File Ref.No.3128/GA - IV - J1/2013/CU

UNIVERSITY OF CALICUT

Abstract

BSc in Electronics -CUCBCSS UG 2014-Scheme and Syllabus- Approved-Implemented-w.e.f 2014 Admissions-Errors/Omissions found in the Scheme and
Syllabus corrected-approved - Corrigendum issued.

G & A - IV - J

U.O.No. 319/2015/Admn Dated, Calicut University.P.O, 13.01.2015

Read:-1. U.O. No. 3797/2013/CU, dated 07.09.2013 (CBCSS UG Modified Regulations) (File.ref.no. 13752/GA IV J SO/2013/CU).

2. U.O. No. 5180/2014/Admn, dated 29.05.2014 (CBCSS UG Revised Regulations) (File.ref.no. 13752/GA IV J SO/2013/CU).

3. Item no. 1 of the minutes of the meeting of the Board of Studies in Electronics held on 27.05.2014.

4.Item no. 8 of the minutes of the meeting of the Faculty of Science held on 27.06.2014.

5.UO No: 9563/GAIV /2014 Dt 7.10.14

6. Corrected Syllabus forwarded by the Chairman

ORDER

The Modified Regulations of Choice Based Credit Semester System for UG Curriculum w.e.f 2014 was implemented under the University of Calicut vide paper read as (1).

The Revised CUCBCSS UG Regulations has been implemented w.e.f 2014 admission, for all UG programme under CUCBCSS in the University, vide paper read as (2).

The Board of Studies in Electronics finalized the revised syllabus of BSc Electronics for implementation w.e.f the Academic Year 2014-2015. vide paper read as (3).

The Faculty of Science has also approved the minutes of the Board vide paper read as (4).

The Hon'ble Vice Chancellor, considering the exigency, excercising the powers of the Academic Council has approved the items regarding the implementation of syllabi in the minutes of the concerned Boards of Studies mentioned in the minutes of the Faculty of Science, subject to ratification by the Academic Council, and UO issued vide paper read as (5).

As per paper read as (6), the Chairman, BOS himself has reported that some errors and omissions have been crept in the syllabus implemented and has forwarded the syllabus rectifying

the errors.

Sanction has, therefore, been accorded for implementing the corrections and rectifying the omissions in the syllabus of BSc Electronics. The Scheme and Syllabus implemented vide paper read as (5) stands corrected to this effect.

Corrigendum is issued accordingly.

(The corrected syllabus is attached herewith and is available in the website: universityofcalicut.info)

Muhammed S
Deputy Registrar

To

1. All Affiliated Colleges/SDE/Dept.s/Institutions under University of Calicut.
2. The Controller of Examinations, University of Calicut.
3. The Director SDE, University of Calicut.

Forwarded / By Order

Section Officer

UNIVERSITY OF CALICUT

B.Sc. ELECTRONICS

CORE AND COMPLEMENTARY PROGRAMMES

STRUCTURE, SCHEME and SYLLABUS

2014 Admission Onwards

B.Sc. Electronics Programme

Programme Objective

There are two main objectives to the B.Sc. Electronics Programme.

1. To train students to a level where they can readily compete for seats for advanced degree courses like MSc (Electronics) and MBA etc.
2. To produce electronic professionals who can be directly employed or start his/her own work as Electronic circuit Designer, Electronics consultant, Testing professional, Service engineer and even an entrepreneur in electronic industry.

On completion of the B.Sc. Electronics Programme, the student will:

- have basic communicative skill in the English language
- have environmental and civic awareness
- communicative skills and literary sensibility in languages other than English
- have sound knowledge of the theory behind core subjects like, Electronic components, Electronic measuring and testing instruments, Analog and Digital IC's, Electronic circuit design and implementation, Troubleshooting and maintenance of electronic and electrical devices.
- have sound skills in Assembly Language and High Level Language programming, Interfacing of electronic devices with computers, and embedded processors, etc.
- be in a position to develop industrial and entrepreneur applications

Eligibility

Candidate of admission to the B.Sc. Electronics Programme should have passed the Higher secondary / Technical higher secondary / Vocational Higher secondary examinations of Govt. of Kerala or CBSE or IELE or any other examinations recognized as equivalent there to by the University of Calicut with Mathematics or Electronics or Computer Science or Computer Applications as one of the optional subjects.

Duration of the Programme

Duration of the programme shall be 6 semesters. Each semester should have 90 instructional days with 5 hours of instruction per day 5-days a week system. The University will conduct semester-end examinations.

Programme Structure

Semester	Course No	Courses	Course Code	Course Title	Contact Hours			Credits	Marks
					Theory	Lab	Total		
Semester I	1	Common Course 1		English course I	5		5	4	
	2	Common Course 2		English course II	4		4	3	
	3	Common Course 3		Additional Language course 1	5		5	4	
	4	**Core Course – 1**	**ELE1B01**	**Basic Electronics**	**1**	**2**	**3**	**3**	**100**
	5	1st Complimentary course –I		Mathematics - I	4	-	4	3	
	6	2nd Complimentary course –1		Optional -1	4		4	3	
		Total					**25**	**20**	
Semester II	1	Common Course 4		English course III	5		5	4	
	2	Common Course 5		English course IV	4		4	3	
	3	Common Course 6		Additional Language course III	5		5	4	
	4	**Core Course 2**	**ELE2B02**	**Electronic Circuits**	**1**	**2**	**3**	**3**	**100**
	5	**Core Lab 1**	**ELE2B03**	**Electronic devices and Circuits**	**1st & 2nd sem. lab Exam**			**3**	**150**
	6	1st Complimentary course 2		Mathematics – II	4	-	4	3	
	7	2nd Complimentary course 2		Optional- 2	4		4	3	
		Total					**25**	**22**	
Semester III	1	Common Course 7		General Course -I	4	0	4	4	
	2	Common Course 8		General Courser-II	4	0	4	4	
	3	**Core Course 3**	**ELE3B04**	**Analogy & Digital Integrated Circuits**	**4**		**4**	**3**	**100**
	4	**Core lab 2 (Part A)**		**Digital electronics**		**3**	**3**		
	5	1st Complimentary course – 3		Mathematics – III	5		5	3	
	6	2nd Complimentary course – 3		Optional- 3	3	2	5	2	
		Total					**25**	**17**	
Semester IV	1	Common Course 9		General Course -III	4	0	4	4	
	2	Common Course 10		General Course -IV	4	0	4	4	
	3	**Core Course 4**	**ELE4B05**	**Microprocessors**	**4**	**3**	**7**	**3**	**100**
	4	**Core lab 2**	**ELE4B06**	**Digital electronics and Microprocessor 8085**	**3rd & 4th sem. lab Exam**			**3**	**150**
	5	1st Complimentary		Mathematics – IV	5		5	3	

		course 4							
	6	2nd Complimentary course 4		Optional- 4	3	2	5	4	
		Total					**25**	**21**	
Semester V	1	**Core Course 5**	**ELE5B07**	**Electromagnetic Theory**	**4**	**0**	**4**	**4**	**100**
	2	**Core Course 6**	**ELE5B08**	**Microcontroller 8051**	**4**	**3**	**7**	**4**	**100**
	3	**Core Course 7**	**ELE5B09**	**Network Theory**	**5**	**0**	**5**	**4**	**100**
	4	**Core Lab 3 part A**		**Analog Integrated Circuits**		**3**	**3**		
	5	**Open course**	**Choose any one Course (Open course for other Programmes)**		**2**	**0**	**2**	**2**	50
			ELE5D01	Computer Hardware					
			ELE5D02	Digital Fundamentals					
			ELE5D03	Electronics Fundamentals					
	5	**Core Lab - 5**	**ELE6B16**	**Project Work**		**4**	**4**		
		Total					**25**	**14**	
Semester VI	1	**Core Course 8**	**ELE6B10**	**Communication System**	**4**	**3**	**7**	**4**	**100**
	2	**Core Course 9**	**ELE6B11**	**Principles of DSP**	**4**	**3**	**7**	**4**	**100**
	3	**Core Course 10**	**ELE6B12**	**Control Systems**	**4**	**0**	**4**	**4**	**100**
	4	**Core course Elective 1**	**Choose any one Course (elective)**		**3**	**0**	**3**	**3**	**100**
			ELE6B13a	Principle of VLSI					
			ELE6B13b	Embedded Systems					
			ELE6B13c	Microwave and radar engineering					
	5	**Core Lab 3**	**ELE6B14**	**Analog Integrated Circuits and Communication System**	**5th & 6th sem. lab Exam**			**4**	**150**
	6	**Core Lab 4**	**ELE6B15**	**Microcontroller 8051 and DSP**	**5th & 6th sem. lab Exam**			**4**	**150**
	7	**Core Lab 5**	**ELE6B16**	**Project Work**	**0**	**4**	**4**	**3**	**50**
		Total					**25**	**26**	

