive networks.	**08**
4.	**CurveFitting:Interpolation**–Newton's divided difference,Lagrange Interpolating Polynomials,LeastsquareRegression-Linear regression and Polynomial regression.	**06**
5.	**Numerical Differentiation and Integration:** (i)HighAccuracyDifferentialFormulas,Derivatives of Unequally Spaced data. (ii)TheTrapezoidalrule,Simpson's1/3rule,Simpson's3/8rule.	**04**
6.	**Solution to Ordinary Differential Equations:** (i)Euler's Method,Improvements of Euler's method (ii) Runge-KuttaMethod	**08**

SEMESTER-III	**CLASS: S.Y. B.Tech. (Electrical)**		
CODE:BTE256	**COURSE:Numerical Techniques Lab**		
Period per week (each of 60minutes)	Lecture	04	
	Laboratory	02perbatch	
	Tutorial	---	
Scheme of Evaluation		Hours	Marks
	In Semester	01	20*2
	End Semester*	03	100
	Practical	---	---
	Laboratory Work (Journal)	---	25
	TOTAL		125

Course Objectives

1. Implement numerical methods in MATLAB or C.
2. Write efficient, well-documented MATLAB or C code and present numerical results in an informative way.
3. Verify various theoretical concepts of numerical methods in laboratory.

Course Outcomes

Upon successful completion, a student should able to:

1. Validate the theoretical concepts of numerical techniques using MATLAB or C.
2. Write a MATLAB or C Program for various numerical techniques.
3. Select appropriate numerical methods to apply to various types of problems in engineering and science considering the mathematical operations involved, accuracy requirements, and available computational resources.
4. Demonstrate they understand the mathematics concepts underlying the numerical methods considered.
5. Demonstrate understanding and implementation of numerical solution algorithms applied to various classes of problems: such as for finding roots of equations, solving systems of linear algebraic equations, curve fitting, solving numerical differentiation and integration, solving ordinary differential equations.

Distribution of marks for in semester evaluation will as under, Attendence - 20 %, practical Performed during semester and graded assignment submission/ – 40 %, /Practical Examination/mini project – 40 %

ListofAssignments/Programs

- BisectionMethod
- SecantMethod
- NewtonRaphsonMethod
- GaussElimination
- GaussJordan
- GaussSeidal
- Newton'sdivideddifferenceinterpolation
- Lagrange'sInterpolation
- Simpson's1/3Rule
- Euler'sRule
- 1Runge-KuttaMethod

S.Y. B.Tech. (Electrical). In Electrical Engineering

Academic Scheme and Syllabus

Sem.IV

2015-16

SEMESTER-IV	**CLASS: S.Y. B.Tech. (Electrical)**		
CODE:BTE226	**COURSE: Engineering Mathematics IV**		
Period per week (each of 60 minutes)	Lecture	04	
	Laboratory		
	Tutorial	---	
Scheme of Evaluation		Hours	Marks
	In Semester	01	20*2
	End Semester*	03	100
	Practical	---	---
	Laboratory Work (Journal)	---	---
	TOTAL	---	100

*60% Weightage for end semester

Course Objectives:

1. Introduce Statistical methods, probability distribution and testing of hypothesis.
2. Introduce Rank of matrix, Cayley-hamilton theorem
3. Introduction to types of Matrices inner product norm

Course Outcomes:

Upon successful completion of course students will be able to

1. Solve problem in basic statistics, probability, probability distribution, testing of hypothesis.
2. Solve matrices to find rank and powers.
3. Solve homogeneous and non-homogeneous system of linear equations. Linear independence and dependence of vectors.

Course Contents:

