MAHATMA GANDHI UNIVERSITY

B.TECH. DEGREE COURSE

5TH SEMESTER

SCHEME
&
SYLLABUS

2002

ELECTRONICS
&
COMMUNICATION
ENGINEERING BRANCH

ELECTRONICS & COMMUNICATION ENGINEEING

SCHEME

5TH SEMESTER

Course Code	Course No:	Subject	Teaching periods			Uty. Exam duration (hours)	Marks			
			L	T	P		Sessional	Theory	Practical	Total
A	CMEL PA 501	Engineering Mathematics IV	3	1	0	3	50	100	-	150
B	LA502	Power Electronics	2	1	0	3	50	100	-	150
C	L503	Applied Electromagnetic Theory	3	1	0	3	50	100	-	150
D	LA504	Computer organization and Architecture	2	1	0	3	50	100	-	150
E	LA505	Linear integrated circuits	3	1	0	3	50	100	-	150
F	L506	Microprocessors and Microcontrollers	3	1	0	3	50	100	-	150
G	LA507	Digital IC lab	0	0	4	3	50		100	150
H	L508	Communication–I lab	0	0	4	3	50		100	150
		Total	16	6	8		400	600	200	1200

SYLLABUS

ENGINEERING MATHEMATICS -IV

CMELPA501 **3+1+0**

Module 1

Complex Integration: Line Integral –Cauchy's integral theorem- Cauchy's integral formula-Taylor's series-Laurent's series- zeros and singularities-Residues- residue theorem-Evaluation of real integrals using contour integration involving unit circle and semicircle.

Module 2

Numerical solution of algebraic and transcendental equations: Successive bisection method-Regula falsi method - Newton –Raphson method – solution of system of linear equations by Jacobi's iteration method and Gauss-Siedel method.

Module 3

Numerical solution of ordinary differential equation: Taylor's series method-Euler's method –Modified Eulers method - Runge – Kutta method (IV order)-Milne's predictor corrector method.

Module 4

Z – Transforms: Definition of Z transform- properties –Z transform of polynomial functions – trigonometric functions, shifting property, convolution property-inverse transform – solution of 1^{st} & 2^{nd} order difference equations with constant coefficients using Z transforms.

Module 5

Linear programming: graphical solution – solution using simplex method (non – degenerate case only) – Big-M method,two phase method- Duality in L.P.P.-Balanced T.P. – Vogels approximation method – Modi method.

References

1. Advanced Engineering Mathematics – Ervin Kreyszig, Wiley Eastern limited.
2. Numerical methods in Engineering & Science – Dr. B.S.Grewal, Kanna Publishers.
3. Higher Engineering Mathematics - Dr. B.S.Grewal, Kanna Publishers.
4. Numerical methods in Science & Engineering - Dr. M.K.Venkitaraman, National Publishing company.
5. Quantitative techniques Theory & Problems - P.C.Tulsian, Vishal Pandey, Pearson Education Asia.
6. Complex variables and applications - Churchill and Brown, McGraw-Hill.
7. Operations research - Panneer Selvam, PHI.
8. Engineering Mathematics Vol. III -S Arumugam, A.T.Isaac, A.Somasundaram, Scitech publications
9. Advanced Mathematics for Engg.students Vol. III- S.Narayanan, T.K.M.Pillay, G.Ramanaigh, S.Vishwananthan printers & publishers.

POWER ELECTRONICS

LA 502 **2+1+0**

Module 1

Power semiconductor Devices - History of development of Power Electronic devices- Constructional features- Characteristics- rating and specification- gate/base drive circuits-protection including cooling and application consideration of diodes- SCRS, GTO, BJTS, MCT, MOSFET and IGBT. Series and parallel operations of SCR- Electromagnetic interference.

Module 2

AC to DC Converters - Operation and analysis of Single phase and multi-phase uncontrolled and controlled rectifiers with R, RL and back EMF load- effect of source inductance- free wheeling effect- power factor improvement methods for phase Controlled rectifiers- filters. PWM chips: SG3524 and TL 494- Block schematic.

Module 3

AC to AC Voltage Converter - Operation and analysis of single phase integral cycle and phase controlled converters- Configuration of three phase controllers.

Module 4

DC to DC Converters - Chopper classification- Step down- step up and four quadrant converters operation- analysis and control with R, RL and EMF load- current and voltage Commutation circuits.

Module 5

DC to AC Converters - Single phase and three phase bridge inverters- VSI and CSI- voltage control - PWM & Square wave operation- Harmonics and their reduction techniques.

References

1. Power Electronics: Rashid Muhammad, Pearson Edn.
2. Power Electronics: Harish C Ray, Galgotia Pub.
3. Thyristors and Applications: Ramamoorthy.
4. Power Electronics: Converter, Applications and Design, Mohan Ned, John Wiley,
5. Power Semiconductor Circuits: Dewan, S.B. and Satrughan A, John Wiley & Sons, 1975.
6. Thyristorised Power Controllers: Dubey, G.K., Doradlla, S. R., Wiley Eastern, 1987.