Core Labs

Core Lab1	ELE2B03	Electronic devices and circuits (1st& 2ndSem)
Core Lab2	ELE4B06	Digital electronics and Microprocessors 8085 (3rd& 4thSem)
Core Lab3	ELE6B14	Analog Integrated Circuits and Communication systems (5th& 6thSem)
Core Lab4	ELE6B15	Microcontroller 8051 and DSP (5th& 6thSem)
Core Lab5	ELE6B16	Project work (5th& 6thSem)

Practical examinations shall be conducted in the even semester (II, IV, and VI)
(Ref: University regulation for CBCSS 8.2)

Minimum 75% of experiments should be done for each lab

Mark Distribution

Common : English		4X100	400	600
Additional Language: Mal/Hin..		2X100	200	
General		4X100	400	400
Core		15(11x100 + 4x150)	1700	1750
Project			50	
Open			50	50
Complimentary	Mathematics	4X100	400	400
	Computer Science	4X100	400	400
Total Marks			3600	3600

Seven Point Indirect Grading System

Percentage of marks	Grade	Interpretation	Grade point Average (G)	Range of grade points	Class
90 and above	A+	Outstanding	6	5.5-6	First class with Distinction
80tobelow 90	A	Excellent	5	4.5-5.49	
70 to below 80	B	Very good	4	3.5-4.49	First class
60 to below 70	C	Good	3	2.5-3.49	
50 to below 60	D	Satisfactory	2	1.5-2.49	Second class
40 to below 50	E	Pass /Adequate	1	0.5-1.49	Pass
Below 40	F	Failure	0	0-0.49	Fail

Guidelines for the Evaluation of Projects

1. Evaluation

1. Evaluation of the Project Report shall be done under Mark System.
2. The evaluation of the project will be done at two stages:
   a) Internal Assessment (supervising teachers will assess the project and award internal Marks)
   b) External evaluation (external examiner appointed by the University)
   c) Marks secured for the project will be awarded to candidates, combining the internal and external Marks
3. The internal to external components is to be taken in the ratio 1:4. Assessment of different components may be taken as below.

Internal (20% of total) – 10 Marks			External (80% of Total) - 40 Marks	
Components	***% of Marks***		***Components***	***% of Marks***
Punctuality	20		Relevance of the Topic, Statement of Objectives, Methodology (Reference/ Bibliography)	20
Use of Data	20		Presentation, Quality of Analysis/Use of Statistical tools, Findings and recommendations	30

Scheme/Organization of Report	30		Viva-Voce	50
Viva-Voce	30			

4. External Examiners will be appointed by the University from the list of VI semester Board of Examiners in consultation with the Chairperson of the Board.
5. The chairman of the VI semester examination should form and coordinate the evaluation teams and their work.
6. Internal Assessment should be completed 2 weeks before the last working day of VIth semester.
7. Internal Assessment marks should be published in the department.
8. In the case of courses with practical examination, project evaluation shall be done along with practical examinations.
9. Chairman Board of Examinations, may at his discretion, on urgent requirements, make certain exception in the guidelines for the smooth conduct of the evaluation of project.

2. Pass Conditions

1. Submission of the Project Report and presence of the student for viva are compulsory for internal evaluation. No marks shall be awarded to a candidate if she/he fails to submit the Project Report for external evaluation.
2. The student should get a minimum of 40 % marks of the aggregate and 40% separately for ESE for pass in the project.
3. There shall be no improvement chance for the Marks obtained in the Project Report.
4. In an instance of inability of obtaining a minimum of 40% marks, the project work may be re-done and the report may be re-submitted along with subsequent exams through parent department, as per the existing rule of the University examinations.

Internal Mark Calculation

- Components with percentage of marks of Internal Evaluation of Theory Courses are

Attendance	25 %
Assignment/ Seminar/Viva	25 %
Test paper	50%

- For practical courses

Attendance	25 %
Lab involvement	25 %
Record	50%

(If a fraction appears in internal marks, nearest whole number is to be taken)

Credit and Hours Distribution

Semester	Credit for					Total	Hours for Core			Hours for			Total Hours per week
	core	Complimentary	English	SL	General		Theory	Lab	Total	Eng	SL	Complimentary	
I	3	6	7	4	-	**20**	1	2	**3**	9	5	8	**25**
II	5	6	7	4	-	**22**	1	2	**3**	9	5	8	**25**
III	4	5	-	-	8	**17**	12	3	**15**	-	-	10	**25**
IV	6	7	-	-	8	**21**	12	3	**15**	-	-	10	**25**
V	14	-	-	-	-	**14**	15	10	**25**	-	-	-	**25**
VI	26	-	-	-	-	**26**	15	10	**25**	-	-	-	**25**
Total	58*	24	14	8	16	**120**	56	30	**86**	18	10	36	-

* (Including Open Course)

Work load (Core)

Semester		Theory	Lab	Total	–
Odd Semesters	I	2	2x2	6	58
	III	12	3x2	18	
	V	15	10x2	35	
Even Semesters	II	2	2x2	6	58
	IV	12	3x2	18	
	VI	15	10x2	35	

Question Paper Scheme

I. Core

(Total = External 80 + internal 20 =100)

Type of Questions	Question Numbers	Choice	Marks	Total Marks
One word question	10	Nil	1	10
Short Answer Questions	7	Any 5	2	10
Short Essays	8	Any 6	5	30
Long Essays	4	Any 2	15	30
Total mark				**80**

II. Complimentary

(Total = External 64 + internal 16 =80)

Type of Questions	Question Numbers	Choice	Marks	Total Marks
One word question	10	Nil	1	10
Short Answer Questions	7	Nil	2	14
Short Essays	8	Any 5	4	20
Long Essays	4	Any 2	10	20
Total mark				**64**

III. Open

(Total = External 40 + internal 10 =50)

Type of Questions	Question Numbers	Choice	Marks	Total Marks
One word question	5	Nil	1	5
Short Answer Questions	5	Nil	2	10
Short Essays	5	Any 3	5	15
Long Essays	3	Any 1	10	10
Total mark				**40**

Semester I

Core 1 ELE1B01 - Basic Electronics

Module I

Introduction to Electronics - Definition, applications, modern trends, Electronic Components (active and passive),colour code, Units[1] **Electricity–** Electric field, Potential, Potential difference, current, relation between charge and current **Resistance and Resistivity**– Factors affecting resistance, effect of temperature, temperature coefficient, ohm's law, power dissipation, Load resistance and load current, concepts of open and short circuits, Direct current and Alternating Current [2]

Module II

Structure of Solids - Bonding in solids, Energy bands, Insulators, Conductors, Semiconductors [2] **Semiconductors -** Semiconductor materials, Intrinsic Semiconductors, Extrinsic Semiconductors [1] **Semiconductor Parameters -** Intrinsic concentration, Mobility, Conductivity, Mass action law, Energy gap, Drift and Diffusion Current [2] **Semiconductor Diodes –** PN junction, Junction Theory, VI characteristics of PN junction diode, Ideal diode, Static and Dynamic Resistance [1][2], Diode current equation[2],Diode notations, diode testing[3][2] **Special Diodes -** Construction, Characteristics and applications of Zener diode, Tunnel diode, varactor diode and LED [2]

Module III

Bipolar Junction Transistors – Types, Construction, Operation, Common Base configuration-input and output characteristics, Common Emitter configuration- input and output characteristics, Common collector configuration, Limits of operation, Transistor testing, Transistor casing and terminal identification[3] **Field Effect Transistors –** introduction, Types, Construction and Characteristics of JFET, Transfer Characteristics [3] **Metal Oxide Semiconductor Field Effect Transistors –** Depletion Type, Enhancement Type, MOSFET handling [3]

Module IV

SCR – construction, characteristics, operation, and ratings, Terminal identification, Applications [2]
DIAC – construction, characteristics**,** operation and applications [2]
TRIAC - construction, characteristics**,** operation [2]
UJT – construction, characteristics, operation, Relaxation oscillator [2]

Text Books

1. NN Bhargava, DC Kulshreshta, SC Gupta "Basic Electronics and Linear Circuits" Tata McGraw-Hill Publishing Company LTD
2. R.S. Sedha"A text book of applied Electronics" S Chand and Company LTD
3. Robert L. Boylestad, Louis Nashelsky "Electronic Devices and Circuit Theory" , 10th edition, Pearson

References

1. Jacob millman, Christos c halkias, satyabratajit , 2nd edition "Electronic Devices and circuits",
2. B.L. Theraja, "Electrical and Electronic Engineering", S Chand and Company LTD
3. R.K. Puri , V.K. Babbar, "Solid state physics and Electronics" , S Chand and Company LTD
4. V.K Mehta, "Principles of Electronics", S Chand and Company LTDTata McGraw Hill Education pvt Ltd.

