

UNIVERSITY OF KERALA

CAREER RELATED FIRST DEGREE

PROGRAM UNDER

**CHOICE BASED CREDIT AND SEMESTER
(CBCS) SYSTEM**

Group 2 (b)

ELECTRONICS

**COURSE STRUCTURE AND
SYLLABUS**

(2019 admissions onwards)

**I. GENERAL STRUCTURE FOR THE CAREER RELATED FIRST DEGREE
PROGRAMME IN ELECTRONICS**

Semester 1

Course	Course Code	Course Title	Marks for CE	Marks for ESE	Instructional Hrs/week			End Semester Exam.Hrs	Credits
					L	T	P		
Language Course	EN 1111	English I Listening and Speaking Skills	20	80	3	0	0	3	2
Core Courses	EX 1141	Environmental Studies	20	80	3	0	0	3	3
	EX 1142	Basic Electrical and Electronics Engg.	20	80	3	0	0	3	3
	EX 1143	Electrical & Electronics workshop	20	80	0	0	4	3	3
	EX 1144	Digital Electronics lab	20	80	0	0	4	3	3
Complementary Course	EX 1131	Digital Electronics	20	80	4	0	0	3	3
		Total			17	0	8		20

Semester II

Course	Course Code	Course Title	Marks for CE	Marks for ESE	Instructional Hrs/week			End Semester Exam. Hrs.	Credits
					L	T	P		
Language Course	EN 1211	English II Writing and Presentation Skills	20.	80	2	0	0	3	2
Core Courses	EX 1241	Solid State Electronics	20	80	4	0	0	3	3
	EX 1242	Network Analysis	20	80	4	0	0	3	3
	EX 1243	Basic Electronics Lab	20	80	0	0	4	3	3
	EX 1244	C Programming Lab	20	80	0	0	4	3	3
Complementary Course	EX 1231	Programming in C	20	80	3	0	0	3	3
		Total			17	0	8		20

SEMESTER III

Course	Course Code	Course Title	Marks for CE	Marks for ESE	Instructional hrs. / week			End Semester Exam. Hrs.	Credits
					L	T	P		
Core Courses	EX 1341	Electronic Circuits	20	80	4	0	0	3	3
	EX 1342	Communication Engineering	20	80	3	0	0	3	3
	EX 1343	Microprocessor and Interfacing	20	80	4	0	0	3	3
	EX 1344	Electronics Circuits Lab	20	80	0	0	4	3	3
	EX 1345	Microprocessor Lab	20	80	0	0	4	3	3
	EX 1332	Computer Organization	20	80	3	0	0	3	2
		Total			17	0	8		20

Semester IV

Course	Course Code	Course Title	Marks for CE	Marks for ESE	Instructional Hrs. / week			End Semester Exam. Hrs.	Credits
					L	T	P		
Core Courses	EX 1441	Applied Electro-magnetic Theory	20	80	4	0	0	3	3
	EX 1442	Linear Integrated Circuits	20	80	4	0	0	3	3
	EX 1443	Electronic Instrumentation	20	80	3	0	0	3	2
	EX 1444	Microcontrollers and applications	20	80	3	0	0	3	3
	EX 1445	Linear IC Lab	20	80	0	0	4	3	3
	EX 1446	Microcontroller Lab	20	80	0	0	4	3	3
Elective Course	EX 1451	Elective – I	20	80	3	0	0	3	3
		Total			17	0	8		20

Semester V

Course	Course Code	Course Title	Marks for CE	Marks for ESE	Instructional Hrs/week			End Semester Exam. Hrs.	Credits
					L	T	P		
Core Courses	EX 1541	Digital Signal Processing	20	80	4	0	0	3	4
	EX 1542	Digital Communication	20	80	4	0	0	3	3
	EX 1543	Computer Networks	20	80	4	0	0	3	3
	EX 1544	Mini Project	20	80	0	0	5	3	4
	EX 1545	Communication Lab	20	80	0	0	5	3	4
Open Course	EX 1551	Elective – II	20	80	3	0	0	3	2
		Total			15	0	10		20

Semester VI

Course	Course Code	Course Title	Marks for CE	Marks for ESE	Instructional Hrs. / week			End Semester Exam. Hrs.	Credits
					L	T	P		
Core Courses	EX 1641	Optical Communication	20	80	4	0	0	3	3
	EX 1642	Biomedical Engineering	20	80	3	0	0	3	3
	EX 1643	Nanoelectronics	20	80	4	0	0	3	3
	EX 1644	Simulation Lab	20	80	0	0	4	3	4
Elective Course	EX 1651	Elective – III	20	80	4	0	0	3	3
Project	EX 1645	Project	20	80	0	0	6	3	4
		Total			15	0	10		20

II LIST OF ELECTIVES

Elective I

- EX1451.1: Principles of Mobile Communication
- EX1451.2: Principles of Management

Open Course (Elective II)

- EX1551.1: Entertainment Electronics Technology
- EX1551.2: Introduction to Mobile Communication

Elective III

- EX1651.1: Internet of Things and applications
- EX1651.2: Microwave Engineering

III. OPEN COURSE (ELECTIVE II)

During the program the students have to undergo three elective courses. The students can opt two courses from Electronics department (Electives I and III) and one from other departments (Elective II).

