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MARATHWADA UNIVERSITY,
AURANGABAD**



**Revised Syllabus of
Second Year**

B. Tech.

[Instrumentation & Control Engineering]

[Effective from 2008-09 & onwards]

Revised Syllabus

for

S. Y. B. Tech.

Instrumentation & Control Engineering

Syllabus for Second Year B. Tech Instrumentation and Control Engineering

Part:I

Sr. No.	Course Code	Subjects	Periods, hrs				Evaluation Schemes					Credits
			L	T	P	Total	TA	CT	ESE	PR	Grand Total	
1		Mathematics-III	3	1	---	4	---	20	80	---	100	4
2		Electronic Devices and Circuits	3	1	2	6	25	20	80	---	125	5
3		Sensors and Transducers	3	1	2	6	25	20	80	25	150	5
4		Electrical Machines and Measurements	3	1	2	6	25	20	80	25	150	5
5		Digital Electronics	3	1	2	6	25	20	80	25	150	5
6		Industrial Management	2	---	---	2	---	10	40	---	50	2
7		Computer Laboratory	---	---	2	2	25	---	---	---	25	1
8		Development of Skills-III	---	---	2	2	50	---	---	---	50	1
Total of Semester I			17	5	12	34	175	110	440	75	800	28

Part:II

Sr. No.	Course Code	Subjects	Periods, hrs				Evaluation Scheme:					Credits
			L	T	P	Total	TA	CT	ESE	PR	Grand Total	
1		Mathematics-IV	3	1	---	4	---	20	80	---	100	4
2		Control System Componenets	3	1	2	6	25	20	80	25	150	5
3		Circuit Theory	3	1	2	6	25	20	80	25	150	5
4		Signals and Systems	3	1	---	4	---	20	80	---	100	4
5		Feedback Control Systems	3	1	2	6	25	20	80	25	150	5
6		Principles of Communication Engineering	2	---	2	4	25	10	40	---	75	3
7		Electronic Workshop	---	---	2	2	25	---	---	---	25	1
8		Development of Skills-IV	---	---	2	2	50	---	---	---	50	1
Total of Semester II			17	5	12	34	175	110	440	75	800	28
Total of Semester II			34	10	24	68	350	220	880	150	1600	56

Periods

- L Lecture hours per week
- T Tutorial hours per week
- P Practical hours per week

Evaluation Scheme:

- TA Teachers Assessment
- CT Class Test
- PR Practical
- ESE End Semester Examination

Mathematics-III

Periods				Evaluation Scheme				Credit	
				Sessional Exam		ESE			Total
L	T	P	Total	TA	CT	TH	PR		
03	01	-----	04	-----	20	80	-----	100	4

Objective:

The contents aims to develop the knowledge of the student in the direction of solving the practical problem in the engineering and technology related to differential equation, Fourier series, Integral transforms and Statistical techniques.

A: Theory:

Unit	Contents	Duration	Nature
01	<p>Linear Differential Equation:</p> <p>Solution of linear differential equation of order 'n' with constant coefficients: The complementary function, Method of finding particular integral: Short method, General method of variation of parameters, equations reducible to linear form:</p> <ol style="list-style-type: none"> The Cauchy's linear equation The Legendre's linear equation. <p>Simultaneous differential equations.</p> <p>Application of linear differential equations to –</p> <ol style="list-style-type: none"> Mechanical system, Electrical System, Beam and Shafts. 	18 Hrs.	Analytical
02	<p>Fourier Series:</p> <p>Dirichlet's conditions, Euler(Euler-Fourier) formulae, Fourier series for function having period 2π, Fourier series for even and odd functions in the interval $(-\pi, \pi)$, Half range expansions: Fourier sine and cosine series</p>	10 Hrs.	Analytical
03	<p>Statistics:</p> <p>Measures of central tendency: Mean, Median, Quartiles, and Mode. Measures of dispersion: Quartile deviation, Mean deviation Standard deviation, coefficient of variation, Moments, Skewness, Kurtosis</p>	05 Hrs.	Analytical
04	<p>Laplace Transform:</p> <p>Definition, Laplace Transform of elementary function and its table, Theorem and properties of Laplace Transform: First shifting theorem, Second Shifting Theorem, Multiplication by 't', Division by t, Change of scale property, Laplace Transform of integral, Laplace Transform of Derivative.</p>	15 Hrs.	Analytical

	<p>Laplace Transform of some special functions: Bessel's function, Periodic function, Error Function, Heaviside Unit Step Function, Displaced Heaviside Unit Step Function Laplace Transform using Heaviside Unit function, Dirac delta function</p> <p>Method to find inverse Laplace Transform:</p> <ol style="list-style-type: none"> Use of Laplace Transform table. Use of Theorem and properties of Laplace Use of partial fraction convolution theorem Use of development of Heaviside Unit Step Function <p>Application of Laplace Transform to solve linear differential equation, partial differential equation</p>		
05	<p>Fourier Transform:</p> <p>Fourier integral: Complex form of Fourier integral, sine and cosine integral, Fourier transform and inverse transform. Fourier transform and inverse transform for even and odd function, Fourier sine and cosine transform and inverse transform, finite Fourier transform, Application of Fourier transform for solution of partial differential equation.</p>	12 Hrs.	Analytical

SECTION:A :- Chapter 1,2,3

SECTION:B:- Chapter 4,5

B:- Practical/ Drawings/ Design/ Workshop:

Not Applicable

C:- Suggested Text Books and References :

Sr. No	Title	Author	Publication
01	A Text Book Of Applied Mathematics Volume-II	P. N. Wartikar, J. N. Wartikar.	Pune Vidyarthi Griha Prakashan
02	A Text Book Of Applied Mathematics Volume-III	P. N. Wartikar, J. N. Wartikar.	Pune Vidyarthi Griha Prakashan
03	Advanced Engineering Mathematics	H. K. Dass.	S. Chand and Co. Ltd.
04	Higher Engineering Mathematics	Dr. B. S. Grewal .	Khanna Publishers
05	Higher Engineering Mathematics	B. V. Ramana	Tata McGraw-Hill Publishing Ltd.

D. Digital references

Sr. No.	Website / Links / e-journals
1	www.sosmath.com
2	www.mathmadeeasy.com
3	www.mathworldwolframe.com
4	www.springer.com/application of mathematics
5	www.springer.com/applied mathematics and optimization
6	Bulletin of Indian Mathematical Society
7	Bulletin of Marathwada Mathematical Society

Electronic Devices and Circuits

Periods				Evaluation Scheme				Credit	
				Sessional Exam		ESE			Total
L	T	P	Total	TA	CT	TH	PR		
03	01	02	06	25	20	80	-----	125	5

Objective:

To study solid state semiconductor devices in depth along with mathematical modeling of each, operation, characteristics and linear application of each device that plays an important role as a basic building block in electronic field.
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A: Theory:

Unit	Contents	Duration	Nature
01	<p>BJT Amplifiers:</p> <p>Configuration of BJT amplifier in CB, CE, CC :Input and Output V –I characteristics , switching characteristics & their comparison, concept of AC and DC load line, of BJT ,cutoff, saturation and active region of operation. Need of biasing, types of biasing, stability factor, bias compensation for different types of biasing circuits for BJT, its mathematical derivation. Relationship between α, β and γ.</p>	08 Hrs.	Analytical
02	<p>FET and MOSFET:</p> <p>An overview of different types of FETs viz. JFET, MOSFET, MESFET, Peculiarities of these types and their application areas.</p> <p>JFET: JFET construction, Symbol, Basic operation, V-I Characteristics, Transfer Characteristics (Shockley’s Equation), Cut-off & Pinch-off voltages, Transconductance, Input resistance & Capacitance. Drain to Source resistance, Universal JFET bias curve. Biasing arrangements for JFET – Biasing against device variation, biasing for zero current drift. JFET as voltage controlled current source. JFET data sheet specifications – IDSS. V_p, g_m, r_d, RDS or RD (ON).</p> <p>JFET Amplifiers: CS, CD, CG amplifiers, their analysis using small signal JFET model. Introduction to MOSFET C-MOS as a VLSI device.</p>	10 Hrs.	Analytical
03	<p>Voltage Amplifiers:</p> <p>Typical small signal Voltage amplifier, its ideal characteristics, single stage CE amplifier, frequency response, bandwidth. Effect of coupling capacitor & bypass capacitor,</p>	08 Hrs.	Analytical

	junction capacitance, temperature on performance of amplifier. Cascaded Amplifier: types of coupling: direct, RC coupling, transformer coupling its operation comparison, advantages disadvantages.		
04	<p>Hybrid Parameters:</p> <p>Low frequency hybrid parameters, derivation of voltage gain, current gain, input impedance and output impedance. Comparison of hybrid parameters of all configurations (CB, CE, CC). High Frequency hybrid Π parameters, equivalent circuits, f_T, f_B, f_X, relationship between hybrid and Π parameters, effect of junction capacitance.</p>	08 Hrs.	Analytical
05	<p>Power Amplifiers:</p> <p>Classes of power amplifiers – Class A, Class B, Class AB, Class C and Class D amplifiers. Class A with resistive load, Transformer coupled class A amplifier, Class B Push-pull, Class AB, Complementary symmetry and Quasi-complementary configurations. Efficiency analyses for Class A transformer coupled amplifier, Class B push-Pull amplifiers, Comparison of efficiencies of other configurations, Distortions in amplifiers, Bootstrapping in complementary symmetry and bias compensation used in push pull amplifiers.</p>	10 Hrs.	Analytical
06	<p>Linear Wave shaping and time base generator Circuits:</p> <p>Application of diode as voltage doublers, Tripler and voltage quadruple configurations, Clipping and clamping circuits, biased clipper, their operation. Clamping circuits. Integrator and differentiator circuits: working and applications pulse transformer UJT saw tooth generator, miller and bootstrap saw tooth generator circuit, current time base generators.</p>	08 Hrs.	Analytical
07	<p>Feedback Amplifiers and Oscillators:</p> <p>Concept of feedback, Negative and positive feedback. Classification of amplifiers based on feedback topology, Transfer gain with feedback. Advantaged and disadvantages of negative feedback, Oscillators: Oscillator startup mechanism, Barkausen criteria for oscillation. Study of following oscillator circuits (using FET and BJT) – (Derivations not expected). LC oscillators – General form of LC oscillator, Hartley oscillator, Colpitts oscillator, RC phase shift oscillator using BJT and FET.</p>	08 Hrs.	Analytical

SECTION:A :- Chapter 1,2,3

SECTION:B:- Chapter 4,5,6,7

B:- Practical/ Drawings/ Design/ Workshop:	
01	V-I characteristics of PN junction Diode
02	Input, output and transfer characteristics of CE configuration
03	Input , output characteristics of CB BJT configuration
04	Drain characteristics and transfer characteristics of JFET
05	BJT biasing and plotting DC load line
06	To plot frequency response of CE amplifier
07	Clipping circuits: positive, negative and biased clipper circuits
08	RC phase oscillator, LC oscillator design and calculation of output frequency
09	Regulation measurement of transistor series voltage regulator
10	Class B Push pull amplifier: operation and efficiency calculation

The assessment of term work shall be on the following criteria:

1. Continuous Assessment
2. Performing the experiments in the laboratory
3. Regular submission of practical report
4. Oral examination conducted internally on the practical work and assigned syllabus

C:- Suggested Text Books and References			
Sr. No	Title	Author	Publication
01	Integrated Electronics	Millman Halkies	Tata McGraw Hill
02	Pulse, Digital and Switching Waveforms	Jacob Millman and Hilbert Taub	Tata McGraw Hill
03	Electronic devices and circuits theory	Boylestead Nashelsky	
04	Linear Integrated Circuits	D. Roy Choudhary, Shailesh Jain	New Age International
05	Operational-Amplifier and Integrated Circuits	Ramakant Gaikwad	Prentice Hall India.
06	Integrated Circuits	K. R. Botkar	Khanna Publishers

Sensors and Transducers

Periods				Evaluation Scheme				Credit	
				Sessional Exam		ESE			Total
L	T	P	Total	TA	CT	TH	PR		
03	01	02	06	25	20	80	25	150	5

Objective:

The content aims to develop the knowledge of the student in the direction of solving the practical problem in the engineering and technology.

A: Theory:

Unit	Contents	Duration	Nature
01	General Configuration and Functional Description of measuring instruments: Static and Dynamic Characteristics of Instrumentation System, errors in Instrumentation System, Active and Passive Transducers and their Classification.	08 hrs.	Analytical
02	Motion Transducers: Resistive strain gauge, LVDT, RVDT, Capacitive transducers, Piezo-electric transducers, seismic displacement pick-ups, vibrometers and accelerometers.	08 hrs.	Analytical
03	Temperature Transducers: Standards and calibration, fluid expansion and metal expansion type transducers, like bimetallic strip, Thermometer, Thermistor, RTD, Thermocouple and their characteristics.	08 hrs.	Analytical
04	Transducers and Sensors: Hall effect transducers, Digital transducers, Proximity devices, Bio-sensors, Smart sensors, Piezo-electric sensors.	08 hrs.	Analytical
05	Flow Transducers: Bernoulli's principle and continuity, orifice plate, nozzle plate, venture tube, Rota meter, anemometers, electromagnetic flow meter, impeller meter and turbid flow meter.	08 hrs.	Analytical
06	Pressure Transducers: Standards and calibration, different types of manometers, elastic transducers, diaphragm bellows, bourdon tube, capacitive and resistive pressure transducers, high and low pressure measurement.	08 hrs.	Analytical

07	Force and Torque Transducers: Proving ring, hydraulic and pneumatic load cell, dynamometer and gyroscopes.	08 hrs.	Analytical
08	Sound Transducers: Sound level meter, sound characteristics, Microphone.	04 hrs.	Analytical

SECTION:A :- Chapter 1,2,3,4

SECTION:B:- Chapter 5,6,7,8

B:- Practical/ Drawings/ Design/ Workshop:

01	To determine the LVDT characteristics.
02	To determine thermocouple characteristics
03	To determine thermister characteristics
04	To determine level transducer characteristics
05	To Determine rotameter characteristics.
06	To determine the characteristics of capacitive displacement transducer
07	To study of different biomedical electrodes
08	To determine RTD characteristics
09	To determine strain gauge characteristics
10	To determine the characteristics of LDR
11	PH measurement

The assessment of term work shall be on the following criteria:

1. Continuous Assessment
2. Performing the experiments in the laboratory
3. Regular submission of practical report
4. Oral examination conducted internally on the practical work and assigned syllabus

The assessment of Practical Examination shall be on the following criteria:

1. Performing the assigned practical during examination
2. Record of experiment submitted by candidate
3. Viva- voce based on the syllabus

C:- Suggested Text Books and References

Sr. No	Title	Author	Publication
01	Electrical and Electronics Measurements and Instrumentation	Sawhney A. K	Dhanpat Rai and Sons
02	Instrumentation Devices and Systems	Rangan C.S, Sarma G.R., Mani V S V	Tata McGraw-Hill Publication Ltd
03	Measurement Systems	Doebelin, E.O.,	McGraw Hill Book Co., 1998
04	Instrumentation Measurement and Analysis	Nakra B.C., Chaudhary K.K	McGraw-Hill Publication Ltd. 2001.