Semester II

Core 2 - ELE2B02 - Electronic Circuits

Module I

Series circuit - Equivalent resistance, Voltage division rule, Total power, open and short [1] **Parallel Circuit** - Equivalent resistance, Current division rule, Total power, open and short [1] **Kirchhoff's Laws** – KVL, KCL [1] **Alternating Current**–Types, Important terms [1] **Wave shaping –** Integrator, Differentiator [1]

Module II

Rectifiers – Half wave, full wave, bridge – average value, RMS value, PIV, Ripple factor, efficiency, Comparison of rectifiers [1] **Filters -** C, LC,π[1] **Regulators** – Zener regulator, Transistor shunt regulator, Transistor series regulator [1] **Clipping circuits –** Positive, Negative, Biased, Combination [1] **Clamping Circuits –** Voltage doublers, Voltage Tripler and quadrupler [1]

Module III

Transistor Biasing – operating point, Fixed bias, Emitter bias, Voltage Divider bias, Collector feedback, Emitter follower, bias stabilization [2] **BJT AC Analysis –** Amplification in the ac domain, BJT modeling, The Hybrid equivalent model, cascaded system, RC coupled BJT amplifier,tuned amplifier, Darlington connection[2] **Frequency Response –**Logarithm, decibel, general frequency consideration, gain bandwidth product[2] **Power Amplifier –** concepts and types, class A,B,C and D amplifiers[2]

Module IV

Feedback - Concepts, types, effect on gain, input impedance, output impedance, frequency distortion, noise, nonlinear distortion, bandwidth and gain stability [2] **Sinusoidal Oscillators –** Criteria for oscillations-Barkhausen-oscillator operations, phase shift oscillator, wien bridge oscillator, colpitts oscillator, Hartley oscillator, crystal oscillators [2] **Non sinusoidal Oscillators –**classification, transistor as a switch, astable, monostable and bistable multivibrators, Schmitt trigger[1]

Text Books

1. R.S. Sedha "A text book of applied Electronics" S Chand and Company LTD
2. Robert L. Boylestad, Louis Nashelsky "Electronic Devices and Circuit Theory" , 10th edition, Pearson

References

1. NN Bhargava, DC Kulshreshta, SC Gupta "Basic Electronics and Linear Circuits" Tata McGraw-Hill Publishing Company LTD
2. Jacob millman, Christos c halkias, satyabratajit , 2nd edition "Electronic Devices and circuits", Tata McGraw Hill Education pvt Ltd.
3. V.K Mehta, "Principles of Electronics", S Chand and Company LTDJacobmillman, C halkias "Integrated Electronics", Tata McGraw Hill

Lab 1 - ELE2B03 - Basic Electronics & Electronic Circuits Lab

PART A - Basic Electronics (1st Sem)

1. Familiarization of various measuring and testing equipments and power sources – Voltmeter, Ammeter, Multimeter, LCR meter, CRO, etc,.
2. Familiarization and testing of passive components, Colour codes of resistors and capacitors
3. Familiarization and testing of Active Components
4. Packaging and lead identification
5. Soldering and desoldering Practice
6. Diode Characteristics (Si, Ge, LED)
7. LDR characteristics
8. Zener Diode Characteristics
9. Common base transistor characteristics
10. Common emitter transistor characteristics
11. FET characteristics
12. UJT characteristics
13. SCR characteristics
14. Circuit and PCB design with suitable software (optional)

References

1. NN Bhargava, DC Kulshreshta, SC Gupta "Basic Electronics and Linear Circuits" Tata McGraw-Hill Publishing Company LTD
2. Jacob millman, Christos c halkias, satyabratajit , 2nd edition "Electronic Devices and circuits", Tata McGraw Hill Education pvt Ltd.

PART B - Electronic Circuits lab (2nd Sem.)

1. Verification of equivalent resistance of series and parallel resistor networks, Voltage division and Current division Rules
2. Rectifier circuits Half wave, Centre tapped and Full wave
3. Different Filter circuits (C,L.pi)
4. Zener voltage Regulator
5. Diode clippers and Clampers
6. RC differentiator and Integrator
7. Voltage divider biasing circuits
8. Single stage transistor amplifier
9. RC Phase shift oscillator
10. UJT Relaxation Oscillator
11. Astable Multivibrator and Monostable multivibrator using BJT
12. Series voltage regulator
13. Simulation of the experiments using software(optional)

References

1. NN Bhargava, DC Kulshreshta, SC Gupta "Basic Electronics and Linear Circuits" Tata McGraw-Hill Publishing Company LTD
2. Jacob millman, Christos c halkias, satyabratajit , 2nd edition "Electronic Devices and circuits", Tata McGraw Hill Education pvt Ltd.

Semester III

Core 3 - ELE3B04 - Analog and Digital Integrated Circuits

Module 1

Operational Amplifiers: Concept and working of differential amplifier - Basics of an Op-amp (IC 741), Op-amp characteristics, parameters, open loop and closed loop configurations. Op-Amp Applications - Inverting, Non-inverting, summing and difference amplifier, Integrator, Differentiator, voltage to current converter, current to voltage converter.

Module 2

Comparators, Schmitt Trigger. Phase shift oscillator, Wien bridge oscillator, Square wave generator. Active filters using Op amp - Design of LP, HP and BP filters. Linear ICs : Voltage regulator ICs 78xx, 79xx, LM 317. 555 Timer - Block diagram, Design of astable and monostable multivibrator circuit, Voltage controlled Oscillator (IC 566),

Module 3

Review of Number Systems: Binary, hexadecimal, BCD – conversion, arithmetics. Signed and fractional binary number representations. Positive and Negative Logic, Basic Logic gates, Universal Gates – symbols and expression. Logic Families: TTL, ECL, CMOS –comparisons only. Boolean algebra & theorems, SOP & POS ,De Morgan's theorem, simplification of Boolean Algebra & K Map. Combinational circuits - Adders, Subtractors, comparators, De-coders, En–coders, MUX & De-MUX, parity generators – Familiarisations of popular ICs

Module 4

Sequential Circuits: Latch and Flip-flops - SR, T, D, JK, Master Slave JK – popular ICs. Counters: asynchronous, synchronous counter (up, down counter, decade, modulus). Shift registers: SISO, SIPO, PISO, PIPO, ring counter, Johnsons counter.

Textbooks

1. Gayakwad Ramakant A, Op-amps and Linear Integrated Circuits, Prentice Hall PTR
2. U.A.Bakshi A.P.Godse "Linear And Digital Ic Applications" - Technical Publications
3. Boatkar K. R., "Integrated Circuits", Khanna Publication
4. Digital Fundamentals: Floyd T.M. - Pearson Education
5. Digital Principles and Applications: Malvino Leach, Tata McGraw-Hill.
6. M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education Asia, (2007

Semester IV

Core 4 - ELE4B05 Microprocessors

Module I :

General architecture of computer, Introduction to Microprocessor, Memory classification, Introduction to 8085,Microprocessor bus organizations ,data bus, addressbus, control bus. Memory addressing, memory mapping. 8085 architecture in detail. General purpose registers and special purpose registers, flag register -8085 pins and signals.