APPLIED ELECTROMAGNETIC THEORY

L 503 **3+1+0**

Module 1

Review of vector analysis: Cartesian, Cylindrical and Spherical co-ordinates systems- Co-ordinate transformations. Static electric field: Coulomb's Law of point charges- Electric flux-Gauss's Law- Electrical scalar potential- different types of potential distribution- Potential gradient- Boundary conditions Capacitance: Capacitance of isolated sphere- capacitance between two concentric sphere shells- capacitance between coaxial cylinders- capacitance between parallel wires. Vector fields: Divergence and curl- Divergence theorem- Stokes theorem.

Module 2

Magnetic field: Steady current and current density in a conductor- Biot-Savarts Law- Ampere's Law- Helmholtz theorems- Faraday's law of electromagnetic induction- Solenoid, toroid, inductance of transmission line- Mutual inductance energy stored in magnetic fields- Magnetic dipole- Electric and Magnetic boundary conditions- vector magnetic potential.

Module 3

Maxwell's equations and travelling waves: conduction current and displacement current- Maxwell's equations- Plane waves- Poynting theorem and Poynting vector- Plane electromagnetic waves- Solution for free space condition- Uniform plane wave-wave equation for conducting medium- Wave polarization- Poisson's and Laplace equations.

Module 4

Guided waves between parallel planes- transverse electric and transverse magnetic waves and its characteristics- Rectangular wave guides- modes of propagation.

Module 5

Transmission lines -Transmission line equations- transmission line parameters- Skin effect- VSWR- Characteristic impedance- Stub matching- Smith chart - Phase velocity and group velocity.

References

1. Engineering Electromagnetics: W. H. Hayt, Mc Graw Hill Publications.
2. Electromagnetics: J. D. Kraus, Mc Graw Hill Publications.
3. Engineering electromagnetics: E. C. Jordan.
4. Field & Wave Electromagnetic: Cheng, Pearson Education.
5. Electromagnetics: Edminister, Schaum series, 2 Edn.
6. Electromagnetic Theory: B. Premlet.
7. Electromagnetic Theory: Sadiku, Oxford University Press.

COMPUTER ORGANISATION AND ARCHITECTURE

LA 504 **2+1+0**

Module 1

Basic structure of computer hardware and software- addressing methods and machine programming sequencing- different addressing modes- instruction sets- computer arithmetic logic design- fast adders- multiplication- Booth's algorithm- fast multiplication- integer division- floating point numbers.

Module 2

Control unit- instruction execution cycle- sequencing of control signals- hardwired control- PLAs- micro programmed controls- control signals- micro instructions - Micro program sequencing- branch address modification- pre fetching of micro instructions.

Module 3

Memory organization- semi conductor RAM memories- internal organization- bipolar and MOS devices- dynamic memories- multiple memory modules and interleaving- cache memories -mapping functions - replacement algorithms- virtual memories- address translation-page tables - memory management units- secondary memories- disk drives- standards.

Module 4

Input-Output organization- accessing I/O devices- direct memory access (DMA)- interrupts and interrupt handling- handling multiple devices- device identification- vectored interrupts- interrupt nesting- daisy chaining- I/O interfaces- serial and parallel standards- buses-scheduling- bus arbitrations- printers- plotters- VDUs.

Module 5

Introduction to parallel processing and architecture- classification- array processors- pipeline architecture- interconnection- networks- multistage networks- message passing architecture.

References

1. Computer organization – Hamacher C V, Mc Graw Hill.
2. Computer Systems and Architecture – Vincent P Heuring, H F Jordan, Pearson Edn.
3. Computer organization and Design – Pal Choudhary
4. Computer organization and Architecture – Hayes J P
5. Computer Org. & Architecture: Stallings, Pearson Education.

LINEAR INTEGRATED CIRCUITS

LA 505 **3+1+0**

Module 1

Introduction to operational amplifiers – Basic differential amplifier - dual input balanced output and unbalanced output- Internal block schematic of op amp - Pin identification- power supply requirements - typical data sheet - Op-amp parameters - ideal op amp - transfer curve - equivalent circuit- open loop configurations - frequency response of op amps - compensating networks - slew rate and its effect.

Module 2

Op amp in closed loop configuration: Different feed back configurations- Voltage series feedback and voltage shunt feedback - concept of virtual ground- voltage follower - V/I converters and its applications - Differential amplifiers with one op amp and 3 op amps- Use of offset minimizing resistor (R_{OM}) and its design.