Electrical Machines and Measurements

Periods				Evaluation Scheme				Credit	
				Sessional Exam		ESE			Total
L	T	P	Total	TA	CT	TH	PR		
03	01	02	06	25	20	80	25	150	5

Objective:

The content aims to develop the knowledge of the student in the direction of solving the practical problem in the engineering and technology.

A: Theory:

Unit	Contents	Duration	Nature
01	D.C Generator: Operating principal, parts of DC Generator, EMF equation, Method of excitation, Concept of Armature reaction and Commutation, Characteristics of DC Generator, Losses, application, Problems.	06 Hrs.	Analytical
02	D.C Motor: Torque equation, Characteristics of DC Motor, Starting and Speed control of DC motor, application, Problems.	06 Hrs.	Analytical
03	Special types of DC Machines: Series Boosters, Shunt Boosters, Rosenberg generator, Amplidyne and Metadyne (Descriptive treatment only).	06 Hrs.	Analytical
04	Induction Motor: Three phase Induction Motor-Principal of operation, Construction, Squirrel cage and Slip ring motor, Torque equation, Torque-slip Characteristics, Power stages, Speed control, efficiency, starters of three phase Induction motor. Single phase Induction Motor- Construction, Double field revolving theory, starting comparison with three phase induction motor and application.	12 Hrs.	Analytical
05	Synchronous Machines: Principal of operation, Phasor diagram, V-curves, Synchronous capacitor, starting method.	08 Hrs.	Analytical
06	Special Machines: Working principle and application of Servomotor (DC and AC), Stepper motor (Variable reluctance type, permanent magnet type and Hybrid type).	08 Hrs.	Analytical

07	Transformers: Three phase Transformer- Various transformer connections(Y/Y, Y/ Δ , Δ /Y, Δ / Δ), V and Scott connection, three phase to six phase connection.	04 Hrs.	Analytical
08	AC and DC Bridge: Measurement of Resistance with bridges, Wheatstone's Bridge, Kelvin Double Bridge. AC Bridges such as Hay's Bridge, Maxwell's Wein Bridge, Maxwell's L/C Bridge, Descourty's Bridge, and Schering Bridge etc. Measurements of Q factor.	10 Hrs.	Analytical

SECTION:A :- Chapter 1,2,3,4

SECTION:B:- Chapter 5,6,7,8

B:- Practical/ Drawings/ Design/ Workshop:	
01	Load characteristics of separately and shunt excited DC Generator.
02	To perform speed control of DC motor and reversal of direction.
03	Load test on DC shunt motor (T/Ia, T/N, N/Ia) Characteristics.
04	To study DC motor starters
05	Speed control of Three phase Induction motor.
06	Load test on Three phase Induction motor
07	Study of operation of Single phase Induction motor.
08	Study of various stepper motor.
09	Verification of current and voltage relationship in star and delta connected balanced three phase load.
10	Use of Wheatstone's bridge.
11	Three phase transformer connection and Verification of voltage relationship.
12	Kelvin's Double Bridge.
13	Schering Bridge
14	Load test on single phase transformer and voltage regulation.
15	Measurements of power by two wattmeter method in star or delta connected balanced three phase load.

The assessment of term work shall be on the following criteria:

1. Continuous Assessment
2. Performing the experiments in the laboratory
3. Regular submission of practical report
4. Oral examination conducted internally on the practical work and assigned syllabus

The assessment of Practical Examination shall be on the following criteria:

1. Performing the assigned practical during examination
2. Record of experiment submitted by candidate
3. Viva- voce based on the syllabus

C:- Suggested Text Books and References:			
Sr. no	Title	Author	Publication
01	Electrical Machines	Nagrath Kothari	Tata McGraw Hill
02	Performance and design of AC machines	M.G. Say	
03	Electrical measurements and measuring instruments	Golding & Widdis	A. H. Wheeler
04	Electrical Technology	B. L. Theraja Vol. I and II	S. Chand
05	Electronic Instrumentation	H.S. Kalsi	Tata McGraw Hill
06	Electrical & Electronic Measurements & Instrumentation	A. K.Sawhney	Dhanpat Rai & Company

Digital Electronics

Periods				Evaluation Scheme					Credit
				Sessional Exam		ESE		Total	
L	T	P	Total	TA	CT	TH	PR		
03	01	02	06	25	20	80	25	150	5

Objective:

The content aims to develop the knowledge of the student in the direction of solving the practical problem in the engineering and technology.

A: Theory:

Unit	Contents	Duration	Nature
01	Binary number system: Binary arithmetic (Addition, subtraction, multiplication, division), octal number system, hexadecimal number system, 1's and 2's complement. Signed numbers, EX-3, gray code alphanumeric code, EBCDIC, ASCII, Hollirith codes, Error detection & correction, parity, 7-bit hamming.	08 Hrs.	Analytical
02	Logic families: Basic gates, Universal gates, and their truth tables, postulates of Boolean algebra, De-Morgan's theorem, Parameter definition: noise margin, power dissipation, voltage and current parameter, propagation delay, typical values for TTL, CMOS and ECL. Input/output profile for TTL & CMOS. TTL logic families-standard TTL, Totem-pole, open collector.	08 Hrs.	Analytical
03	Combination circuit Design: Min term and Max term representation of logical function, K-map minimization using K-map, Don't care condition, Quinn Mc-clusky method for minimization, example – Binary half and full adders, and subtractor, BCD to Seven segment decoder, binary to gray and gray to binary conversion.	12 Hrs.	Analytical
04	Combinational Logic Design Using MSI circuit: Multiplexers, cascading of multiplexers, introduction to general purpose 74-series ICS, De-multiplexer / Decoders, Encoder, cascading of De-multiplexers, binary and BCD adder, Digital comparator, parity generation & checking (IC74180), Look ahead carry generator, ALU (74181).	12 Hrs.	Analytical

05	Flip Flop (FF): 1-Bit memory cell, Clocked S-R FF, JKFF,MSJK FF, T – Type FF, D Type FF, Excitation table for all FF's, Application of all FF's, tri-state devices, buffers, example 8286, 74LS244,74LS245, Latches 8282.	04 Hrs.	Analytical
06	Sequential Logic Design: Introduction, registers, shift register, 4 bit bidirectional shift register, Universal register, application of shift register as ring counter, twisted ring counter, introduction to general purpose 74, series register ICS.	06 Hrs.	Analytical
07	Counter: Ripple or asynchronous counter, modulus of counter, introduction to general purpose 74/54 series. Asynchronous ICS, cascading of ripple counter ICS, synchronous counter, Design principles, UP/Down counter, introduction to general purpose 54/74 series synchronous ICs.	06 Hrs.	Analytical
08	Semiconductor Memories: Introduction, memory organization and operation, introduction to different types of memories such as RAM, EPROM, EEPROM, RAM (static and dynamic).	04 Hrs.	Analytical