Module	Details	Hrs.
1.	**Statistics:** Curve fitting: Correlation, Karl Pearson coefficient &Spearman's rank correlation coefficient, linear regression, lines of regression.	**10**
2.	**Probability and Statistics:** Concept of probability, conditional probability, Baye's theorem, Random variable Probability distribution for discrete and continuous random variables, Density function and distribution function. Expected value, variance, moments, moment generating function, Binomial, Poisson, normal distributions for detailed study with proof,	**05**
3.	**Testing of Hypothesis:** Statistical decisions, hypothesis. Null & alternate hypothesis. Test of hypothesis and significance. Type I & type II error.LOS. One tail two tail test. Test of significance for large samples Test of significance for small samples (t-test, pairedt-test, F-test)	**06**
4.	**Testing of Hypothesis:** Population & sample. Sampling with & without replacement, Random Samples. Population parameters, sample statistics. Sampling distributions. Samples mean, sampling distribution of means, sampling distribution of proportions Sample variance, Sampling distribution of variances.	**08**
5.	**Matrices:** Types of matrices, Adjoint of a matrix, Inverse of a matrix, Rank of a matrix, Linear dependence and independence of rows and columns of a matrix over a real field, Reduction to normal form and partitioning of a matrix, Systems of homogeneous and non-homogeneous equations, their consistency and solutions, Brief revision of vectors over real fields, inner product, norm, linear independence and orthogonality of vectors.	**10**
6.	**Matrices:** Unit Characteristic Polynomial, characteristic equation, characteristic roots, and characteristic vectors of square matrix, properties of characteristic roots and Vectors of different types of matrices such as orthogonal matrix, Hermitian matrix, Skew-Hermitian matrix. Cayley-Hamilton theorem (with out proof).	**05**

7.	**Matrices:** functions of square matrix, minimal polynomial and derogatory matrix, Quadratic forms, Congruent and orthogonal reduction of quadratic form, rank, index, signature and class value of quadratic form.	**04**

Text Books:

1. Engineering mathematics-IV by G.V. Kumbhojkar

Reference Books:

1. Matrices by Shanti Narayan (S.Chand&co.)
2. Matrices by A.R.Vashitha
3. Statistics and probability by Murray Spiegel(Schaumseries)

SR.NO.	EXAMINATION	MODULE
1.	T1	1,2,
2.	T2	3,4
3.	END SEMESTER	1TO7

SEMESTER-IV	**CLASS: S.Y. B.Tech. (Electrical)**		
CODE:BTE227	**COURSE:ANALOG CIRCUITS**		
Period per week (each of 60minutes)	Lecture	04	
	Practical		
	Tutorial	---	
Scheme of Evaluation		Hours	Marks
	In Semester	01	20*2
	End Semester*	03	100
	Practical	-	-
	Laboratory Work (Journal)	-	--
	TOTAL	---	100

*60%Weightageforendsemester

Course Objectives:

1. Introduce power amplifiers.
2. To discuss frequency response of op-amp and fet.
3. Introduction and application of 555 timer and voltage regulator.
4. Introduce active filters.
5. Discuss negative feedback amplifiers.
6. Discuss oscillators.

Course Outcomes:

Understand frequency response of Op-Amp and BJT.

1. Able to design power amplifier to meet the desired requirement.
2. Understand the functions of basic building blocks of 555 timer
3. Understand the functions of basic building blocks of voltage regulators.
4. Compare circuits using negative feedback.
5. Able to design active filters
6. Select appropriate components to design oscillator.

Course Contents:

Module	Details	Hrs.
1.	**Power Amplifiers:** Introduction to different types of Large signal amplifiers viz. Class A,B,AB,C.	04
2.	**Frequency response:** BJT and op-amp.	06
3.	**555timer:** Introduction to the block diagram, Applications: astable and mono-stable multivibrator with applications of each.	08
4.	**Voltage regulator:** Fixed Voltageregulator:78XX,79XX,AdjustableVoltageregulator:723	06
5.	**Active Filters:** First and Second order LP,HP,BP & band reject filters.	08
6.	**Feedback amplifiers (Negative Feedback):** Introduction to negative and positive feedback, Negative feedback Current, Voltage: Series and Shunt type Effect of Negative feedback on:	08

7.	**Oscillators:** Frequency of oscillation, Condition for maintenance of oscillations of: (i) RC phase shift (ii) Wien Bridge, Crystal oscillator.	08

Text Books:

1. Robert Boylestad and Louis Nashelsky,'Electronic devices and circuits', Prentice HallofIndia7thEdition, London.
2. David Bell, 'Electronic Devices and Circuits',5th Edition, OxfordUniversity Press
3. Allen Mottershead, "Electronic Devices and Circuits an introduction", Prentice Hall of India, 2004.
4. Donald A. Neamen, "Electronic Circuit Analysis and Design", Tata McGraw-Hill Publishing Company Limited, second edition, 2002.

References

1. Bhargava, Kulshreshtha, Gupta: 'Basic Electronics and Linear Circuits' TTTI Chandigarh, Tata McGraw Hill, New Delhi.1984
2. K. R. Botkar," Integrated Circuits", Khanna Publication 10th Edition, 2006
3. D. Roy Choudhari and Shail B.Jain," Linear Integrated Circuits", 3rd Edition New age International Publishers.
4. Gayakwad Ramakant ," Op-Amps and Linear Integrated Circuits",4th Edition, PHI publication.