Module 2 :

Assembly language programming basics. Opcode, Mnemonics etc. 8085 instruction set ,Data transfer ,Arithmetic and Logic, Shifting and rotating, Branching/Jump, Program control. Addressingmodes. Memory read and write cycle. Timing diagram. Instruction cycle , machine cycle and T-states. Types of I/O addressing .Simple programs.

Module 3

Types of programming techniques looping, indexing(pointers),delay generation. Stack in 8085, call and return Instructions. Data transfer between stack and microprocessor. Subroutine and delay programs. Interrupts in 8085.Interrupt driven programs.

Module 4

Interfacing microprocessor to peripherals .Programmable Peripheral Interface controller 8255A, DMA controller 8237,Programmable Display/Keyboard interface 8279,timer 8253.Interfacing ADC/DAC using microprocessor. Introduction to 8086/8088.

Text Book:

1. 8085 - Architecture programming and techniques By Ramesh Goanker.
2. Microprocessor and interfering programming and Hardware - By Doughles V Hall - Tata Mc Hill.
3. Microprocessor and microcomputer - Based system Design - CRC press - M. Rafiquzzman.PHI
4. Microprocessors and micro-controllers – Krishna Kant -PHI India.

Reference Book:

1. Micro computer system - The 8086/8088 family architecture programming and Design - LIU.Y and Gibson - PHI.
2. Microprocessors PC Hardware and interfacing –N.Mathivanan–PHI

Lab 2 - ELE4B06 - Digital Electronics& Microprocessor 8085

PART A- Digital Electronics lab(3rd Sem.)

1. Familiarization of Logic Gates and Study of Universal Gates
   - To familiarize the different logic gate IC chips and verification of their truth table 7400, 7402, 7404, 7408, 7432, 7486.
   - To implement the basic logic gate and, or, and not gates using the universal gate nand and nor gates.
2. Adders, Subtractors and Comparators
   - To implement the half adder, half subtractor and full subtractor circuits.
   - To familiarize
     - the 4-bit binary adder 7483
     - 4 bit magnitude comparator 7485.
3. Multiplexers and Demultiplexers
   - To implement a 4:1 multiplexer and 1:4 demultiplexer circuits.
   - To familiarize
     - the nibble multiplexer IC 74157,
     - 8:1 Multiplexer 74151
     - 3:8 Demultiplexer 74138
     - 2:4 Demultiplexer 74156.
4. Decoders, Encoder & Seven Segment Displays
   - To familiarize
     - BCD to decimal Decoder IC7442
     - BCD to Seven Segment Decoder 7448
     - Seven Segment Display
     - BCD to Binary 74154
     - Decimal to Binary priority and 74147
5. Latches and Flip Flop
   - To implement JK Flip-Flop and SR Flip Flop using Discrete Gates.
   - To familiarize
     - 4 bit latch IC 7475
     - JK Flip-Flop IC7476
     - D Flip Flop IC 7474
     - Master slave JK Flip Flop IC 74107.
6. Counters
   - To familiarize the different counter chip
     - asynchronous binary counter 7493
     - BCD Counter 7490
     - Binary Up/Down Counter 7493
     - Presettable Binary Counter 74197.
   - To implement a Johnson Counter and Ring Counter.
7. Shift Registers

Part B - Microprocessor Lab 8085(4th Sem.)

1. Addition – 8 bit, 16 bit
2. Subtraction – 8 bit, 16 bit

3. Multiplication& Division
4. Array addition (multibyte)
5. Logical operators – AND, OR NOT
6. Decimal to ASCII and ASCII to Decimal.
7. Decimal to Hexa and Hexa to Decimal.
8. Ascending Order& Descending order
9. Largest & smallest
10. Up/down Counter
11. Block data transfer
12. Rotating display – Flashing display
13. Interfacing with LED's
14. Square wave Generation

Semester V

Core5 - ELE5B07 - Electro Magnetic Theory

Module 1: Fundamental of Vector Analysis

Fundamental vector operations, Coordinate systems-unit length, area and volume, Integrals of vector functions, Gradient of a scalar field, Divergence of a vector field, Divergence theorem, Curl of a vector field, Stokes's theorem, Physical Interpretation of Gradient, divergent and curl, coordinate transformations.

Module 2: Electrostatics

Static Electric Fields; Postulates of electrostatics, Coulomb's law, Gauss's law and applications, Electric potential, dielectrics, flux, boundary conditions, capacitance, capacitors, Electrostatic energy and forces, Solution of Electrostatic Problems- Poisson's and Laplace's equations-Method of images, Boundary conditions and Boundary value problems.

Module 3: Magnetostatics

Steady Electric Currents; current density, Ohm's law, Boundary condition for current density, Equation of continuity and Kirchhoff's law, Biot-Savart Law, Postulates of Magnetostatics, Vector Magnetic Potential, Force between two current wires, Ampere's Circuit Theorem, Magnetic dipole, Boundary conditions for magnetostatic fields, Magnetic energy, Magnetic forces and torques.

Module 4: Time varying Electromagnetic fields and waves

Faraday's law of electromagnetic induction, Inconsistency of Amperes law, Maxwell's equations , Integral and differential forms, conduction current and displacement current- Uniform Plane waves- Poynting theorem and Poynting vector- Solution for free space condition-Intrinsic impedance- wave equation for conducting medium- Wave polarization, Reflection and transmission, TE, TM and TEM waves, fundamentals of antennas and parameters.

Text Books

1. Engineering Electromagnetics – Haytt (McGraw-Hill Education)
2. Elements of Electromagnetics--Matthew N. O. Sadiku (Oxford University Press)
3. Electromagnetic Field Theory and Transmission Lines--G. S. N. Raju (Pearson Education)

Core 6 - ELE5B08 - Micro controller 8051

Module I :

Comparison between microprocessor and Microcontroller .The 8051 Microcontroller .Architecture of 8051 microcontroller. Internal memory (ROM) organization. Important Registers .Internal RAM organization. Register banks ,Byte and bit addressable area. Flags and flag register (PSW) .Program counter and data pointer . Stack and Stack pointer. Special Function Registers. 8051 Ports and I/O pins, control signals. External memory interfacing signals.

Module 2 :

8051 instruction set ,Data transfer(internal and external) ,Arithmetic and Logic, Shifting and rotating ,Branching/Jump. Bit related instructions and operations. Addressing modes. External memory related instruction. Stack and subroutine. Call and return instructions. Push and Pop instructions. Delay generation, calculation and programs.8051 Interrupts.

Module 3 :

Counters and Timers : Timer / counter interrupts – Delay using Timer - Modes of Operation - Counting .RS232 Communication standard. Serial data input of serial data output : Serial data interrupt - Data transmission Data reception - serial data transmission interrupts : Times Flag interrupt - Serial port interrupt - External interrupt - Reset -Interrupt concept - interrupt priority - interrupt destination - software generated interrupts.

Module 4 :

Key board interfacing program, key debouncing, matrix keypad . Display interface - 7 segment multiplexed display ,scanning . 16X2-LCD Basics, program to display character. A/D and D/A interfacing. Stepper Motor interface, program to rotate motor. Relay and Traffic interface.

Text Book:

1. The 8051 microcontroller and embedded systems using assembly and C -Kenneth.J.Ayala - CENGAGE Learning.
2. 8051 Microcontroller and applications – Ali Mazidi
3. Microprocessors and micro-controllers (8085,8051)– Krishna Kant -PHI India

Core 7 – ELE5B09 - Network Theory

Module 1

Basic Circuit Concepts: Voltage and current sources, Resistance, Capacitance, Inductance, Mutual Inductance, Series and Parallel elements, Duality, voltage division and current division. **Circuit Analysis:** Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL), Node analysis, Mesh analysis, Star-Delta conversion. **Network Theorems:** Superposition theorem, Thevenin's theorem, Norton's theorem, Reciprocity theorem, Millman's theorem, Maximum power transfer theorem.

Module 2

DC Transient Analysis : Initially charged RC circuit, RL circuit with initial current, time constant, RL and RC circuits with sources, DC response of series RLC circuits (using differential equations).

Module 3

AC circuit analysis: Sinusoidal voltage and current, Definition of instantaneous, peak, peak to peak, root mean square and average values. Voltage-current relationship in resistor, inductor and capacitor. Phasor, complex impedance, power in AC circuits: instantaneous power, average power, reactive power, power factor. Sinusoidal circuit analysis for RL, RC and RLC circuits. Mesh analysis, node analysis and network theorems for AC circuits.