SECTION:A :- Chapter 1,2,3,4

SECTION:B:- Chapter 5,6,7,8

B:- Practical/ Drawings/ Design/ Workshop:

Experiment list

01	Study of logic gates, Verification by truth tables
02	Implementation of Boolean algebra
03	Realization of half and full adder using gates
04	Realization of Subs tractors using gates
05	BCD adder using binary adder
06	Design and realization of code converter
07	Study of multiplexer and de-multiplexers
08	Study of S-R J-K, T AND D Flip-flop
09	Design and Implementation of 4 bit up/down counter using MSJK FF AND STUDY OF 7490, 7492,7493,74193 and other related chips.
10	Shift register Implementation using MSJK F, study of 74192 and other related chips
11	Study of BCD to seven segment decoder
12	Study of ALU IC 74181

The assessment of term work shall be on the following criteria:

1. Continuous Assessment
2. Performing the experiments in the laboratory
3. Regular submission of practical report
4. Oral examination conducted internally on the practical work and assigned syllabus

The assessment of Practical Examination shall be on the following criteria:

1. Performing the assigned practical during examination
2. Record of experiment submitted by candidate
3. Viva- voce based on the syllabus

C:- Suggested Text Books and References

Sr. No	Title	Author	Publication
01	Modern Digital Electronics	R.P. Jain	Tata McGraw-Hill Publication Ltd 1997.
02	Digital Electronics Principles	Malvino Leach	McGraw Hill Book Co., 1998
03	Switching theory and logic design	Hill and Peterson	John Wiley
04	Digital circuits and system	Douglas Hall	Tata McGraw-Hill Publication.

Industrial Management

Periods				Evaluation Scheme				Credit	
				Sessional Exam		ESE			Total
L	T	P	Total	TA	CT	TH	PR		
02	-----	-----	02	-----	10	40	-----	50	2

Objective:

To understand concept of Management, administration, organization, industrial law, financial management

A: Theory:

Unit	Contents	Duration	Nature
01	<p>Introduction to management:</p> <p>Managing and manager, organizations and the need for management, the management process, types of managers, the challenge of management, the evolution of management theory.</p>	05 hrs.	Descriptive
02	<p>Management in the twenty-first century:</p> <p>The importance of organizational and natural environment, elements of the direct action environment, managing multiple stock holder relationship, elements of the Indirect Action Environment, Natural environments, management 2000 and beyond, social responsibility and ethics, globalization and management.</p>	03 hrs.	Descriptive
03	<p>Business origination:</p> <p>Forms of business organization, individual proprietorship, joint stock company, co-operative enterprise and public sector undertakings. Organization structures in industries, line organization, functional organization, line and staff organization, committee organization, project organization, matrix organization.</p>	04 hrs.	Descriptive
04	<p>Nature and Significance of Economics:</p> <p>Science, Engineering and technology their relationship with economic development. Basic economic concepts, human wants- economic goods, utility, value, price, cost, wealth and capital. Demand, supply, elasticity of demand and supply, concept of profit and revenue.</p>	03 hrs.	Descriptive

05	Economic Development of India: Structures and features of Indian economy, industrialization of India, economics of small and large scale industries, growth of public sector in India, recent trend in labour movement in India, role of agriculture in Indian economy, problems of Indian agriculture and modernization of Indian agriculture.	04 hrs.	Descriptive
06	Financial Management: Concept of management accounting systems, financial accounting and cost accounting system, sources of industrial finance, sales organization of a firm, management of sales and advertisement, market research.	05 hrs.	Descriptive
07	Personnel Management: Man power, sources of recruitment, selection and training, job evaluation, performance appraisal, wages and incentives, self and time management.	03 hrs.	Descriptive
08	Industrial ACT: Industrial, factory act, pollution control, industrial safety, introduction to causes of accidents, safety, accident prevention techniques and related legal provisions.	03 hrs.	Descriptive

SECTION:A :- Chapter 1,2,3,4

SECTION:B:- Chapter 5, 6,7,8

B:- Suggested Text Books and References			
Sr. No	Title	Author	Publication
01	Industrial Management	O.P Khanna	
02	Management for Business and Industry	C. S George Jr.	
03	Principles of Management	Knootz and O'Donnell	
04	Economic Principles, Problems and Policies	Mc Connel, Gupta	TMH
05	Industrial Organization and Engineering Economic	T.R Bange, S.C Sharma	Khanna Publication
06	Engineering Economics	G. D. Stervens	
07	Business Organization and Management	M.C. Shukla	
08	Management	James A.F Stoner, R Edward Freeman, Daniel R Gilbert Jr.	PHI

Computer Laboratory

Periods				Evaluation Scheme					Credit
				Sessional Exam		ESE		Total	
L	T	P	Total	TA	CT	TH	PR		
-----	-----	02	02	25	-----	-----	-----	25	1

Objective:

To study various operating system and simulation software packages.

A: Theory:

Not Applicable

B:- Practical/ Drawings/ Design/ Workshop:	
Experiment list	
01	Fundamentals of DOS disk operating system
02	Basic DOS commands
03	batch files basics
04	Installation of Windows 9x operating system, Windows NT
05	Fundamentals of Linux operating system
06	Simulation of single stage transistor amplifier
07	Simulation of 3 bit synchronous counter
08	Introduction to MATLAB
09	Introduction to Simulink toolbox in MATLAB
10	Designing of simple circuits like inverting/ non inverting amplifier using MATLAB

The assessment of term work shall be on the following criteria:

1. Continuous Assessment
2. Performing the experiments in the laboratory
3. Regular submission of practical report
4. Oral examination conducted internally on the practical work and assigned syllabus

Development of Skill – III
(Personality Development)

Periods				Evaluation Scheme					Credit
				Sessional Exam		ESE		Total	
L	T	P	Total	TA	CT	TH	PR		50
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Objective

Upon completion of this course students will be able to:

- Develop skills necessary to enhance their personality.
- Manage themselves, people and their organization better and move on from being good to great.