SR.NO.	EXAMINATION	MODULE
1.	T1	1,2,3
2.	T2	4,5
3.	END SEMESTER	1TO7

SEMESTER-IV	**CLASS: S.Y. B.Tech. (Electrical)**		
CODE:BTE277	**COURSE:ANALOG CIRCUITS Lab**		
Period per week (each of 60minutes)	Lecture		
	Practical		
	Tutorial	---	
Scheme of Evaluation		Hours	Marks
	In Semester		25
	End Semester*		
	Practical	02	
	Laboratory Work (Journal)	-	--
	TOTAL	---	25

Distribution of marks for in semester evaluation will as under, Attendances - 20 %, practical Performed during semester and graded assignment submission/ – 40 %, /Practical Examination/mini project – 40 %

Course Objectives:

1. To plot frequency response of Op-Amp and BJT .
2. Use IC 555 as mono-stable and astable multivibrator.
3. Introduce active filters.
4. Understand negative feedback amplifiers.
5. Learn oscillators.

Course Outcomes:

1. Compare frequency response of Op-Amp and BJT by plotting it experimentally.
2. Able to select component values for astable and mono-stable multivibrators using IC 555
3. Able to use voltage regulators using IC 723.
4. Able to design active filters
5. Select appropriate components to design oscillator.

Term Work

List of Experiments:

1. Frequency Response of Op-amp
2. Astable multivibrator using 555
3. Mono-stable multivibrator using 555
4. Low voltage regulator
5. High voltage Regulator
6. First order LPF.
7. Wein Bridge Oscillator
8. RC phase shift Oscillator
9. Gain of CE amplifier with and without Feedback (CE bypass Capacitor)

SEMESTER-IV	**CLASS: S.Y. B.Tech. (Electrical)**		
CODE:BTE228	**COURSE: Electrical & Electronic Measurements**		
Period per week (each of 60 minutes)	Lecture	04	
	Laboratory	-	
	Tutorial	---	
Scheme of Evaluation		Hours	Marks
	T1	01	20*2
	End Semester*	03	100
	Practical	---	---
	Laboratory Work (Journal)	---	-
	TOTAL	---	100

*60%Weightageforendsemester

Course Objectives:

- Detailed study of analog measurement instruments.
- Understanding of time, voltage, frequency and ratio metric digital measurement techniques.
- Introduction to transducer and instrument transformer.

Course Outcomes:

- Selection of appropriate measuring technique and instrument for measurement of desired parameter/quantity.

Course Contents:

Module	Details	Hrs.
1.	**Analog Measuring instruments** General features of indicating, recording and integrating type of instruments, Working Principles of analog instruments, Megger,Bridge measurements- Wheatstone bridge, Maxwell'sbridge.	**04**
2.	**Digital time measurement:** Measurement of time interval between 2 events, resolution, Measurement of time interval with constraint ,Measurement of periodic time ,Capacitance measurement, Phase measurement, Measurement of time interval between 2 events defined by voltage levels, Time constant measurement.	**07**
3.	**Digital frequency measurement:** Digital measurement of ratio of two frequencies, Digital measurement of product Of two frequencies, High frequency measurement, Power system frequency deviation measurement, Peak frequency measurement, Fast low frequency measurement of sinusoidally varying signal	**07**
4.	**Digital Voltage measurement:** Sampling theorem, Time division multiplexing ,Quantization, Indirect type A/D converter, Voltage to frequency converters, Direct type analog to digital converters, Input circuitry of digital voltmeter	**08**
5.	**Digital ratio metric measurements:** Ratiometric measurement techniques, applications ,Digital ohm meter, Digital Capacitance meter, Frequency meter for sinusoidal signals, Digital quality factor meter	**08**

6.	**Instrument transformers:** Theory of Current and potential transformers, Definition importance and applications, Definition of ratio and phase angle errors	**08**
7.	**Transducers:** Measurement of vibration, velocity, f low ,level ,Photoelectric, strain gauge ,and measurement of strain performance, Characteristics and selection for given application	**06**

Term Work

Experiments(7-8)based on above syllabus.