Module 4

Resonance: Resonance in series and parallel RLC circuits, frequency response of series and parallel RLC circuits, Quality (Q) factor and bandwidth. Passive filters: low pass, high pass, band pass and band stop.

Text Books:

1. W. H. Hayt, J. E. Kemmerly, S. M. Durbin, Engineering Circuit Analysis, Tata McGraw Hill(2005)
2. Robert L. Boylestad, Essentials of Circuit Analysis, Pearson Education (2004)
3. M. Nahvi and J. Edminister, Electric circuits, Schaum's outline series, Tata McGraw Hill (2005)
4. S. A. Nasar, Electric Circuits, Schaum's outline series, Tata McGraw Hill (2004)
5. C. Alexander and M. Sadiku, Fundamentals of Electric Circuits , McGraw Hill (2009)
6. John. D. Ryder, Networks, Lines and Fields, Prentice Hall of India (2002)
7.Circuit theory:analysis & synthesis,A.Chakraborthy,dhanpat rai & co(2010);
8. ,D.Roy Choudary ,Networks and systems: second edition.2010,New age International publishers

Semester VI

Core 8 - Ele6b10 - Communication Systems

Module I

Communication Systems- Modulation – Need for modulation, Amplitude Modulation- Frequency spectrum of AM wave – Representation of AM wave, Power relation in AM wave, Generation of AM- DSBSC- Balanced Modulator,SSB Techniques –- Filter system, Phase shift method, Third method.

Module II

Frequency Modulation – Theory of Frequency and Phase modulation, Mathematical representation of FM, FM-Noise Triangle, De-emphasis, Pre-emphasis, Comparison of Wide band and Narrow band FM, FM Generation and Detection-Generation of FM – Direct method, Indirect method, discriminator circuits.

Module III

Radio receivers- Reciever types, TRF, superheterodyne receiver, Sensitivity, Selectivity, Image frequency and its rejection, image frequency and IF amplifiers, AGC- diode detector, AFC, FM receivers – Amplitude limiting, Stereo-phonic FM multiplex system.

Propagation of waves in free space –Ground wave propagation, surface wave propagation, ionospheric propagation – critical frequency, MUF, Skip distance.

Module IV

Sampling - reconstruction - aliasing - PAM, PWM, PPM – TDM – FDM-CDMA - noise in pulse modulation, Pulse code modulation. Quantization noise - Companding law - The PCM system . Digital modulation technique ASK, FSK, PSK, DPSK

Text book:

1.Communication systems- A. Bruce Carlson, Paul B. Crilly

2.Electronic Communication Systems - Kennedy and Davis

3.Communication Systems : Simon Haykins, John Wiley & Sons, Inc., 4th Edition, 2001

4.Principles of Communication : Taub and Schilling

5.Electromagnetic wave propagation, KD Prasad

References

1.Digital Communications Fundamentals and Applications: Bernard Sklar, Person Education, 2nd edition

2.Modern Digital and Analog communication system: B.P.Lathi, Oxford University Press, 3rd edition

Core 9 - ELE6B11 - Principles of Digital Signal Processing

Module I- SIGNALS

Signals – Various types and classifications – Uni dimensional and multi dimensional-Analog, Discrete and Digital Signals- Energy and power signals, Causal and non causal signals- even and odd signals-Representation methods-Functional, Graphical, Tabular and Sequential - Important test signals. Mathematical operations on discrete time signals- signal as summation of impulses.

Module II- LAPLACE, FOURIER AND Z TRANSFORMATIONS

Laplace transformation-definition-properties- Fourier transform on discrete signals (DTFT) - definition-properties-Z transform-definition and its properties.

Module III-SYSTEMS AND CONVOLUTION

Definition-various classifications-Static & Dynamic, Time invariant & Time variant, Linear & Nonlinear, Causal & Non causal, Stable & Unstable, FIR & IIR, Recursive & Non recursive-Excitation, response and Impulse response of system-their relations- transfer functions and its properties-Convolution- Linear and circular-their properties-sectioned convolution-overlap add and overlap save method.

Module IV-STRUCTURAL REPRESENTATION OF DISCRETE TIME SYSTEMS

Representation of IIR systems-Direct form I, Direct form II, Cascade representation and Parallel representation- Representation of FIR systems-Direct form representation, Cascade representation and Linear phase realization.

Module V-DISCRETE FOURIER TRANSFORM

DFT-definition-properties- relation between Z transform and DFT-computation techniques--FFT-radix 2 FFT-DIT FFT and DIF FFT- butterfly diagram- computation techniques.

References

1. Digital Signal Processing by A. NagoorKani
2. Digital signal Processing by S Salivahan
3. Digital Signal Processing by Proakis&Manolokis

Core 10 – ELE6B12 - Control Systems

Module I

Basics of control system, classification of control system, open loop , closed loop, examples

Servomechanism, feedback and feed forward system, Basics of Laplace Transform, Use of Laplace transform in control system.

Module II

Transfer function, Impulse response, poles, zeroes, pole-zero plot , order and type number ,Mathematical modeling of control system, Mechanical, rotational and electrical systems, servomotors, speed control system.

Module III

Block diagram representation; block diagram reduction, signal flow graph, Mason's gain formula, Time response analysis, standard test signals, steady state error, Analysis of first and second order system. Time domain specifications.

Module IV

Frequency domain analysis, Frequency domain specifications, frequency response plots, Bode plot, polar plot, stability analysis, Routh Hurwitz criterion, Nyquist stability, concept of Root locus- Controllers –PI,PD,PID ,Compensators-Lag, lead, Lag-lead

References

1. Control System Engineering-U.A Bakshi , V.U Bakshi
2. Control Systems – Nagoor Kani

Core Lab 3 - ELE6B14 - Analog Integrated Circuits & Communication Lab

PART A- Analog Integrated Circuits Lab (5th Sem.)

1. Inverting and non inverting op-amp configuration and its characteristics.
2. Differentiator and integrator circuit characteristics.
3. Summing and difference amplifiers.
4. Voltage follower and instrumentation amplifier.
5. Low pass and High pass filters and frequency response.
6. Band pass filter and Band rejection filter and their frequency response.
7. Schmitt trigger-measurement of UTP and LTP.
8. Triangle wave generator.
9. Symmetrical and asymmetrical square wave generation using 555.
10. Non- Retriggerable and Retriggerable multivibrators.
11. IC fixed voltage regulation and characteristics.
12. IC 723 variable voltage regulator.
13. Oscillators: 1) Wein bridge 2) RC phase shift.
14. Simulation experiments using suitable softwares(optional) :
    - Wein bridge oscillator
    - Instrumentation amplifier
    - Voltage regulator
15. Students are encouraged to do a small Project work using op amp, timers and regulators (optional).

Text book:

1. T.D. Kuryachan&Shyam Mohan S,"Electronics Lab Manual, Vol.II", Ayodhya publications.

PART B Communication Lab (6th Sem)

1. AM Generation/demodulation
2. Frequency Response of IF Amplifier
3. Mixer
4. Frequency Modulation
5. Frequency Demodulation
6. Pre-emphasis and De-emphasis
7. Pulse Amplitude Modulation& Demodulation
8. Pulse width Modulation
9. Pulse width Demodulation
10. PPM
11. VCO using 555.
12. Study of TDM using IC

Core LAB IV – ELE6B15 – Microcontroller – 8051 & DSP LAB

PART A Microcontroller Lab (5th Sem.)

1. Addition – 8 bit, 16 bit.
2. Subtraction – 8 bit, 16 bit.
3. Multiplication & Division
4. Array addition (multibyte)
5. Logical Operations – AND, OR, NOT
6. Decimal to ASCII and ASCII to Decimal.
7. Decimal to Hexa and Hexa to Decimal.
8. Sorting Ascending Order
9. Sorting Descending Order
10. Block data transfer
11. Up/down Counter
12. Interfacing with LCD.
13. Interfacing with Matrix Keypad.
14. Square wave generator
15. Interfacing with ADC.
16. Interfacing with DAC.
17. Digital Clock.
18. Interfacing with Stepper Motor.