A: Theory:

Not Applicable

B: - Six assignments based on the topics mentioned below:

Sr. No.	Section	Duration	Contents
01	Introduction	02 Hrs	Definition, Traits and Types
02	External Features	02Hrs	Body Language, Gesture, Posture, Facial expressions, etc.
03	Human Mind	04 Hrs	Types and Stimuli Managing thoughts Managing emotions
04	Techniques to enhance good personality	08 Hrs	Meditation and self-hypnosis Memory building and concentration Positive attitude, will power, patience and creativity Anger, Fear, Stress and time management
05	Other qualities for personality development	04 Hrs	Leadership People Skills (social)
06	Debate	02 Hrs	Process
07	Group Discussion	04 Hrs	Process Roles
08	Practice on G. D. and Debate	06 Hrs	In group on various topics

The assessment of term work shall be on the following criteria:

1. Continuous Assessment
2. Performing the experiments in the laboratory
3. Regular submission of practical report
4. Oral examination conducted internally on the practical work and assigned syllabus

C. Suggested Text Books and References:

Sr. No.	Title	Author	Publication	Edition
1	You Can Win	Shiv Khera	Macmillan India Ltd	Revised 2002
2	How to Develop Self confidence and Influence People by Public Speaking	Dale Carnegie	Pocket Books	
3	How to have a beautiful mind	Edward De Bono		
4	Six Thinking Hats	Edward De Bono		
5	The 7 Habits of Highly Effective People	Stephan R. Covey	Simon & Schuster	2003
6	Development of Generic Skills II	K. Sudesh	Nandu Publishers	2007
7	Management Ideas in Action	Pramod Batra & Deepak Mahendru	Think Inc.	1996
8	The Monk who sold his Ferrari	Robin Sharma	Jaico Publishing House	
9	Leadership Wisdom	Robin Sharma	Jaico Publishing House	
10	The Greatness Guide	Robin Sharma	Jaico Publishing House	
11	How to succeed in Group Discussions and Personal Interviews	Dr. S .K. Mandal	Jaico Publishing House	
12	How to prepare for Group Discussions and Interviews	Hari Mohan Prasad	Tata McGraw Hill	
13	Total Leadership	Jim Barrett	Kokan Page	

D. Digital references	
Sr. No.	Website / Links / e-journals
1	www.mindtools.com
2	www.selfgrowth.com
3	www.mindthinksuccess.com
4	www.easymotivation.com
5	www.1truevalue.com
6	www.123oye.com
7	www.success.com

Mathematics - IV

Periods				Evaluation Scheme					Credit
				Sessional Exam		ESE		Total	
L	T	P	Total	TA	CT	TH	PR		
03	01	-----	04	-----	20	80	-----	100	4

Objective:

The contents aims to develop the knowledge of the student in the direction of solving the practical problem in the engineering and technology related to Function of complex variable, transforms, partial differential equation, Probability

A: Theory:

Unit	Contents	Duration	Nature
01	<p>Function of complex variable:</p> <p>Introduction, Analytic function, Cauchy-Riemann equation in Cartesian and polar coordinates, Harmonic function, orthogonal system, Integration in complex plane: Line integral, Contour integral, Cauchy's integral theorem , Cauchy's integral formula, Extension of Cauchy's theorem on multiply connected region Taylor's and Laurent's series(without proof), Singularities, Residues, Cauchy's residue theorem, Evaluation of real integrals: Integration along unit circle and along the upper half semi circle, Conformal Transformation, Bilinear transformation.</p>	20 hrs.	Analytical
02	<p>Z- transform:</p> <p>Definition, Z-transform of elementary function , properties of Z-transform , Inverse Z-transform :Power series method ,partial fraction method, inversion integral method(Residue method),Solution of Difference equation by using Z-transform.</p>	09 hrs.	Analytical
03	<p>Vector Calculus:</p> <p>Differentiation of vectors, Radial, Transverse, Normal And tangential components of velocity and acceleration, Scalar and vector point function , Gradient of scalar point function , Divergence and curl of vector point function , Second order differentiation operator , Irrotational and solenoid fields, Line integral, Surface integral, Gauss divergence theorem, Stoke's theorem, Green's theorem, Curvilinear coordinates: Cylindrical and Spherical polar coordinates.</p>	20 hrs.	Analytical

04	Application of partial differential equation: Solution of partial differential equation by method of separation of variable Application to i. Vibration of a string (The wave equation), ii. One dimensional heat flow (The diffusion equation) iii. Two dimensional heat flow.(The Laplace equation)	07 hrs.	Analytical
05	Probability: Introduction, Probability Distribution: Binomial Distribution, Poisson Distribution, Normal Distribution	04 hrs.	Analytical

SECTION:A :- Chapter 1,2

SECTION:B:- Chapter 3,4,5

B:- Practical/ Drawings/ Design/ Workshop:

Not Applicable

C:- Suggested Text Books and References :

Sr. No	Title	Author	Publication
01	A Text Book Of Applied Mathematics Volume-II	P. N. Wartikar, J. N. Wartikar	Pune Vidyarthi Griha Prakashan
02	A Text Book Of Applied Mathematics Volume-III	P. N. Wartikar, J. N. Wartikar	Pune Vidyarthi Griha Prakashan
03	Advanced Engineering Mathematics	H. K. Dass	S. Chand and Co. Ltd
04	Higher Engineering Mathematics	Dr. B. S. Grewal	Khanna Publishers
05	Higher Engineering Mathematics	B. V. Ramana	Tata McGraw-Hill Publishing Ltd.

D. Digital references

Sr. No.	Website / Links / e-journals
1	www.sosmath.com
2	www.mathmadeeasy.com
3	www.mathworldwolframe.com
4	www.springer.com/application of mathematics
5	www.springer.com/applied mathematics and optimization
6	Bulletin of Indian Mathematical Society
7	Bulletin of Marathwada Mathematical Society

Control System Components

Periods				Evaluation Scheme					Credit
				Sessional Exam		ESE		Total	
L	T	P	Total	TA	CT	TH	PR		
03	01	02	06	25	20	80	25	150	5

Objective:

The contents aims to develop the knowledge of the student in the direction of solving the practical problem in the engineering and technology

A: Theory:

Unit	Contents	Duration	Nature
01	Mechanical networks and Gears: Introduction, springs, mass dash-pot and absorbers, mechanical equalizes and their transfer function, comparison of electrical and mechanical systems, introductions to gears, types of gears and use of gears in control system.	10 Hrs.	Analytical
02	Mechanical components: Flyweight tachometer, gyroscope, and principal of operations, equation of motion of gyroscope practical gyroscope, application of gyroscope.	04 Hrs.	Analytical
03	Hydraulic components: Introduction basic types of hydraulic transmission lines, servo motors, power supply, Hydraulic circuits and transmission, applications like motor speed control, reciprocating, loading, unloading, sequencing of cylinders and direction control.	10 Hrs.	Analytical
04	Pneumatic components: Pneumatic power supplies, introduction to pneumatic systems and their analysis, filters and pressure regulators, flapper nozzle system, pneumatic motors.	06 Hrs.	Analytical
05	Control valves: Classification of valves. Valve actuators and accessories, detail study of valve characteristics. Study of valve construction by considering examples from hydraulic, pneumatic and electrical types. Introduction to valve selection and specifications. Valve sizing with mathematical treatment. Introduction to analog and digital fluidic devices.	08 Hrs.	Analytical

06	Synchros: Transmitter and receiver construction, principal, analysis and applications of Synchros as an error detector.	06 Hrs.	Analytical
07	AC and DC servomotors: Constructional features, theory of operations, analysis, approximate transfer function and block diagram, load-torque, speed-torque characteristics, electronic drive circuits, comparative studies and applications in control system.	06 Hrs.	Analytical
08	Stepper motor: Construction, types such as variable reluctance stepper motor, single stack and multi stack, permanent magnet stepper motor, hybrid stepper motors and their principle of operations, drive circuits and high speed operations, applications in control systems.	06 Hrs.	Analytical
09	Relays: Introduction to types of relays, cam timer relays and bulk timer relays, electromagnetic relays and contactors, constructional features and applications in control system.	04 Hrs.	Analytical
10	Safety: Safety in electrical circuits, fundamental safety rules and electrical system earthing.	04 Hrs.	Analytical