Text Books:

1. Digital measurement techniques by T.S.Rathore Narosa Publishing house.
2. Sawhney.A.K.-A course in Electrical and electronics measurements and InstrumentationbyDhanpatRaiandSons17thedition2007.

Reference Books

1. KalsiH.S.ElectronicInstrumentationTataMcGrawHill,3rd edition1997.
2. Doeblin E.O Measurement system application and designTataMcGrawHill,4rd edition1990.

SR.NO.	EXAMINATION	MODULE
1.	T1	1,2,3
2.	T2	4,5
3.	ENDSEM	1TO7

SEMESTER-IV	**CLASS: S.Y. B.Tech. (Electrical)**		
CODE:BTE278	**COURSE: Electrical & ElectronicMeasurements Lab**		
Period per week (each of 60minutes)	Lecture		
	Laboratory	-02	
	Tutorial	---	
Scheme of Evaluation		Hours	Marks
	In Semester	-	-
	Practical	02	---
	Laboratory Work (Journal)	---	-
	TOTAL	---	25

Distribution of marks for in semester evaluation will as under, Attendence - 20 %, practical Performed during semester and graded assignment submission/ – 40 %, /Practical Examination/mini project – 40 %

Course Objectives

1] Detailed study of analog measurement instruments.
2] Understanding of time, voltage, frequency and ratio metric digital measurement techniques.
3] Introduction to transducer and instrument transformer.

Course Outcomes

1] Selection of appropriate measuring technique and instrument for measurement of desired parameter quantity.

List of Experiments:

1] To measure the energy consumed by load using analog energy meter and compare the measurement with static energy meter.
2] To study the working of Megger and carry out measurement of insulation resistance.
3] To study the working of vibrating reed type frequency meter.
4] To study analog to digital conversion using LM0804.
5] To study the active filters low pass, high pass, band pass and band reject filter.
6] To measure input voltage signal using Voltage to Frequency Converter using IC 555.
7] To study the working principle and constructional details of electrodynamometer wattmeter.
8] To study the operation and working of the thermocouple.

SEMESTER-IV	**CLASS: S.Y. B.Tech. (Electrical)**		
CODE:EE229	**COURSE: Elements of Power System**		
Period per week (each of 60minutes)	Lecture	04	
	Laboratory	--	
	Tutorial	02perbatch	
Scheme of Evaluation		Hours	Marks
	T-I	01	20*2
	End Semester*	03	100
	Practical	---	---
	Laboratory Work(Journal)	---	25
	TOTAL		125

*60%Weightageforendsemester

Course Objectives

- Study of various power generating stations.
- Introduction to power system.
- Understanding the economics of power system.
- To obtain equivalent circuits for transmission lines based on distance and operating voltage for determining voltage regulation and efficiency and improve the voltage profile of the transmission line.
- To study the transmission system, parameters and its performance.
- To study earthing and safety techniques.

Course Outcomes

- Model a power system with requisite parameters.
- Appreciate importance of equipment earthing and system grounding

Course Contents:

Modul e	**Details**	**Hrs.**
1	**Generating station:** Electric energy, Fossil fuel plant, nuclear power plant,hydro power plant, gas turbine powe r plant, diesel power plant, renewable power plants.	04
2	**Power system representation** Basic structure of powers ystem, Overhead & underground systems, Choice of generating voltage, transmission voltages. Choice of economic Voltage ,Need for EHV transmission, Transmission &distribution network systems, Overheadlines and different types of underground cables.	04
3	**Economics of powerplant:** Load curves, load duration curve, Connected load, maximum demand, demand factor, Average load, load factor ,diversity factor, Tariff, deregulated electric power industry	06
4	**Transmission system** Main components of overhead lines, Line supports, Types of steel towers, Conductor materials, Conductor configuration spacing & clearance, span lengths, sag & tension, Types of insulator, Voltage distribution over insulator string, Methods to improve string efficiency.	03
5	**Line Parameters** Resistance: Skin effect and proximity effect, Inductance: Review of magnetic flux	12

	linkage of infinite straight wire, flux linkages; much conductor case, Conductor bundling, transposition, Capacitance: Review of electric fields, line capacitance, and Typical parameter values.	
6	**Performance of transmission line** (i)Representation of lines, Single line diagram, Single phase solution of balanced three phase network, Impedance diagram, reactance diagram, Per unit method, Advantage of per unit system, (ii)Shortline, mediumlineT&∏models,Interpretation of long line equation, Ferranti effect, Surge impedance loading, Power flow through transmission lines, Power handling capability of line**,** Travelling waves of transmission lines, wave equation, reflection and refraction of waves, typical cases of line terminations **Corona** Phenomenon of Corona, Disruptive critical voltage, Visual critical voltage Corona loss, factors affecting corona loss, Ratio Interference due to corona.	16
7	**Earthing and Safety Techniques:** Soil resistivity, earth resistance, Tolerable limit of body currents- tolerable step and touch voltage- actual step and touch voltage, Design of earthing grid- concrete encased electrodes- and tower footing – Resistance, Measurement of earth resistance, soil resistivity-Impulse behavior of Earthing Earthing system design.	03