IV. CONTINUOUS EVALUATION

There will be continuous evaluation (CE) based on continuous assessment for each course and carries 20% weightage as shown below:

(a) Theory

Component	Marks
Attendance	5
Assignment	5
Class tests	10 (minimum two tests)

Class tests: Each test paper may have duration of minimum two hours. For each course there shall be a minimum of two written tests during a semester.

Assignments: Each student is required to submit two assignments for a theory course.

(b) Practical

Component	Marks
Attendance	5
Performance	5
Laboratory record	5
Test	5

Separate records are to be used for each practical course. A candidate shall be permitted to attend the end semester practical examination only if he/she submits a duly certified record book. This is to be endorsed by the external examiner.

(c) Mini Project

Component	Marks
Attendance	5
Performance	5
Presentation	5
Report	5

(a) Project

Component	Marks
Attendance	5
Presentation	5
Report	5
Internship Report	5

(b) The allotment of marks for attendance shall be as follows.

Grade	Marks
≥ 90%	5
< 90% but ≥ 80%	4
< 80% but ≥ 70%	3
< 70% but ≥ 60%	2
< 60%	1

V. END SEMESTER EXAMINATION

There will end semester examination (ESE) conducted by the University for each course and carries 80% weightage.

(a) Theory

1. The examination has duration of 3 hours, marks 80.
2. Each question paper has four parts A, B, C &D.
3. Part A contains 10 questions spanning the entire syllabus and the candidate has to answer all questions. Each question carries 1 mark.
4. Part B contains 12 short answer questions spanning the entire syllabus. Out of this, the candidate has to answer 8 questions. Each question carries 2 marks.
5. Part C contains 9 short essays/problems spanning the entire syllabus and the candidate has to answer 6 of them. Each question carries 4 marks.
6. Part D contains 4 long answer questions, one from each module, in which the candidate has to answer 2 questions. Each question carries 15 marks.

(b) Practical

The practical examinations shall be conducted by the University. The examiners shall be selected from a panel of experts prepared by the University. For each examination, there shall be two examiners, one external to the institution and the other from the institution. The mark sheet prepared after the evaluation and duly signed by both the examiners shall be sent to the University within 5 days after the examination. The evaluation criterion for the end semester practical examinations shall be as follows:

Component	Marks
Circuit, Design	20
Setting up circuit and trouble shooting	15
Result: waveform, tabulation etc	30
Viva Voce	15

For Software labs, the criterion shall be as follows:

Component	Marks
Flow chart/Algorithm	10
Programme	20
Compilation, trouble shooting	10
Result	25
Viva Voce	15

(c) Mini Project

The evaluation of the mini project shall be according to the scheme given below.

Component	Marks
Novelty	10
Demonstration-cum-Result	20
Presentation	15
Viva Voce	15
Report	20

The evaluation of the mini project shall be done by two examiners (one external to the institution and the other from the institution) according to the scheme given above. Each candidate shall be evaluated separately. There shall be a maximum of 10 candidates per session with two sessions per day. The mark sheet prepared after the evaluation and duly signed by both the examiners shall be sent to the University within 5 days after the examination.

(d) Internship Program

The students have to undertake an internship program for a duration not less than 15 days in a recognized research institute (public/private) or university research department or in a

recognized industry or in colleges offering such internship programs. Each student has to submit a report after the successful completion of internship program and its evaluation will be done along with the sixth semester project examination. Being a career related course, the goal of the internship program is to impart an exposure to industrial/research environment such that the theoretical and practical knowledge acquired thereby in various areas of electronics may be extended to develop new ideas and apply in the successful completion of their projects in the coming semesters and envision their future as well. The internship can be done either during the summer vacation/semester break or during weekends. The students have to complete the internship program before the commencement of sixth semester.

(e) Project

The evaluation of the project shall be according to the scheme given below.