PART B DSP LAB (6th Sem)

1. Familiarization with DSP simulation software
2. Generation simple signals –sine wave square wave,ramp, unit step and impulse
3. Generation of AM signals
4. Linear convolution
5. Circular convolution
6. Impulse response of LTI system
7. Impulse response from transfer function of the system
8. Computation of n-point DFT and IDFT

Open Course - V semester

ELE5D01 - Computer Hardware

Module I

Evolution of Computers and Computer Generations, Computer Classification Processing speed of a computer, Technology Trends, Measuring Computer Performance, Architecture, Functional Units and Components in Computer Organization, Computers – Block diagram, Memory addressing capability of a CPU, Word length of a computer, Basic components of a Digital Computer - Control unit, ALU, IO Subsystem of a Computer, Bus Structures, Uses of Program Development Tool, Editor, Compiler, Assembler, Interpreter.

Module II

Number systems – Decimal Number system, Binary number system and Hexa-decimal number system,1's & 2's complement, Representation of Positive and Negative Numbers Binary Fixed- Point Representation, Arithmetic operation on Binary numbers, Codes, ASCII Logic Gates, AND, OR, NOT GATES and their Truth tables.

Module III

Input Devices - Keyboard, Mouse, Output Devices - CRT Monitor, LCD Displays, Touch Screen Displays Print Devices, Multiprocessor and Multi core Architecture

Text Book

- Computer Fundamentals – B. Ram – New Age International Publishers

Reference BOOKS

1. Rashid Sheikh, “Computer Organization & Architecture”
2. Computer Organization – Hamacher, Vranesic and Zaky, McGraw Hill.
3. Digital Logic and Computer Design – Morris Mano, PHI
4. Computer Organization and Architecture -William Stallings, Pearson Education Asia.
5. Computer Organization and Design – Pal Chaudhuri, PH

ELE5D03 - Digital Fundamentals

Module 1

Number System and Codes: Decimal, Binary, Hexadecimal, Octal, BCD, conversion of one code to another, Complements (one's and two's), Addition and Subtraction, Multiplication Logic Gates and Boolean Algebra: Truth Tables, OR, AND, NOT, XOR, NOR,NAND, Universal (NOR and NAND) Gates, Boolean Theorems, DeMorgan's Theorems.

Module 2

Combinational Logic Analysis and Design: Standard representation of logic functions (SOP and POS), Karnaugh map minimization. Adder (half and full) and subtractor.

Module 3

Sequential logic design: Latch, Flip flop (FF), SR FF, JK –master slave FF, T and D type FFs, Clocked FFs, Registers, Counters (synchronous and asynchronous)

References

1. R.L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw-Hill (1994)
2. Donald P. Leach, Albert Paul Malvino, Digital Principles and Applications, Tata McGraw Hill (1995)
3. M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education Asia, (2007)
4. Thomas L. Floyd , Digital Fundamentals, Pearson Education Asia (1994)
5. S.P. Bali , Solved Problems in Digital Electronics, Sigma Series, Tata McGraw-Hill, (2005)
6. W. H. Gothmann, Digital Electronics: An Introduction To Theory And Practice, Prentice Hall of India (2000)
7. R.P. Jain , Modern Digital Electronics, Tata McGraw-Hill (2003)

ELE5D03 - Electronics Fundamentals

Module 1.

Voltage and Current : Concepts of emf, potential difference and current, resistance, capacitance and inductance, S.I. units of work, power and Energy, concept of Kilo Watt Hour, Module 2: Batteries and cells, their types, primary cells and secondary cells, Lead Acid, Ni-Cd, Ni-MH and Li-ion batteries, current capacity and cell ratings, charging and discharging of batteries, importance of initial charging, maintenance procedure, series and parallel battery connections.

Module 3.

D.C. Circuits : Resistance in Series and Parallel circuits, Shorts and Opens in series and Parallel circuits, Ohm's law, Kirchhoff's Voltage and current laws, Determination of direction

of current and voltage sign, applications, Simplifications of networks using series and parallel combinations.

Module 4.

AC fundamentals : Generation of alternating voltages and currents, Transformer, Equations of AC voltage and current, Simple wave forms, concept of time period, frequency, amplitude and phase, Peak value and RMS value of amplitude, AC through resistance inductance and capacitance.

Reference

A text book of Electrical Technology, B L Theraja and A K Theraja

Elective Course- VI sem

ELE6B13a - Principles of VLSI

Module I:

Introduction : General classification of integrated circuits – Scale of integration – Advantages over discrete components.

Module 2:

Thick film technology : Features of hybrid IC technology – Thick film conductors – Dielectric – Resistors – Thick film processing – Thick film substrate – Design ideas – Advantages and applications.

Module 3:

Thin film technology : Thin film conductors – resistors – dielectric – substrates – thin film processing – Advantages and applications – Monolithic IC process : Growth and refining of Si crystals – Substrate slicing and polishing – Wafer preparation – Diffusion – Ion implantation – Oxidation – Photo-lithography – CVD – Epitaxial grown – Metallization – Monolithic resistors and capacitors.

Module 4 :

Introduction – Modern VLSI devices – High field effect – MOSFET devices – long channel & short channel MOSFET. Bipolar devices – n.p.n. transistor – characteristics of typical n.p.n. transistor – Bipolar device design – Design of emitter, base and collector region – concept of HDL.

Text Books

1. Module (I, II, III) : Integrated Circuits (K.R. Botkar).
2. Module (IV) : Fundamentals of Modern VLSI Devices by Yuan Taur and Tak H.NING

Cambridge Publishers.

References

1. Basic VLSI Design Systems and Circuits by Dougles A. Pucknell and Kamran Eshragian, PHI.
2. Fundamentals of Digital Design", Charles H.Roth,Jr., PWS Pub.Co.,1998

ELE6B13b Embedded System

Module I :

Introduction to Embedded Systems, Stand-alone and real-time embedded systems. Requirements of embedded systems, Components of embedded system. Embedded processors (Eg : ARM ,PIC32 etc) Programming languages and tools. Embedded operating system.Embedded system Application examples.

Module 2:

Components of Embedded system,hardware and software. Microcontrollers 8-bit,16-bit,32-bit general overview and examples(8051,PIC,ARM etc).Memory technologies in embedded system,EEPROM,flashmemory,DDR RAM, Memory Card (general overview Memory sizes,pins and signals).Peripherals RTC,Temperaturesensor,relay etc.

Module 3:

Embedded system software. Assembly languages,high level languages. Embedded C programming (Eg: Kiel C, Microchip C, SDCC Compiler).Data types ,variables,port accessing, functions etc. 8051 in keil C (uVision IDE).Simple programs -LED blinking,LCD,Serialport,EEPROM. Embedded communication standards ,RS232, I2C, SPI ,USB (Over view). Programs using library. Microcontroller programmer,programmingtools,debugging tools. Software Simulation.

Module 4:

Advanced embedded systems.ARM processors general architecture.over view of Embedded OS, Android OS. Real Time OS ,Embedded Linux (Examples) .Case study ,Traffic Light controller,Water level controller.,DC Motor speed control. Electronics manufacturing process, circuit designing, Programming, PCB designing using software .

Text Book:

1. The 8051 microcontroller and embedded systems using assembly and C - Kenneth.J.Ayala - CENGAGE Learning.(8051.kiel IDE)
2. The 8051 microcontroller and embedded system- Ali Mazidi. Pearson.
3. Microprocessors and micro-controllers (8085,8051)– Krishna Kant -PHI India
4. Introduction to embedded systems -Shibu .K.V - Tata McGraw Hill Publications
5. Embedded system architecture,programming and designing.-Raj kamal Tata McGraw Hill Publications.
6. Embedded Systems, -Rao, B. Kanta (ARM,PIC)

7. Reference Book:
8. “Introduction to Embedded Systems”, Raj Kamal, TMS, Tata McGraw Hill Publications, 2002.
9. “Embedded / Real time systems: Concepts, Design and Programming”, Dr.K V K K Prasad, Dream Tech press, New Delhi, 2003

ELE6B13c Microwave Theory and Techniques

Module I

An introduction to Microwaves: Introduction, Frequency spectrum, Micro wave bands, Applications of microwaves in different fields, Plane waves and free space propagation, Guided waves-slow waves and fast waves- wave guides, rectangular wave guides, TE and TM waves, Transverse electromagnetic waves, group and phase velocities.