Laboratory Work base done syllabus(Journal)

Text Books:

1. BergenR&VitthalV,"Power system analysis",Pearson publication,second edition,2009
2. GrainerJohn&.Stevenson,Jr.William,"Powersystem analysis",TataMcGraw-hillEdition2003
3. NagrathI.J.,KothariD.P.,"ModernPowersystem",TataMcGraw-hillEdition
4. DuncanGlover,SarmaMulukutla,OverbyeThomas,"Powersystem analysis&design",cengage learning,fourthedition

References:

1. GuptaB.R.,"Powersystemanalysis&design",S.Chand,
2. WadhawaC.L.,"ElectricalPowersystems",Newage internationa lpublication,5th edi
3. DeshpandeM.V.,"Elementsofpowerstationdesign"Wheeler publication,second edition.
4. MehtaV.K.&MehtaRohit,Principlesofpowersystem,S.Chand,fourthedition
5. GuptaB.R.,"Generation of electrical energy",S.Chand,sixth edition

SR.NO.	EXAMINATION	MODULE
1.	T1	1,2,3,4
2.	T2	5,6(i)
3.	ENDSEMESTER	1TO7

Distribution of marks for in semester evaluation will as under, Attendance - 20 %, practical Performed during semester and graded assignment submission/ – 40 %, /Practical Examination/mini project – 40 %

SEMESTER-IV	**CLASS: S.Y. B.Tech. (Electrical)**		
CODE:EE230	**COURSE:Signals & Systems**		
Period per week (each of 60minutes)	Lecture	04	
	Practical	--	
	Tutorial	--	
Scheme of Evaluation		Hours	Marks
	In Semester	01	20*2
	End Semester*	03	100
	Practical	---	---
	Laboratory Work (Journal)	---	-
	TOTAL		100

*60%Weightageforendsemester

Course Objective

1. To introduce the concepts of signals and systems.
2. To discuss different analysis tools (Fourier Series, Fourier Transform, Laplace Transform and Z-Transform) and their properties.
3. To carry out analysis and synthesis of both continuous-time and discrete time systems both in time domain and transform domain using different transforms and applied mathematics concepts.

Course Outcome:
Upon successful completion, a student should able to:

1. Understand and characterize CT and DT signals and systems.
2. Analyze CT and DT systems in Time domain using convolution.
3. Represent CT and DT signals in the Frequency domain using Fourier analysis tools like CTFS, CTFT, DTFS and DTFT.
4. Construct a periodic signal using trigonometric functions and exponential signals.
5. Evaluate Laplace Transform and Z-Transform of a given function.
6. Analyze CT system using Laplace transform.
7. Analyze DT systems using Z Transform.
8. Understand realization of system in block diagram form.
9. Relate different transforms.

Course Contents:

Module	**Details**	**Hrs.**
1.	Introduction to Signals & Systems :Definition of Signal,Signal classification, Signal manipulations,Periodicity in CT(ContinuousTime)&DT(DiscreteTime) domain, Concept of a system, System representations & classification, Impulse Response,Convolution,BIBO stability	08
2.	Revision of Fourier Series,Concept of Orthogonality,Different forms of Fourier Series, Fourier Series properties, Revision of Fourier Transform, Properties of Fourier Transform,Fourier Transform of important functions Spectral Content of a signal,Amplitude &phase spectra,Energy& Powersignals, Energy Spectral Density,Power Spectral Density	08