Component	Marks
Novelty	10
Demonstration-cum-Result	20
Presentation	15
Viva Voce	15
Project report	10
Internship report	10

The evaluation of the project shall be done by two examiners (one external to the institution and the other from the institution) according to the scheme given above. Each candidate shall be evaluated separately. There shall be a maximum of 10 candidates per session with two sessions per day. The mark sheet prepared after the evaluation and duly signed by both the examiners shall be sent to the University within 5 days after the examination.

VI. PASS REQUIREMENTS

For each subject (including theory, practical, seminar and project), a student should get a minimum of 40% marks for continuous evaluation and a minimum of 40% marks for end semester examination for a pass.

SYLLABUS

EN1111: ENGLISH I - LISTENING AND SPEAKING SKILLS

- Objectives**
1. To familiarize students with English sounds and phonemic symbols.
 2. To enhance their ability in listening and speaking.

Outcome: On completion of the course, the students should be able to

1. listen to lectures, public announcements and news on TV and radio.
2. engage in telephonic conversation.
3. communicate effectively and accurately in English.
4. use spoken language for various purposes.

MODULE I

Pronunciation

Phonemic symbols – consonants – vowels – syllables - word stress - strong and weak forms - intonation.

MODULE II

Listening Skills

Difference between listening and hearing – active listening – barriers to listening - academic listening - listening for details - listening and note-taking - listening for sound contents of videos - listening to talks and descriptions - listening for meaning - listening to announcements - listening to news programmes.

MODULE III

Speaking Skills

Interactive nature of communication - importance of context - formal and informal - set expressions in different situations – greeting – introducing - making requests - asking for / giving permission – giving instructions and directions – agreeing / *disagreeing* - *seeking and giving advice* - *inviting and apologizing* telephonic skills - conversational manners.

MODULE IV

Dialogue Practice

(Students should be given ample practice in dialogue, using core and supplementary materials).

COURSE MATERIAL

Core Reading : Sasikumar, Listening and Speaking: A Course for Undergraduate Students (Foundation Books)

Further Reading

1. Jonathan Marks, English Pronunciation in Use, Cambridge University Press, 2007.
2. Tony Lynch, Study Listening, Cambridge University Press, 2008.
3. Kenneth Anderson, Joan MacLean & Tony Lynch, Study Speaking. Cambridge University Press, 2008.

EX 1141: ENVIRONMENTAL STUDIES

MODULE I

NATURE OF ENVIRONMENTAL STUDIES:

Definition, Meaning and Importance;

Ecology & Ecosystems: Concept of an Ecosystem structure and function of an Ecosystem. Producers, Consumers and decomposers: Energy flow in the Ecosystem: Ecological succession, food chain, food web, Ecological pyramids: Introduction, Types, Characteristic feature, structure and function of forest ecosystem, Grassland ecosystem, Desert ecosystem and aquatic ecosystem (Ponds, streams, rivers, lakes, oceans, estuaries)

MODULE II

BIODIVERSITY AND ITS CONSERVATION:

Introduction, Definition; Ecosystem, Genetics and species, diversity; value of Biodiversity – Consumptive, productive, social, ethical, aesthetic and option values. Biodiversity at global, national and local level; India as a mega diversity nation, Hotspots of Biodiversity, Threats of Biodiversity- Habitat loss, poaching of wildlife; conservation of Biodiversity, In-situ conservation, Ex-situ conservation. Endangered and endemic species of India; **Environmental pollution** – definition, cause, effects, and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and nuclear hazards: **Solid waste management**- Types and sources: causes of solid waste, effects of solid waste pollution, control measures of solid waste, role of individual in prevention of pollution.

MODULE III

NATURAL RESOURCES:

Features and types of natural resources – Renewable and non renewable resources; natural resources and associated problems of **(a) Air resources (b) Forest resources** – use and over exploitation, Deforestation, effects of deforestation; timber extraction, mining on forests **(c) water resources**;- use, utilisation and over utilisation of surface and ground water. Floods, drought, conflicts over water. Benefits and problems of dams, management of water resources. **(d) Mineral resources**: Use and exploitation, environmental effects of extracting and using mineral resources, **(e) Food resources**: World food problems, changes caused by agriculture and over grazing, Effects of modern agriculture, fertilizer- pesticide problems, water logging. Salinity. **(f) Energy resources**:- classification of energy resources. **(g) Land resources**: - Land as a resource, soil, land degradation, over exploitation of natural resources. Conservation of natural resources- soil, forest, wildlife, mineral, energy; water conservation- measures to conserve water in day today life. Sustainable water utilisation, rain water harvesting- methods; water shed management.