Module II

Basics of transmission lines and waveguides: Transmission lines and wave guides, Review of transmission lines, Telegraph equations, group and phase velocities, characteristic impedance-open circuit, closed circuit, quarter wavelength and half wavelength lines, Standing wave ratio, VSWR, Reflection coefficient, Impedance matching, strip/microstrip transmission lines, microwave guides, propagation through wave guides, cut off frequency and dispersion-wave and group velocity, Ridged waveguides-applications, cavity resonators-design equations, Waveguide Tees, Magic Tees, Rat Race, Directional couplers, Isolators and circualators.

Module III

Microwave Linear beam tubes and Cross field devices: Microwave tubes, Introduction, limitations of conventional tubes, Transit time effects, Multi cavity Klystron, reentrant cavities, Velocity modulation and beam bunching, bunching diagrams, reflex klystron, magnetron, working of magnetron, travelling wave tubes-slow wave structures-amplification mechanism, Forward and backward wave Cross field amplifiers-principle of operation-microwave characteristics.

Module IV

Transferred Electron devices and transit time devices: Microwave Semiconductor devices, Tunnel diodes- negative resistance-band theory for forward and reverse biasing, Schottky diodes, Point contact diodes, Varactor diodes, IMPATTT diode-structure-negative resistance-efficiency and output power, TRAPATT diode-principle of operation and performance, Gunn effect and Gunn diode-modes of operation-oscillation modes-, Applications.

Text books

1. Microwave devices and circuits, Samuel Y. Lio (Prentice Hall)
2. Fundamentals of microwave engineering –Collins (Wiley India)
3. Electronic communication systems – Kennedy and Davis (Tata Mc Graw Hill)

Electronics Complimentary Syllabus

Semester I

ELE1C01 Electronic Devices

Module I

Introduction to electronics: Components - passive and active components- Resistors, capacitors, inductors types-identification-colour coding. Circuit control and protective devices- switches, fuses and relays, Printed Circuit Board

Module II

Fundamentals of electronics – Band theory, conductors, insulators, semiconductors. Intrinsic and extrinsic semiconductors, PN junction,diode, biasing and characteristics, breakdown, diode resistance and capacitance, switching diode, zener diode

Module III

Structure and operation of LDR, Photo voltaic cell, Photo diode, LED and LCD.

Module IV

Bipolar junction transistor, operation, transistor configurations, characteristics and their comparison, current transfer ratio, transistor as a switch.

Module V

FET, structure, characteristics, parameter terminal current, transconductance model, comparison between BJT and FET, applications, MOSFET, types and characteristics, UJT.

Text book

Textbook of Applied electronics – R.S Sedha.

References

1. Principles of electronics- V.K Metha.

2. Basic electronics and linear circuits – N.N Bhargava, Kurukshetra and Gupta.
3 Electronics Engineering - B.L.Theraja

Electronic Devices LAB

1. Familiarization of electronic components.
2. Familiarization of equipments like CRO, Signal generators.
3. Characteristics of PN junction diode.
4. Characteristics of zener diode.
5. Characteristics of LED.
6. FET Characteristics.
7. Characteristics of transistor in CE and CB configurations.
8. RC differentiator and integrator circuits.

Semester II

ELE2C02 - Electronic Circuits

Module I

Rectifier circuits, half wave rectifier, full wave rectifier, bridge rectifier, Ripple factor, General filter consideration, different type of filters, comparison, voltage regulators – zener diode regulator, Three terminal regulators (78XX and 79XX) – Principle and working of switch mode power supply (SMPS).

Module II

Biasing of BJT- Q-point, stability factor and biasing circuits, BJT amplifiers, RC-coupled amplifiers, frequency response, voltage gain, current gain, input resistance and out put resistance, comparison of BJT amplifiers concept of gain – applications.

Module III

Feedback amplifier, positive and negative feed back, Types of feed back, applications, power amplifier – class A , class B and class C amplifiers.

Module IV

Oscillators - sinusoidal oscillators, Barkhausen criteria, RC-oscillators, LC oscillators, crystal oscillators, multivibrators, typical oscillators, applications, 555 timer – astable and monostable mode

Text book

Textbook of Applied electronics – R.S Sedha.

References

1. Principles of electronics- V.K Metha.

2. Basic electronics and linear circuits – N.N Bhargava, Kurukshetra and Gupta.
3 Electronics Engineering - B.L.Theraja.

Electronic Circuits Lab

1.Rectifier circuits (Half wave, Full wave and bridge rectifiers) and filters.
2.Voltage regulator using zener diode.
3.CE amplifier (determination of voltage gain).
4.Astable multivibrator using BJT.
5.RC phase shift oscillator.
6.Astable multivibrator using 555.
7.Monostable multivibrator using 555.

Semester III

ELE3C03 -Digital Electronics

Unit 1

Number System and Codes: Decimal, Binary, Hexadecimal, Octal, BCD, conversion of one code to another, Complements (one's and two's), Signed and Unsigned numbers, Addition and Subtraction, Multiplication .Logic Gates and Boolean Algebra: Truth Tables, OR, AND, NOT, XOR, XNOR, Universal (NOR and NAND) Gates, Boolean Theorems, DeMorgan's Theorems, Principle of duality.

Unit 2

Combinational Logic Analysis and Design: Standard representation of logic functions (SOP and POS), Karnaugh map minimization. Multiplexers and Demultiplexers, Implementing logic functions with multiplexer, Adder (half and full) and subtractor, Encoder and Decoder.

Unit 3

Sequential logic design: Latch, Flip flop (FF), S-R FF, J-K FF, T and D type FFs, Clocked FFs, Registers, Counters (synchronous and asynchronous, ring, modulo-N),Shift registers – Serial and parallel

Unit 4

Memories: General Memory Operation, ROM, RAM (Static and Dynamic), PROM, EPROM, EEPROM,EAPROM.

Suggested Books:

1. R.L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw-Hill (1994)
2. Donald P. Leach, Albert Paul Malvino, Digital Principles and Applications, Tata McGraw

Hill (1995)
3. M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education Asia, (2007)
4. Thomas L. Floyd , Digital Fundamentals, Pearson Education Asia (1994)
5. S.P. Bali , Solved Problems in Digital Electronics, Sigma Series, Tata McGraw-Hill, (2005)
6. W. H. Gothmann, Digital Electronics: An Introduction To Theory And Practice, Prentice Hall of India (2000)
7. R.P. Jain, Modern Digital Electronics, Tata McGraw-Hill (2003)

Digital Electronics LAB

1.Familiarization of logic gates using ICs (NOT, OR, AND, XOR, NAND, NOR).
2.Realization of basic gates using NAND & NOR
3.Design a Half and Full adder
4.Design a Half and Full Subtractor.
5.Design a 4x1 Multiplexer using logic gates
6.Multiplexers and Demultiplexer using ICs
7.Study of RS and D flip flops
8.Design a 3 bit Counter using JK Flip-Flop IC

Semester IV

ELE4C04 – Microprocessors

Module I :

General architecture of computer, Introduction to Microprocessor, Memory classification, Introduction to 8085,Microprocessor bus organizations ,data bus, addressbus, control bus. Memory addressing, memory mapping. 8085 architecture in detail. General purpose registers and special purpose registers, flag register -8085 pins and signals.

Module 2 :

Assembly language programming basics. Opcode, Mnemonics etc. 8085 instruction set ,Data transfer ,Arithmetic and Logic, Shifting and rotating, Branching/Jump, Program control. Addressing modes. Memory read and write cycle. Timing diagram. Instruction cycle , machine cycle and T-states. Types of I/O addressing .Simple programs.

Module 3

Types of programming techniques looping, indexing(pointers),delay generation. Stack in 8085, call and return Instructions. Data transfer between stack and microprocessor. Subroutine and delay programs. Interrupts in 8085.Interrupt driven programs.

Module 4

Introduction to Intel Family- 8086/8088, 80186, 80286, 80386, 80486, Pentium processor – RISC Vs CISC Comparison- Super scalar architecture.

Text Book:

1. 8085 - Architecture programming and techniques By Ramesh Goanker.
2. Microprocessor and interfering programming and Hardware - By Doughles V Hall - Tata Mc Hill.
3. Microprocessor and microcomputer - Based system Design - CRC press - M. Rafiquzzman.PHI
4. Microprocessors and micro-controllers – Krishna Kant -PHI India.

