MAHATMA GANDHI UNIVERSITY

B.TECH. DEGREE COURSE

4TH SEMESTER

SCHEME
&
SYLLABUS

2002

ELECTRONICS
&
COMMUNICATION
ENGINEERING BRANCH

ELECTRONICS & COMMUNICATION ENGINEEING

SCHEME

4TH SEMESTER

Course Code	Course No.	Subject	Teaching periods			Uty. Exam duration (hours)	Marks			
			L	T	P		Sessional	Theory	Practical	Total
A	CMELR TPA 401	Engineering Mathematics III	3	1	0	3	50	100	-	150
B	LA402	Digital Electronics and Logic Design	3	1	0	3	50	100	-	150
C	LA403	Communication Engineering	3	1	0	3	50	100	-	150
D	LA404	Electronic circuits –II	3	1	0	3	50	100	-	150
E	LTA405	Signals and systems	2	1	0	3	50	100	-	150
F	LA406	Reliability & Humanities	2	1	0	3	50	100	-	150
G	LA407	Electronic circuits Lab	0	0	4	3	50		100	150
H	LA408	Computer programming Lab	0	0	4	3	50		100	150
		Total	16	6	8		400	600	200	1200

SYLLABUS

ENGINEERING MATHEMATICS - III

CMELRPTA 401 **3+1+0**

Module 1

Ordinary Differential Equations: Linear Differential equations with constant coefficents - Finding P.I. by the method of variation of parameters – Cauchys equations- Linear Simultaneous eqns- simple applications in engineering problems.

Module 2

Partial Differential Equations - formation by eliminating arbitrary constants and arbitrary Functions - solution of Lagrange Linear Equations –Charpits Method – solution of homogeneous linear partial differential equation with constant coefficients – solution of one dimensional wave equation and heat equation using method of separation of variables – Fourier solution of one dimensional wave equation.

Module 3

Fourier Transforms: - Statement of Fourier Integral Theorems – Fourier Transforms – Fourier Sine & Cosine transforms - inverse transforms - transforms of derivatives – Convolution Theorem (no proof) – Parsevals Identity - simple problems.

Module 4

Probability and statistics: Binomial law of probability - The binomial distribution, its mean and variance - poisson distribution as a limiting case of binomial distribution - its mean and variance - fitting of binomial & poisson distributions - normal distribution - properties of normal curve - standard normal curve - simple problems in binomial, poisson and normal distributions.

Module 5

Population & Samples: Sampling distribution of mean (σ known) –Sampling distribution of variance, F and Chi square test – Level of significance - Type 1 and Type 2 errors – Test of hypothesis – Test of significance for large samples – Test of significance for single proportion, difference of proportions, single mean and difference of means (proof of theorems not expected).

References

1. Higher Engineering Mathematics - B.S. Grewal, Khanna Publishers.
2. Engineering Mathematics Vol.II -3rd year Part A & B - M.K. Venkataraman, National Publishing Company
3. Elements of Partial Differential Equations - Ian N.Sneddon.,McGraw Hill.
4. Miller and Fread's Probability and statistics for engineers – Richard A Johnson, Pearson Education Asia / PHI.

5. A text book of Engineering Mathematics (Volume II) – Bali and Iyengar, Laxmi Publications Ltd.
6. Advanced Engg. Mathematics Erwin Kreyszig, Wiley Eastern Ltd.
7. Probability and statistical inferences – Hogg and Tanis, Pearson Education Asia.

DIGITAL ELECTRONICS AND LOGIC DESIGN

LA 402 **3+1+0**

Module 1

Gates –Inverter - OR gates - AND gates - NOR Gates - De Morgan's Theorems - NAND Gates - EXCLUSIVE-OR Gates - Tristate Inverter - TTL Circuits - Digital Integrated Circuits - 7400 Devices - TTL Characteristics - TTL Overview - AND -OR- NOT Gates - Open-Collector Gates – CMOS gates.

Module 2

Boolean Algebra and Karnaugh Maps - Boolean Relations - Sum-of-Products method - Algebraic Simplification - Karnaugh maps – Pairs – Quads - and Octets - Karnaugh Simplifications - Don't-Care Conditions. Multiplexers - de-multiplexers - decoder and encoder.

Module 3

Arithmetic-Logic Units - Binary Addition - Binary Subtraction - Half Adders - Full Adders - Binary Adders - signed Binary Numbers - 2's Complement - 2's-Complement Adder-Subtractor.