SECTION:A :- Chapter 1,2,3,4

SECTION:B:- Chapter 5,6,7,8,9,10

B:- Practical/ Drawings/ Design/ Workshop:

01	Study of synchro characteristics:
02	Study of synchro transmitter characteristics
03	Study of synchro transmitter and receiver pair.
04	Study of stepper motor.
05	Study of stepper motor and translator.
06	Open loop control system with digital input.
07	Open Loop Control System with Analog Input
08	Study of A.C. Servo Motor:
09	Control characteristics of servo motor by amplitude control (control voltage vs. speed characteristics)
10	Speed Torque Characteristics
11	Study of Gyroscope
12	Study of Hydraulic control valve
13	Study of pneumatic control valves
14	Study of logic fluidic devices.
15	Study of flapper nozzle system

The assessment of term work shall be on the following criteria:

1. Continuous Assessment
2. Performing the experiments in the laboratory
3. Regular submission of practical report
4. Oral examination conducted internally on the practical work and assigned syllabus

C:- Suggested Text Books and References :

Sr. No	Title	Author	Publication
01	Control system components	Gibson and Tutor	
02	Industrial control Handbook	E. A. Parr	
03	Control System Engineering	Nagrath and Gopal	
04	Control Valve Primer	Bauman	
05	Measurement and control handbook	Liptak B.G.	

Circuit Theory

Periods				Evaluation Scheme					Credit
				Sessional Exam		ESE		Total	
L	T	P	Total	TA	CT	TH	PR		
03	01	02	06	25	20	80	25	150	5

Objective:

The contents aims to develop the knowledge of the student in the direction of solving the practical problem in the engineering and technology

A: Theory:

Unit	Contents	Duration	Nature
01	Development of circuit concepts: Charge, Current, Voltage, Energy, introduction to basic passive circuit parameters.	06 Hrs.	Analytical
02	Conventions for describing networks: Reference direction for current and voltage, active element convention, source transformation, dot convention for coupled circuits, Topological description of networks.	08 Hrs.	Analytical
03	Network Equation: Kirchoff's law's number of network equations, loop variable analysis, node variable analysis, duality, formation of network equation in matrix form, network solution by Laplace Transformation technique.	06 Hrs.	Analytical
04	Initial conditions in networks: Use and study of initial conditions in various elements, a procedure for evaluating initial conditions, initial state of a network.	06 Hrs.	Analytical
05	Transform of other signal waveform: The shifted unit step function, ramp and impulse function, wave form synthesis, initial and final value theorem, convolution, integral, convolution as a summation.	06 Hrs.	Analytical

06	Impedance functions and network theorems: The concept of complex frequency, transform impedance and transform circuit, series and parallel combination of elements, Thevenin, Superposition, Millmans, Tellegen, substitution, reciprocity, Norton and maximum power transfer theorems.	08 Hrs.	Analytical
07	Network functions: Network functions for one port and two port network, calculation of network functions. a. Ladder network b. General network Poles and zeros of network functions, restriction on poles and zeros locations for driving point functions and transfer functions, Time domain behavior from pole and zero plot.	08 Hrs.	Analytical
08	Two port parameters: Relationship of two port variables, short circuit admittance parameters, open circuit impedance parameters, transmission parameters, hybrid parameters, relationship between parameters sets, parallel connection of two port networks.	06 Hrs.	Analytical
09	Fourier series and signal spectra: Fourier series, evaluation of Fourier coefficients, Fourier transforms. Convergences in truncated series: Exponential form of the Fourier series, steady state response of periodic signals.	06 Hrs.	Analytical

SECTION:A :- Chapter 1,2,3,4,5

SECTION:B:- Chapter 6,7,8,9

B:- Practical/ Drawings/ Design/ Workshop:	
01	Kirchhoff's law justification.
02	Maximum power transfer theorem practical justification
03	Thevenin's theorem practical justification
04	Norton's theorem practical justification
05	Plotting of behavior of RC circuit for step input.
06	Plotting of behavior of RL circuit for step input.
07	Plotting of behavior of RLC circuit for step input
08	Fourier series analysis of square wave.
09	Fourier series analysis of triangular wave
10	To determine the hybrid and impedance parameters of a given network

The assessment of term work shall be on the following criteria:

1. Continuous Assessment
2. Performing the experiments in the laboratory
3. Regular submission of practical report
4. Oral examination conducted internally on the practical work and assigned syllabus

The assessment of Practical Examination shall be on the following criteria:

1. Performing the assigned practical during examination
2. Record of experiment submitted by candidate
3. Viva- voce based on the syllabus

C:- Suggested Text Books and References :

Sr. No	Title	Author	Publication
01	Network analysis	M. E. Van Valkenberg	
02	Circuit Theory: Continuous and Discrete Time Systems, Elements of Network Synthesis	C. P. Kuriakose	
03	Basic Circuit Theory	L. P. Huelsman	
04	Circuit Theory	Umesh Sinha	
05	Theory and problems in circuit analysis	T. S. K. V. Iyer	

Signal and Systems

Periods				Evaluation Scheme				Credit	
				Sessional Exam		ESE			Total
L	T	P	Total	TA	CT	TH	PR		
03	01	----	04	----	20	80	----	100	4

Objective:

The contents aims to develop the knowledge of the student in the direction of solving the practical problem in the engineering and technology

A: Theory:

Unit	Contents	Duration	Nature
01	<p>Continuous–Time and Discrete –Time Signals:</p> <p>Various classifications; Mathematical Representation; Signal Energy and Power. Transformations of the Independent Variable; Periodic Signals; Even and Odd Signals; Arithmetic Operations on Sequences; Continuous-Time and Discrete-Time Complex Exponential. The continuous-Time Unit Step and Unit Impulse Functions. The Discrete-Time Unit Impulse and Unit Step Sequences; Representation of Direct-Time Signals in Terms of impulse.</p>	08 Hrs.	Analytical
02	<p>Continuous-Time and Discrete-Time Systems:</p> <p>Interconnections of Systems; Basic System Properties (Causality, Stability, Time-Invariance, Linearity, Invertibility, systems with and without, memory).</p>	04 Hrs.	Analytical
03	<p>Linear Time –invariant systems:</p> <p>The Discrete–Time and Continuous-Time LTI Systems; Unit Impulse Response; Convolution Sum and Convolution Integral Representation. Properties of LTI Systems (Commutative, Distributive, Associative Properties, Invertibility, Causality, Stability). The Unit Step Response of an LTI System; LTI Systems Described by Differential and the Difference Equations; Block Diagram Representations; Singularity Functions.</p>	08 Hrs.	Analytical
04	<p>Fourier Series Representation of Periodic Signals:</p> <p>The Response of LTI Systems to Complex Exponential; Fourier Series Representation of Continuous-Time and Discrete–Time periodic Signals; Convergence of the Fourier Series; Properties of Discrete-Time and Continuous-Time Fourier Series; Fourier Series and LTI Systems.</p>	08 Hrs.	Analytical