Microprocessor LAB

1.Assembly language programming using 8085
2.Sum of 8 bit data.
3.Subtraction of 8 bit data.
4.8 bit multiplication and division.
5.Count of odd and even numbers.
6.Largest and smallest of numbers.
7.Sum of 16 bit data.
8.BCD addition and subtraction.
9.Sorting of numbers.
10.Factorial of a number.

Electronics Complimentary Lab

ELE4C05 - Devices, Circuits, Digital and Microprocessor

1. Familiarization of electronic components.
2. Familiarization of equipments like CRO, Signal generators.
3. Characteristics of PN junction diode.
4. Characteristics of zener diode.
5. Characteristics of LED.
6. FET Characteristics.
7. Characteristics of transistor in CE and CB configurations.
8. RC differentiator and integrator circuits.
9. Rectifier circuits (Half wave, Full wave and bridge rectifiers) and filters.
10. Voltage regulator using zener diode.
11. CE amplifier (determination of voltage gain).
12. Astable multivibrator using BJT.
13. RC phase shift oscillator.
14. Astable multivibrator using 555.
15. Monostable multivibrator using 555.
16. Familiarization of logic gates using ICs (NOT, OR, AND, XOR, NAND, NOR).
17. Realization of basic gates using NAND & NOR
18. Design a Half and Full adder
19. Design a Half and Full Subtractor.
20. Design a 4x1 Multiplexer using logic gates
21. Multiplexers and Demultiplexer using ICs
22. Study of RS and D flip flops
23. Design a 3 bit Counter using JK Flip-Flop IC
24. Sum of 8 bit data.

25. Subtraction of 8 bit data.
26. 8 bit multiplication and division.
27. Count of odd and even numbers.
28. Largest and smallest of numbers.
29. Sum of 16 bit data.
30. BCD addition and subtraction.
31. Sorting of numbers.
32. Factorial of a number

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MODEL QUESTION PAPERS

FIRST SEMESTER B.Sc. DEGREE EXAMINATION,
ELECTRONICS -CORE COURSE
EL 1B – BASIC ELECTRONICS

Time: 3 Hrs **Maximum Marks: 80**

Part I

Answer **all** *questions.*
Each question carries 1 mark.

1. Components that are not able to process a signal is called……components.
2. Ohm's law is valid only when ……..is constant.
3. In short circuit the resistance between the two terminals equals……
4. The BJT amplifier operates in …….region.
5. The gap between the conduction and valence band is called……..
6. Arsenic is a ……..impurity.
7. ……..diode is used for voltage stability.
8. A ……..diode is a PNPN devise with only two terminals.
9. The process of commutation is related with……
10. The devise that contains both an infrared LED and a photo detector is called…….

(10 X 1 = 10)

Part II

Answer any **five** *questions.*
Each question carries 2 marks.

11. State Ohms Law and hence define resistance of a material?
12. Find the effective resistance of three resistances connected in a) series; b) parallel.
13. Draw the energy band diagram of a semiconductor.
14. What is the difference between intrinsic and extrinsic semiconductor?
15. Explain the difference between a JEFET and MOSFET?
16. Explain Zener effect?
17. Draw the construction structure of SCR?

(5 X 2 = 10)

Part III

Answer any six questions.
Each question carries 5 marks.

18. What is PN juction. How a depletion region is formed in a PN junction?
19. Write notes on semiconductors.
20. Draw the CE configuration of BJT and Explain its characteristics with graph.
21. How is a diode forward biased? Explain the forward bias characteristic with the aid of a graph?
22. Explain the working of an NPN transistor?
23. Explain the difference between SCR and TRIAC?
24. Briefly explain Tunnel diode.
25. Explain diode current equation.

(6 X 5 = 30)

Part IV

Answer any two questions.
Each question carries 15 marks.

26. Explain Semiconductor parameters.
27. What is an SCR .Draw its characteristics and Explain methods to turn ON and OFF SCR.
28. Explain the construction and working of UJT and how it is turned ON and OFF?
29. Explain depletion and enhancement MOSFET.

(2 X 15 = 30)

FOURTH SEMESTER B.Sc. DEGREE EXAMINATION,
ELECTRONICS -CORE COURSE
ELE4B05-MICROPROCESSORS

Time: 3 Hrs **Maximum Marks: 80**

Part I

Answer **all** *questions.*
Each question carries 1 mark.

1. The non-maskable interrupt of 8085 is.....
2. The Intel 8254 chip is.....
3. The bit size of PSW registers in 8085 is.....
4. ..... is the register pair of 8085
5. LDA 0F24H is ..... addressing mode of instruction.
6. The memory capacity of 8085 microprocessor is.....
7. The 8285 has ..... 4 bit port.
8. ..... instruction is used to access a subroutine.
9. .....is the unconditional jump instruction used in 8085?
10..... IC is used as DMA controller.

(10 X 1 = 10)

Part II

Answer any **five** *questions.*
Each question carries 2 marks.

11. What are the control and status signals of 8085?
12. What are the functions of Accumulator?
13. Mention the interrupts of 8085.
14. Specify the functions of address and data bus.
15. Enumerate any four data transfer instructions of 8085.
16. What do you mean by the minimum mode configuration of the 8086 processor?
17. Explain the control Register of an 8255 Chip?

(5 X 2 = 10)

Part III

Answer any six questions.
Each question carries 5 marks.

18.Give a brief description of general purpose registers of 8086 microprocessor?
19.Explain stack and stackpointer?
20.Illustrate SIM and RIM instructions?
21.Explain the various addressing modes avaliable for 8085 processor?
22.Explain the Mode 1 and Mode 2 operations of Intel 8255?
23.Write down an 8085 ALP to find the largest of two numbers stored in memory locations 2501H and 2502H and store the result in 2504?
24.Expalin the working of a DMA controller?
25.Explain the various Interrupt singnals avaliable in 8085.What do you mean by masking of an interrupt?

(6 X 5 = 30)

Part III

Answer any two questions.
Each question carries 15 marks.

26.Draw the pin daigram of 8085 and explain the functions of each pin?
27.Draw the functional block diagram of Intel 8253 or 8254 and explain the different modes of operation?
28.With the help of a block diagram, Explain the internal architecture of 8086 microprocessor?
29.Explain the instruction set of 8085 processor with examples?

(2 X 15 = 30)

SIXTH SEMESTER B.Sc. DEGREE EXAMINATION,
ELECTRONICS -CORE COURSE
EL6B -COMMUNICATION SYSTEMS

Time: 3 Hrs **Maximum Marks: 80**

Part I

Answer **all** *questions.*
Each question carries 1 mark.

1. The process of recreation of modulating signal is called.....
2. The modulation index of AM wave is lying between..... And....
3. The amount by which the carrier frequency is varied from the unmodulated value is called.....
4. DSBSC is.....
5. Indirect FM is also called.....

6. The boosting of higher modulating frequency in accordance with a pre arranged curve is termed as.....
7. PWM is.....
8. AGC is used for.....
9. The most important parameters of a receiver are.... and....
10. AFC is used for tracking of.....

(10 X 1 = 10)

Part II

Answer any **five** *questions.*
Each question carries 2 marks.

11. Define Modulation Index? Obtain the Modulation index for AM and FM?
12. Explain the necessity of modulation?
13. Define direct and indirect methods of FM generation?
14. What do you mean by de-emphasis and pre-emphasis?
15. What are the common methods of pulse modulation?
16. What do you mean by multiplexing?
17 What is quatization range and quantization error?

(5 X 2 = 10)

Part III

Answer any six questions.
Each question carries 5 marks.

18. Explain generation of FM?
19. Explain Balanced Modulator?
20. Describe the relationship between power in the Unmodulated and modulated wave for AM?
21. Explain image frequency. Define image frequency rejection ratio?
22. Explain the need for Automatic Gain Control in a receiver?
23. Explain FDMA.
24. Explain PCM.
25. Explain Discriminator circuits.

(6 X 5 = 30)

Part III

Answer any two questions.
Each question carries 15 marks.

26. Explain Single side band generation using block diagram.Give the advantage of SSB transmission?
27. Comparison of AM, FM and PM modulation techniques.
28. Explain Superheterodyne receiver.
29. Explain different multiplexing techniques.

(2 X 15 = 30)