Module 4

Flip Flops - RS Latches - Level Clocking - D Latches - Edge-Triggered D & T Flip-Flops - Edge-Triggered JK Master-slave Flip-Flop.

Module 5

Registers and Counters - Buffer Registers - Shift Registers - Controlled Shift Registers - Ripple Counters - Synchronous Counters - Ring counters - Modulo counters - Three-State Register. ROMs – PROMs and EPROMs - RAMs. A small TTL Memory.

References

1. Digital Fundamentals: Floyd, Pearson Edn.
2. Digital Design: Wakerly, Pearson Education.
3. Fundamentals of digital circuits: A Anand Kumar, PHI
4. Digital Integrated Electronics: Taub and Shilling, McGraw Hill,
5. Digital electronics: D C Green, Pearson Edn.
6. Digital Logic and state machine design: Comer, Oxford.
7. Digital electronic principles and applications: A K Maini, Khanna Pub.
8. Digital electronic principles: Malvino and Leach, Mc Graw Hill.
9. Logic and computer design fundamentals: M Morris Mano, Pearson Edn.

COMMUNICATION ENGINEERING

LA 403 **3+1+0**

Module 1

Introduction: communication systems – Modulation - need for modulation- bandwidth- Amplitude modulation - theory- mathematical representation- frequency spectrum - USB & LSB- power relation- Frequency modulation - theory- mathematical representation- frequency spectrum- Phase modulation- comparison of AM- FM- PM.

Module 2

Radio transmitters: AM transmitter - block diagram - Solid state modulators - circuit explanation- FM transmitter - reactance modulator- varactor diode modulator- Amstrong modulator.

Module 3

Radio receivers: Tuned radio frequency receiver- superheterodyne receiver - block schematic- selectivity- sensitivity- importance of IF - image frequency rejection - AM receivers - schematic explanation - RF amplifiers - circuit explanation - Mixer circuits - IF amplifiers - circuit explanation- simple diode detector - Automatic gain control circuit - simple and delayed AGC - FM receivers - block schematic explanation - amplitude limiting - FM demodulators: slope detectors- phase discriminator- ratio detectors.

Module 4

Side band communication: Single side band transmission - suppression of carrier - balanced modulator - filtering of unwanted sideband - SSB receivers - block schematic explanation - pilot carrier receiver - suppressed carrier receiver - Vestigial side band transmission - transmitter and receiver responses - advantages of VSB in television.

Module 5

Telephone Systems - Telephone subscribers loop circuit - subscribers line interface circuit - Pulse and tone signaling - Frequency assignments - Electronic telephone - block schematic of a telephone set- block schematic of single line analog SLIC board - two wire repeaters - Electronic private automatic branching exchange - basic block schematic- Power line communication: block schematic explanation- Facsimile - FAX transmitter and receiver.

References

1. Electronic communication Systems: Wayne Tomasi- Pearson Edn.
2. Electronic communication: Roody and Coolen- PHI.
3. Electronic Communication systems: George Kennedy- Mc Graw Hill.
4. Electronic and radio engineering: A P Mathur.
5. Telephony and Carrier current engineering: P N Das.
6. Modern communication Systems: Couch- PHI.

ELECTRONIC CIRCUITS - II

LA 404 **3+1+0**

Module 1

High frequency equivalent circuit of a transistor. Hybrid pi model - explanation of components -r parameters in terms of h parameters -Tuned amplifiers -principle - single tuned and double tuned amplifiers -frequency response -applications (no analysis) -multistage amplifiers -frequency response.

Module 2

Feedback -different types -positive, negative, voltage, current, series and shunt feedback -Feedback in amplifiers -its effect on amplifier performance -typical feedback arrangements -emitter follower -darlington emitter follower -cascade amplifier (principles only) -difference amplifier.

Module 3

Oscillators -conditions for oscillation -analysis and design of RC phase shift oscillator, general form of oscillator circuit -working of Hartley, Colpitt's, Crystal, tuned collector and Wien Bridge oscillators.

Module 4

Mono-stable multi vibrator -analysis -design -applications -triggering -Bistable multi-vibrator -analysis and design -different methods of triggering -commutating capacitor -Schmitt trigger -working -design.

Module 5

Large signal amplifier -harmonic distortion -analysis of class A, class B, class C and class D amplifiers -complimentary and symmetry stage -sweep generators - voltage and current sweeps -time base generators -linearisation -miller and bootstrap sweeps - applications.