Module 3

Op amp applications- Summer- Subtractor- Log amplifier- Antilog amplifier- Comparators: zero crossing- using voltage reference- regenerative (Schmitt trigger) comparators- Astable and monostable multivibrators- Triangular and sawtooth wave generators- Integrator and differentiator- RC phase shift and Wien bridge oscillators-Sample and hold circuit- Peak detector circuit.

Module 4

Filters and timers: LPF- HPF- BPF- Notch and all pass filters- I order and II order filters- Switched capacitor filter- Switched capacitor integrator. 555 timers – Functional block diagram- Astable multivibrator, monostable multivibrator and its applications.

Module 5

Specialized ICs and applications: Voltage regulator ICs – 78XX and 79XX series- 317 variable regulators- 1723 switching regulators- 566 VCO chip- Phase locked loop(PLL) - capture and lock range- 565 PLL - PLL applications: Frequency multiplication and division- AM demodulation- FM detection- FSK demodulation - LM 380 power amplifier - intercom using LM 380- 8038 Function generator chip - applications.

References

1. Op amps and Linear Integrated circuits: Ramakand Gaykwad- PHI publications.
2. Op amps and Linear Integrated circuits: R F Coughlin- Pearson Education.
3. Op amps and Linear Integrated circuits: Ravi Raj Dudeja- Umesh Publications.
4. Linear Integrated circuits: Roy Choudhary & Jain- Wiely Eastern Publications.
5. Integrated circuits: K R Botkar

MICROPROCESSORS AND MICROCONTROLLERS

L506 **3+1+0**

Module1

Introduction to microprocessors and microcomputers: Function of microprocessors- architecture of 8085- pin configuration and functions – tristate bus concept - generation of control signals - bus timings – de-multiplexing AD_0-AD_7 – flags - memory decoding - interfacing of RAM and EPROM - I/O addressing - I/O mapped I/O - and memory mapped I/O schemes - instruction execution - fetch/execute cycle - instruction timings and operation status.

Module 2

Atmel AT89C51 microcontroller – features - pin configurations - internal block schematic - pin descriptions - PORT0, PORT1, PORT2, PORT3, idle & power down mode - power control register - program protection modes - flash programming & verification.

Module 3

Memory organization - program memory - data memory - direct & indirect addressing area - Program status word - register banks - addressing modes - instruction set – arithmetic - logical and data transfer instructions - Boolean instructions - program branching instructions - Programming examples.

Module 4

Machine cycles – interrupts - interrupt sources - interrupt enable register - interrupt priority - interrupt control system - interrupt handling - single step operation - port bit latches and buffers - port structures and operation - accessing external memory – programming examples.

Module 5

Timer0 & Timer1 - TMOD SFR - mode0, mode1, mode2, mode3 - TCON SFR - serial interface - SCON SFR - mode0, mode1, mode2, mode3- block schematics- baud rates- power on reset circuit- ONCE mode- on chip oscillator- external program & data memory timing diagrams- I/O port timings – programming examples.

References

1. The 8051 Microcontroller: Muhammad Ali Mazidi, Pearson Education.
2. The 8051 Microcontroller: Kenneth J Ayala, Penram International
3. Microprocessors and Architecture: Ramesh S Goankar
4. Microcomputers and Microprocessors: John Uffenbeck, PHI
5. Web site of Atmel - www.atmel.com

DIGITAL IC LAB

LA 507 **0+0+4**

List of experiments

1. TTL & CMOS characteristics (7400, CD4001)
2. Interfacing of TTL & electromagnetic relay using transistor, opto coupler (4N33) & Darlington arrays (ULN2803).
3. Logic family interconnection (TTL to CMOS & CMOS to TTL)
4. Design of half adder & full adder using gates.
5. Design and testing of ripple & synchronous counters using JK flip flops (7473, 7476)
6. Counters using shift registers (Ring counter & Johnson counter).
7. Study of counter ICs (7490, 74190).
8. Design of astable & mono-stable multi-vibrators using gates.
9. Design of mono-shots using dedicated ICs (74123).
10. Logic design using multiplexers (74150).
11. Logic design using decoders (74138).
12. Adders, Subtractors, multipliers.
13. Design of 7 segment display circuits-static/dynamic (7447, FND542).
14. PRBS generator.
15. Digital circuit simulation using electronic work bench/ similar working tools.

Note

Any experiment related to LA402 may be added to the above list.

COMMUNICATION - I LAB

L 508 **0+0+4**

List of experiments

1. Passive filters – constant K and M derived.
2. Amplitude modulation.
3. Frequency modulation.
4. PWM using SG3525.
5. 555 Applications
6. 566 Applications
7. Study of 565 and its applications
8. Crystal oscillator
9. Oscillators using OP-AMP
10. Colpitts & Hartley oscillator.
11. Multiplexing using analog multiplexer IC's.

Note

Any other experiments may be added to the above list related to LA403.