3.	Revision of LaplaceTransform,definition &properties,Two-sided&one-sided Laplace Transform, Region of Convergence (ROC), Relationship with Fourier Transform & mapping.	03
4.	CT Signal & system analysis in the Frequency Domain.	03
5.	Z Transform Two-sided Z Transform Region of Convergence (ROC), Relationship with Laplace Transform &mapping ,One-sided Z Transform.InverseZ Transform.	08
6.	Discretetime(DT) Systems Differenceequation,FIR&IIRsystems,Systemrealization,Linear,circular&CircularConvolution,TimeDomainAnalysisofDTSystems,Transferfunction &Impulse response,Solution of a difference equation, Zero input & zero state response calculations.	12
7.	DT Signal Analysis &Computation of Spectra DTFS definitions from orthogonal complex exponentials, CTFS &DTFS, Properties of DTFS ,Power Density spectrum, DTFT, Properties of DTFT. , Energy Density spectrum, Relationship between DTFT & Z transform.	06

TermWork
Course Contentstobetakenin7-8practicals

TextBooks:
1. HaykinSandVanVeenB.,Signal&Systems,WileyPublication,2ndEd.,2002
2. LindnerD.K.,Introduction to Signal & Systems,McGraw-Hill InternationalEdition, 1999.
3. Ambardar,Analog&DigitalSignalProcessing,Thomson learning,2ndEd.

Reference Books:
1. ProakisJ.G.andManolakisD.G.,"DigitalSignalProcessing:Principles,Algorithms andapplications",PHIpublications(1995).
2. LathiB.P.,Signal&Systems,OxfordUniversityPress,second edition,1998.
3. Chen,"Signal&Systems Analysis",Saunders College publishing, Seconde dition.

SR.NO.	EXAMINATION	MODULE
1.	T1	1,2
2.	T2	3,4,5
3.	END SEMESTER	1TO7

SEMESTER-IV	**CLASS: S.Y. B.Tech. (Electrical)**		
CODE:EE280	**COURSE:Signals&Systems Lab**		
Period per week (each of 60minutes)	Lecture	--	
	Practical	--	
	Tutorial	--	
Scheme of Evaluation		Hours	Marks
	In Semester		
	End Semester*		
	Practical	---	25
	Laboratory Work (Journal)	---	-
	TOTAL		25

Course Objective

1. To plot the signals.
2. To understand different in-built MATLAB functions related to signals and system.
3. To validate the theoretical results.

Course Outcomes

Upon successful completion, a student should able to:

1. Plot the signals.
2. Write a MATLAB Program.
3. Use in-built MATLAB functions for signals and system analysis.
4. Evaluate convolution of two signals.
5. Construct a periodic signal using basic signals.
6. Model the system in transfer function form.
7. Validate the theoretical results.
8. Plot frequency spectrum

Semester-IV	**Class:S Y. B. Tech**		
Code:BTE231	**Course: Micro processor and Micro controller**		
Period per week (each of 60minutes)	Lecture	04	
	Laboratory	---	
	Tutorial	---	
Scheme of Evaluation		Hours	Marks
	In Semester	01	20*2
	End Semester*	03	100
	Practical	---	---
	Laboratory Work (Journal)	---	---
	Total	---	100
	Credit	**04**	

*60%Weightageforendsemester

CourseObjectives:

- To introduce computer design and classify computer organization.
- To understand different types of memory used in computer systems.
- To understand the applications of Microprocessors & Microcontrollers.
- To understand architecture and features of typical Microcontroller.
- To learn interfacing of real world input and output devices.

CourseOutcomes:

After successfully completing the course students will be able to

- Describe the basic architecture of a computer.
- Learn importance of microcontroller in designing embedded application.
- Learn use of hardware and software tools.
- Write assembly language programs for the 8051 microcontroller.
- Develop interfacing to real world devices.

Course Contents

Module	**Details**	**Hrs**
1.	**Principles of Computer Design:** **Hardware:** Hardware interaction layers in computer architecture, Central processing unit. **Software:** Machine language instructions, Addressing modes, instruction types, Instruction cycle and execution cycle, Control unit, Data path and control path design.	06
2.	**Input Output devices:** Input-output processing, bus interface, data transfer techniques, I/O interrupts channel	04
3.	**Introduction to Microprocessor:** Architecture of Intel 8085/8086 Micro-Processor, Programming Model, operand types, Addressing modes, Instruction set- Data transfer group, Arithmetic group ,logical group, control transfer group, miscellaneous instruction groups, programming.	06