05	Continuous-Time Fourier Transform: Representation of Continuous-Time aperiodic Signals and Continuous-Time Fourier Transform; The Fourier Transform for Periodic Signals; Properties of Continuous-Time Fourier Transform; Fourier Transform and LTI Systems.	06 Hrs.	Analytical
06	Discrete- Time Fourier Transform: Representation of Discrete-Time aperiodic signals and the Discrete-Time Fourier Transform; Fourier Transform for Periodic Signals; Properties of the Discrete-Time Fourier Transform; Discrete-Time LTI Systems and Discrete-Time Fourier Transform.	06 Hrs.	Analytical
07	Time and Frequency Characterization of Signals and Systems: The Magnitude and Phase Representation of the Fourier Transform; The Magnitude and Phase Representation of the Frequency Response of LTI systems; Time Domain Properties of Frequency Selective Filters; First Order and Second Order Continuous-Time and Discrete Time Systems; Time and Frequency Domain Analysis of Systems.	06 Hrs.	Analytical
08	Sampling: Representation of a continuous–Time Signal by its Samples; The Sampling Theorem; Reconstruction of Signals from its Samples using Interpolation; Effect of Under Sampling (Frequency Domain Aliasing); Discrete Time processing of Continuous–Time Signals	04 Hrs.	Analytical
09	Z Transform: The Region of Convergence for the Z- Transform; Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot; Properties of Z-Transform; Analysis and Characterization of Discrete-Time LTI Systems using Z-Transform; System Transfer Function; Block Diagram Representation; The Unilateral Z-Transform; Solution of Difference Equation using the Unilateral Z-Transform.	10 Hrs.	Analytical

SECTION:A :- Chapter 1,2,3,4

SECTION:B:- Chapter 5,6,7,8,9

B:- Practical/ Drawings/ Design/ Workshop:

Not Applicable

C:- Suggested Text Books and References :			
Sr. No	Title	Author	Publication
01	Signals and Systems	A. V. Oppenheim, A. S. Willsky with S. H. Nawab	PHI Pvt. Limited, 2 nd Edition, 1997
02	Signals and Systems	S. Haykin and B. V. Veen,	John Wiley and Sons, Inc.,
03	Signals and Systems: Analysis using , Transform Methods and MATLAB,	M. J. Roberts	Tata McGraw-Hill Publishing Company Limited

Feedback Control Systems

Periods				Evaluation Scheme					Credit
				Sessional Exam		ESE		Total	
L	T	P	Total	TA	CT	TH	PR		
03	01	02	06	25	20	80	25	150	5

Objective:

Introduce the basic elements of Control system, its mathematical analysis, Characteristics and its response to various inputs so as to design a control system considering all its performance factors.

A: Theory:

Unit	Contents	Duration	Nature
01	<p>Introduction to control systems:</p> <p>Definition, History, elements of control systems, Examples of control systems, Open- loop (non feedback) and closed loop (Feedback) control systems, Effect of feedback on overall gain, Parameter variations, External disturbances or noise and control over system dynamics, Regenerative feedback, Linear versus nonlinear control systems, Time- invariant versus Time- varying systems, SISO and MIMO systems.</p>	08 Hrs.	Analytical
02	<p>Time- domain Analysis of control systems:</p> <p>Standard test signals, transient response, Steady state error and error constants, Dynamic error series, Time response of first and second order systems and transient response specifications, Effect of adding poles and zeros to transfer functions, dominant poles of transfer function, Basic control actions and response of control systems, Effects of Integral and derivative control action on system performance, Higher order systems.</p>	16 Hrs.	Analytical
03	<p>Stability of Linear Control systems:</p> <p>Concept of stability, BIBO stability: condition, zero-input and asymptotic stability, Hurwitz stability criterion, Routh-Hurwitz criterion in detail, Relative stability analysis.</p>	08 Hrs.	Analytical
04	<p>The Root-Locus technique:</p> <p>Introduction, Basic properties of the root loci, General rules for constructing root loci, Root- locus analysis of control systems, Root loci for systems with transport lag, Root-contour plots, Sensitivity of the roots of the characteristics equation.</p>	08 Hrs.	Analytical

05	<p>Frequency domain analysis:</p> <p>Frequency response of closed loop systems, Frequency domain specifications of the prototype second order system, Correlation between time and frequency response, Effect of adding a pole and a zero to the forward path transfer function, Polar plots, Bode plots, Phase and Gain margin, Stability analysis with Bode plot, Log magnitude versus Phase plots. Constant M and N circles, Nichols Chart, Gain adjustments, Sensitivity analysis in frequency domain, Nyquist stability criterion: Mathematical preliminaries, stability and relative stability analysis.</p>	14 Hrs	Analytical
06	<p>Compensators:</p> <p>Introduction, Different types of Compensators (Electrical, Electronic and Mechanical type), their transfer functions, Bode plots, polar plots, Design of Lead, Lag, Lead-Lag Compensator using Root Locus and Bode Diagrams.</p>	06 Hrs	Analytical

SECTION:A :- Chapter 1,2,3

SECTION:B:- Chapter 4,5,6

B:- Practical/ Drawings/ Design/ Workshop:	
01	Study and plot the unit step responses of addition of a pole and a zero to the closed loop transfer function. Plot the responses for four different values of poles and zeros. Comment on the simulations obtained.
02	Transient response of second order system
03	Study the performance of an open and closed loop control system using electronic amplifiers using OPAMPs.
04	Study the performance of a second order system (Use any OPAMP based electronic system such as an active second order Butterworth filter).
05	Study the performance of any first order and second order system.
06	Determination of transfer function of D. C. generator.
07	Introduction to MATLAB, MATLAB's Simulink and control systems toolbox (with some examples) or any other control system related software package.
08	Compare and plot the unit-step responses of the unity-feedback closed loop systems with the given forward path transfer function. Assume zero initial conditions. Use any computer simulation program.
09	Study of effect of damping factor on system performance by obtaining unit step response and unit impulse response for a prototype standard second order system. Consider five different values for $\zeta = 0.1, 0.3, 0.5, 0.7$ and 1.0 . Also study the effect of varying un-damped natural frequency by taking three different values. Comment on the simulations obtained.
10	Write a program that will compute the step response characteristics of a second order system i.e. percent overshoot, rise time, peak time and settling time. Generalize it for accepting different values of un-damped natural frequency and damping factor.

The assessment of term work shall be on the following criteria:

1. Continuous Assessment
2. Performing the experiments in the laboratory
3. Regular submission of practical report
4. Oral examination conducted internally on the practical work and assigned syllabus

The assessment of Practical Examination shall be on the following criteria:

1. Performing the assigned practical during examination
2. Record of experiment submitted by candidate
3. Viva- voce based on the syllabus

C:- Suggested Text Books and References :

Sr. No	Title	Author	Publication
01	Modern Control Engineering	K.Ogata	Pearson education India
02	Automatic Control System	D.Roddy and J.Cooien	Prentice-Hall of India Private Limited
03	Control System Engineering	Norman S Nise	
04	Modern Control System	R. C. Dorf	

Principles of Communication Engineering

Periods				Evaluation Scheme					Credit
				Sessional Exam		ESE		Total	
L	T	P	Total	TA	CT	TH	PR		
02	-----	02	04	25	10	40	-----	75	3

Objective:

To understand the basics of electronic communication and broad band communication theory.