References

1. Electronic devices and circuits -Boylsted & Neshelsky, Pearson Edn.
2. Integrated electronics -Millman & Halkias , Mc Graw Hill
3. Electronic principles -Malvino
4. Electronic devices and circuits -Bugart
5. Microelectronics Digital and Analogue -Botkar.

SIGNALS AND SYSTEMS

LTA 405 **2+1+0**

Module 1

Dynamic Representation of Systems - Systems Attributes- Causality - linearity- Stability- time-invariance. Special Signals- Complex exponentials- Singularity functions (impulse and step functions). Linear Time-Invariant Systems: Differential equation representation- convolution Integral. Discrete form of special functions. Discrete convolution and its properties. Realization of LTI system (differential and difference equations).

Module 2

Fourier Analysis of Continuous Time Signals and Systems - Fourier Series- Fourier Transform and properties- Parseval's theorem- Frequency response of LTI systems. Sampling Theorem.

Module 3

Fourier Analysis of Discrete Time Signals & Systems - Discrete-Time Fourier series- Discrete-Time Fourier Transform (including DFT) and properties. Frequency response of discrete time LTI systems.

Module 4

Laplace Transform - Laplace Transform and its inverse: Definition- existence conditions- Region of Convergence and properties- Application of Laplace transform for the analysis of continuous time LTI system (stability etc.) Significance of poles & zeros- Z-Transform **-** Z-Transform and its inverse: Definition- existence- Region of convergence and properties- Application of Z-Transform for the analysis of Discrete time LTI systems- Significance of poles and zeros.

Module 5

Random Signals - Introduction to probability. Bayes Theorem- concept of random variable- probability density and distribution functions- function of a random variable. Moments- Independence of a random variable. Introduction to random process. Auto and cross correlation. wide-sense stationarity- power spectral density White noise- Random processes through LTI systems.

References

1. Signals and Systems: Oppenheim Alan- V- Willsky Alan. S- Pearson Edn.
2. Communication Systems: Haykin Simon- John Wiley.
3. Signals and Systems: I J Nagrarth- Tata Mc Graw Hill.
4. Signals and Systems: Farooq Husain- Umesh pub.
5. Adaptive signal processing: W Bernad- Pearson Edn.

RELIABILITY AND HUMANITIES

LA 406 **2+1+0**

Module 1

Concepts of reliability: Definition of reliability- failure- classification of failures- measures of reliability- failure rate- mean time between failures (MTBF)- mean time to failure (MTTF).

Module 2

Failure pattern and fitting curves: Graphical plots- Bath tub curves- Hazard models- Constant hazard models- Linearly increasing hazard model- Weibull model.

Module 3

Manufacture for Quality and reliability: The need for prototype tests- the quality standard- planning to achieve required quality- basic concepts of sequencing.

Module 4

Control charts in statistical quality control: statistical quality control advantages- types of control charts- X and R chart- P chart- C chart- Re-engineering- Zero defects.

Module 5

Human relations: Human Behavior- Scope of Industrial psychology-Theories of Motivation-Handling of workers grievances-Workers participation in management-Industrial discipline-Industrial disputes-Industrial fatigue-Wages and incentives.

References

1. Reliability Engineering: L S Sreenath.
2. Reliability Engineering: A K Govil.
3. Industrial Engineering & Management: Banga and Sharma.

ELECTRONIC CIRCUITS LAB

LA 407 **0+0+4**

List of experiments

1. Power amplifiers: Design of class A and class AB push pull stage – verification of power output.
2. IC power amplifier.
3. Oscillators: Design of RC phase shift, Hartley & Colpitts oscillators.
4. Design of Mono-stable and bi-stable multi-vibrators.

5. Design of bootstrap sweep generator.
6. Schmitt trigger.
7. SCR, Triac firing circuits.
8. Feedback amplifier, design of two stage RC coupled amplifier.
9. Tuned amplifiers.
10. Design and testing of DC regulated power supplies (Fixed and variable).
11. Simulation of above circuits using PSPICE.

Note

New experiments may be added in accordance with subject LA 404

COMPUTER PRORAMMING LAB

LA 408 **0+0+4**

Part 1

1. Computer hardware familiarization.
2. Familiarization of MS-DOS commands, Microsoft Windows.
3. Familiarization of Microsoft Word, Adobe Acrobat Reader.

Part 2

Programming Experiments in C/C++: Programming experiments in C/C++ to cover control structures, functions, arrays, structures, pointers and files, classes, operator & function overloading, inheritance, polymorphism.