4.	**Microprocessor and Microcontroller architecture:** comparison, advantages of each Harward and Von Neumann architecture, RISC and CISC comparison, 8051 Microcontroller architecture.	04
5.	**8051 Microcontroller:** Assembly language programming, I/O Port Programming, 8051 Addressing Modes, Arithmetic & Logic Instructions and Programs, 8051 Programming in C.	08
6.	**8051 Interfacing:** Interfacing to External Memory,8051 Interfacing to LCD,ADC and Sensors, LCD and Keyboard Interfacing, 8051 Interfacing with 8255	06
7.	**Application of 8051**: such as: Seven Segment LED display, A/D and D/A converter, Power factor measurement and control.	02

Text Books:-

1. Mano M., "Computer System and Architecture", Prentice Hall of India, New Delhi,1994.
2. Muhammad Ali Mazidi, "The 8051 Microcontrollers and Embedded Systems using Assembly and C", PHI.
3. KennethJ.Ayala,"The8086Microprocessor:Programming&InterfacingThePC", Delmar Publishers,2007.

Reference Books:-

4. William Stallings, " Computer Organization and Architecture", Pearson Education
5. Kenneth J. Ayala, "The 8051 microcontroller", Delmar Cengage Learning.
6. Muhammad Ali Mazidi et al, "PIC Micro Controller And Embedded System", Pearson Education.
7. A K Ray,K M Bhurchandi ,Advanced Microprocessors and Peripherals,TMH, 2007.

Sr.No.	Examination	Module
1	T1	1,2,3
2	T2	4,5,6
3	ENDSEMESTER	1to7

Semester-IV	**Class:S Y. B. Tech**		
Code:BTE281	**Course: Microprocessor and Microcontroller Lab**		
Period per week (each of 60minutes)	Lecture	--	
	Laboratory	02	
	Tutorial	---	
Scheme of Evaluation		Hours	Marks
	In Semester	--	--
	End Semester*	--	--
	Practical	02	---
	Laboratory Work (Journal)	---	---
	Total	---	25
	Credit	**04**	

Term Work

List of Experiments:

Microprocessor:

1) Addition of Two 8-bit Numbers and Sum is 8-bit.
2) Addition of two 8 bit numbers and sum is 16-bit.
3) Addition of Two 16-Bit Numbers and Sum is 16-bit.
4) Decimal Addition of Two 8-Bit Numbers and Sum is 8-bit.
5) One's Complement of an 8-bit Number.
6) Two's Complement of an 8-bit Number.

Microcontroller:

1) To add and subtract two 8 bit numbers using registers.
2) To multiply and divide two 8 bit numbers using register.
3) Addition and subtraction of two numbers using DPTR.
4) Multiply and divide two numbers using DPTR.
5) Count number of ones in given 8 bit number.
6) To perform read and write operation by 8255 interfacing.

SEMESTER – IV	**CLASS : S.Y. B.Tech. (Electrical). (Electrical)**		
CODE:BTE232	**COURSE: Organisational Communication and Interpersonal Skills**		
Period per week (each of 60 minutes)	Lecture	02	
	Laboratory	---	
	Tutorial	02 per batch Alternate Week	
Scheme of Evaluation		Hours	Marks
	In Semester	01	20 X 02
	End Semester*	03	100
	TW/Practical	---	50
	TOTAL		150

*60%Weightageforendsemester

COURSE OBJECTIVE:

1. To inculcate in students professional and ethical attitude, effective communication skills, team work, interpersonal Skills, and an ability to understand social responsibilities with multi- disciplinary approach.
2. To enable students to communicate in professional and social context with knowledge of business etiquettes.
3. To prepare students for successful career that meets the corporate, industrial and global requirement
4. To help students build an understanding of different organizational cultures, business practices, and social norms to communicate more effectively in domestic and cross-cultural business contexts.
5. To help student's to use a strategic communication model and critical thinking to identify objectives, analyze audiences, and choose the most effective structure and style for delivering strategically sound written and spoken messages.

COURSE OUTCOME:

Upon successful completion of this Course learners will be able to

1. Explain principles of effective group communication, so as to cultivate trust and understanding, develop open participation, and strengthen decision making in work groups and teams.
2. Analyse a company's communication processes or key messages and recommend changes that can help advance communication as an integral part of that organization's management strategy and possess entrepreneurial approach for lifelong learning
3. As a team, design and deliver a presentation that both informs and persuades, using an appropriate visual support strategy with leadership skills and adhering to a specified time limit.
4. Participate and succeed in campus placements and display corporate etiquettes
5. Have education necessary for understanding the impact of engineering solutions on society and demonstrate awareness of contemporary issues.