A: Theory:

Unit	Contents	Duration	Nature
01	Introduction to Electronic Communication: Elements of communication system, types, base band signals and base band transmission, modulation techniques, bandwidth requirements, Introduction ,sources of noise, thermal or Johnson noise, short noise partition noise, Low Frequency or flicker noise.	03 hrs.	Descriptive
02	Amplitude Modulation: Equation of AM wave, modulation index, average power, effective voltage & current for sinusoidal wave, generation of AM : low level and high level modulation, AM transmitters, AM broadcast transmitters, AM Receivers: Types of receivers: Tuned Radio Frequency(TRF) , Super heterodyne, problems in TRF receivers, characteristics of Radio receivers: selectivity, sensitivity, fidelity, image frequency and its rejection, double spotting, AM receivers.	06 hrs.	Descriptive
03	Angle Modulation: FM theory, characteristics of FM: modulation index, deviation ratio, frequency spectrum, bandwidth requirement, percentage modulation, FM modulators: FET reactance modulators, Transistor reactance modulators, comparison of AM and FM transmission.	06 hrs.	Descriptive
04	FM Receiver: Various stages of fm receiver , RF amplifier, Mixer ,IF amplifier, limiters, , use of AGC & double limiting, FM demodulator ,slope detector, balance slope detector, foster seeley discriminator, ratio detector, Quadrature detector, comparison of FM detection ,noise triangle in FM capture effect.	08 hrs.	Descriptive

05	Audio Communication:	07 hrs.	Descriptive
	Microphone types: moving coil, ribbon type, condenser and carbon type, characteristics, response parameters, Loudspeaker: types: moving coil cone, electro-dynamic, horn type, characteristics, enclosures and baffles necessity and types, hi-fi system, stereophony, tone control circuits, recent trends in sound recording.		

SECTION:A :- Chapter 1,2,3
SECTION:B:- Chapter 4,5

B:- Practical/ Drawings/ Design/ Workshop:	
01	To study various types of Micro phones & Loudspeakers
02	Class C Plate modulation in AM.
03	To measure modulation index , power , efficiency & frequency spectrum of AM.
04	SSB using balance Modulator
05	Demodulation of SSB Using product detector
06	Frequency Modulation (FET reactance modulator) measure modulation depth.
07	To plot S curve of balance slope detector & foster seeley discriminator or phase discriminator in FM Demodulator, find maximum useful frequency.
08	To Plot frequency response of typical tone control circuit. (Bass boost & cut, Treble boost & cut).

<u>The assessment of term work shall be on the following criteria:</u>
<ol style="list-style-type: none"> 1. Continuous Assessment 2. Performing the experiments in the laboratory 3. Regular submission of practical report 4. Oral examination conducted internally on the practical work and assigned syllabus

C:- Suggested Text Books and References			
Sr. No	Title	Author	Publication
01	Principle of communication Engineering	George Kennedy	McGraw Hill
02	Principle of communication Engineering	Roody Coolen	Tata McGraw Hill
03	Audio & Video Systems	R.G.Gupta.	
04	Communication Systems	B. P Lathi	BP publications
05	Digital and Analog Communication Systems	K. Shanmugam	John Wiley & Sons

Electronic Workshop

Periods				Evaluation Scheme					Credit
				Sessional Exam		ESE		Total	
L	T	P	Total	TA	CT	TH	PR		
-----	-----	02	02	25	-----	-----	-----	25	1

Objective:

To understand basic of semiconductor devices, identify and test it, design the electronic system and make it a product.

A: Theory:

Not Applicable

B:- Practical/ Drawings/ Design/ Workshop:	
Experiment list: (Minimum 10 experiments to be performed)	
01	Study of various types of fixed and variable passive components(Resistor, capacitor, inductors)
02	Study of various types of switches
03	Study of various types of connectors
04	Study various types of relays
05	Study of diode, LED, Zener diode(silicon, germanium) and power diode with specifications
06	Study of transistors with data sheets specifications(low power and power amplifiers)
07	Study of FET, MOSFET, CMOS with data sheets specifications
08	Study of various types of PCB, layout and artwork techniques
09	circuit simulation using Pspice and implementing it as a mini project
10	Hobby Circuit design

<u>The assessment of term work shall be on the following criteria:</u>
<ol style="list-style-type: none"> 1. Continuous Assessment 2. Performing the experiments in the laboratory 3. Regular submission of practical report 4. Oral examination conducted internally on the practical work and assigned syllabus

Development of Skill – IV
(Internet Applications and Web Technologies)

Periods				Evaluation Scheme					Credit
				Sessional Exam		ESE		Total	
L	T	P	Total	TA	CT	TH	PR		50
-----	-----	02	02	50	-----	-----	-----		

Objective:

<ol style="list-style-type: none"> 1. To learn the history and structure of the internet protocols 2. To learn about Email and List servers 3. To learn about Bulletin boards and chat rooms 4. To learn webpage designing.

A: Practical Related Contents:

Unit	Contents	Duration	Nature
1	Introduction to internet: What is internet? Application of internet, History of internet, Glossary of internet terms.	2 Hours	Practical
2	The History/Structure of the internet protocols: Background on the internet packet Switching, The TCP/IP protocol suite, gateways, HTTP Protocol.	2 Hours	Practical
3	Learning basic internet skills: Study of Browser (IE, Nets cape Navigators, MSN, Menus of all browser, options, setting), what is Domain name server? How we can use it? High level overview of browsers.	2 Hours	Practical
4	Using Email: Write all details about options provided in Email Account. What is Email? How it is used, sending Email, reading Email, forwarding an Email.	2 Hours	Practical
5	To study internet tutorial: What is search engine? Example of search engine, how it works? How to download files from internet.	2 Hours	Practical
6	To study internet terminology: Study different terminologies related to internet such as bandwidth, firewall, host, LAN, multimedia, web portal, client-server, chat, upload, download.	2 Hours	Practical

7	Using Email and List Servers: Handling your email account, organizing messages in folders, copying and moving files, subscribing and unsubscribing to list servers searching list server databases.	2 Hours	Practical
8	Using Bulletin boards and chat rooms: Online bibliographic searches, internet searching and web page evaluation.	2 Hours	Practical
9	Privacy and the internet: Crime & encryption, spamming, surveillance, pornography, hate speech, Dissent.	2 Hours	Practical
10	Introduction to world wide web: History of evolution of www, Components of a Web application, Mime Types, Browsers & Web servers ,Types of Web Content i.e. Static, Dynamic, Active, The URL.	2 Hours	Practical

B:- Practical/ Drawings/ Design/ Workshop:	
01	History of internet
02	Study of protocols
03	Study of Domain Name System
04	Study of browsers
05	Study of Email(all options provided in Email account)
06	Searching internet tutorials
07	Study of internet terminology
08	Study of internet using Bulletin boards and chat rooms
09	Note on Crime & Encryption
10	Design static web page using FrontPage

<u>The assessment of term work shall be on the following criteria:</u>
<ol style="list-style-type: none"> 1. Continuous Assessment 2. Performing the experiments in the laboratory 3. Regular submission of practical report 4. Oral examination conducted internally on the practical work and assigned syllabus

C. Suggested Text Books and References:

Sr. No.	Title	Author	Publication	Edition
1	Internet Essentials	Pawan Arora	New Light	First
2	Internet	Vishnu Priya Singh	Asian	

D. Digital references	
Sr. No.	Website / Links / e-journals
1	www.w3schools.com
2	www.wikipedia.com

ADS