Course Contents:

Module No.	**Details**	**Hrs.**
01	**Organisational Behaviour:** Introduction, Concept of OB, Organisational culture, Status patterns in organizations, Organisational conflicts: Causes, Consequences and Management, Techniques of Organisational Development.	05

02	**Corporate Etiquettes and Manners:** Introduction, Etiquettes and rules of behavior, Professional Conduct, Etiquette in Meetings, Dining Etiquettes.	05
03	**Meetings & Documentations:** Types of meetings, Notice, Agenda, Minutes of the meetings, Strategies for conducting effective meetings.	02
04	**Report writing:** Objectives of report writing, Language and style in a report, Types of reports. **Formats of reports:** Memo, Letter, and Project report Survey based.	06
05	**Presentation Skills**: A Computer- aided presentation of the Project report. Technical Proposals: Objectives of technical proposals, Parts of proposals.	02
06	**Interpersonal Skills:** Emotional Intelligence, Leadership Skills, Goal Setting and Decision making, Stress Management, Assertiveness.	08
07	**Career Skills:** Group Discussions, Know thy Self (SWOT Analysis), Job Application letter, Writing Effective Resume', Interview Skills.	04

List of Assignments:

1. Two assignments based on case studies on Organisational Behaviour
2. Three assignments on report-writing (A Bound report to be submitted on topic given in partial fulfillment of the syllabus report writing, Report content will be graded and counted during presentation, a printed copy of the presentation and a soft copy in the form of CD to be attached with the report).
3. Technical Proposal (Group activity, document of the proposals)
4. Interpersonal Skills: Case Studies, Group Activity and assignments
5. Two assignments on Career Skills (Cover Letter and Resume' Mock Interviews, Practical sessions)
6. Etiquettes case study and role play.
7. Practical sessions on Group Discussion topic

Distribution of Term Work/ Practical marks shall be as follows:

1. Project report presentation : **15 marks**
2. Presentations on Interpersonal topics: **10 Marks**
3. Assignments:**10 marks**
4. Group Discussion : **10 marks**
5. Attendance**: 05 marks**

Text Books:

1. Lesikar,Flately, Rentz, Pande "Business Communication", Mc Graw Hill, Education Eleventh Edition.
2. R. C. Sharma and Krishna Mohan, "Business Correspondence and Report Writing"

Reference Books:

1. Fred Luthans, "Organisational Behavior", Mc Graw Hill, edition.
2. Huckin and lsen, "Technical Writing and Professional Communication", Mc Graw Hill
3. Wallace and Maters, "Personal Development for Life and Work", Thomson Learning, 12th edition.
4. Heta Murphy, "Effective Business Communication", Mc Graw Hill, edition.
5. B.N. Ghosh, "Managing Soft Skills for Personality Development", Tata McGraw Hill Lehman, Dufrene, Sinha, "BCOM", Cengage Learning, 2nd edition
6. Bell Smith, "Management Communication" Wiley India Edition, 3rd edition,
7. Dr. K. Alex, "Soft Skills", S.Chand and Company.

Sr. No.	Examination	Module
1	T – I	01
2	T – II	02, 3
3	Final Examination	1, 2, 3, 4, 5

PLC course

Sr No	Chapter Name	Details	Time in Hrs.
1	Hardwired Relay Logic	• History of PLC and Recent Advances in PLC. • Role of PLC in Automation Industry and its future. • Hardwired Relay Logic (Ladder Diagram) • Practicing Hardwired Relay Logic	2
2	Introduction to PLC	• PLC Block Diagram • Input and output devices • PLC Scan Cycle • Overview Allen Bradley PLC Trainer Kit	2
3	Relay Logic Instructions	• Hardwiring of input section • Hardwiring of output section • Memory organization and addressing • Programming for simple control applications like (On-Off Control , Latch, Interlock, Sequencing)	3
4	Timer Instructions	• On Delay Timer • Off Delay Timer • Retentive Timer • Cascading of Timer • Resetting Timer	2
5	Counter Instructions	• Up Counter • Down Counter • Cascading Counter • Resetting Counter	1
6	Data manipulation and flow control instructions	• Data Transfer Instructions • Mathematical Instructions • Comparative Instructions • Rotate and Sequencer instruction • Working with analog data	3
7	Developing Application programs	• Traffic Light Control • Automatic Inductor Manufacturing • Elevator System • Bottle Processing Plant • Stepper motor control	3