MODULE IV-

SOCIAL ISSUES AND THE ENVIRONMENT:-

Unsustainable to sustainable development, urban problems related to energy. Resettlement rehabilitation of people; environmental ethics; climate change; greenhouse effect and global warming- effects and remedial measures; acid rain; ozone layer depletion, water land degradation, consumerism and waste products, ecomark.

HUMAN POPULATION AND THE ENVIRONMENT: -

Population growth; population exploitation; family welfare programme, environment and human health, urban environment and health, value education, women and child welfare; HIV and AIDS.

Text

Systematic Approach to Environmental Studies: Dr. K.G.C.Nair, Dr. Dipa, Dr. Yohannan

References

1. A text book of Environmental studies: Erach Bharucha
2. A text book of Environmental studies: Dr. Vijaykumar Tiwari.

EX 1142 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

MODULE I

Basic Concept in Electrical Engineering: Introductory concepts and basic elements, resistance in series, resistance in parallel, effect of temperature on resistance. DC voltage sources: ideal and non ideal case; DC current sources: ideal and non ideal case; open circuit voltage and short circuit current sources, basic problems.

Kirchoff's Laws: Introduction, Kirchoff's current law, Kirchoff's voltage law, voltage divider circuit, current divider circuit; source transformation – voltage source to current source and current source to voltage source, basic problems.

MODULE II

Magnetic Circuits: Introduction, magnetic field around a bar magnet, magnetic field around a current carrying conductor, magnetic flux, magnetic flux density, magnetomotive force, magnetic field intensity, permeability, relative permeability, reluctance, permeance, comparison of electric and magnetic circuits, leakage flux in magnetic circuit; Magnetic hysteresis.

Electromagnetic induction: Faraday's laws of electromagnetic induction, Lenz's law, Electromagnetically induced emf, Dynamically induced emf, Fleming's right hand rule, Fleming's left hand rule, statically induced emf, mutually induced emf, mutual inductance.

MODULE III

AC Fundamentals: Introduction, generation of sinusoidal emf, definitions of waveform, instantaneous value, cycle, time period, amplitude, frequency, phase, phase difference, phase angle, RMS value, average value; Determining the RMS and average value of sine wave, half and fully rectified sine wave, saw tooth and triangular waveforms.

MODULE IV

Introduction to Electronics: Semiconductor diodes – Introduction, PN junction, PN junction with no external voltage, Forward and Reversed biased PN junction, VI characteristics of PN junction diode, static and dynamic resistance of diode, types of diodes – Zener diode, photo diode, LED and solar cell (basic idea only)

Text books

1. Mittle, VN, Basic Electrical Engineering, TMH
2. Navas, KA and Suhail, TA, Basic Electrical and Electronics Engineering, Rajat Publishers, Kochi
3. Rajendran, N, Basic Electrical and Electronics Engineering, Moonlight Publishers, Trivandrum
4. Thankachan, Aneesh P, Basics of Electronics Engineering, Phoenix, Kollam
5. Babu, Suresh V and Gopi, Varun P, Basics of Electronics Engineering, Owl Books, Trivandrum

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each, spanning the entire syllabus and the candidate has to answer all questions. Part B contains 12 short answer questions of 2 marks each, spanning the entire syllabus and the candidate has to answer any 8. Part C contains 9 short essays/problems of 4 marks each, spanning the entire syllabus and the candidate has to answer any 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer any 2.

EX 1143: ELECTRICAL and ELECTRONICS WORKSHOP

List of Experiments

Electrical Engineering: (use soldering for all connections)

1. Ohm's Law: To verify Ohm's Law using a known value resistance, ammeter and a DC source.
2. Study of resistance when connected in series: To find the total resistance, the current flowing in the circuit and the voltage dropped across each resistor, both theoretically and practically.
3. Study of resistance when connected in parallel: To find the total resistance, the current flowing in the circuit and the current flowing through each resistor and the voltage dropped across each resistor, both theoretically and practically.
4. Study of resistance in a series- parallel connection: To find the total resistance, the current flowing in the circuit, the current flowing each resistor, the voltage dropped across each resistor, both theoretically and practically.
5. Designing and etching a PCB for a simple circuit

Wiring Experiments:

6. Demonstration of one lamp controlled by one switch
7. Demonstration of staircase wiring: one lamp controlled by two switches
8. Demonstration of house wiring - Two lamps controlled by two switches

Electronics Experiments

9. To plot the VI characteristics of a PN junction diode
10. To plot the VI characteristics of an LED

Continuous Evaluation: 20 marks

1. Attendance	5
2. Performance	5
3. Test	5
4. Fair Record	5

End Semester Examination: 80 marks

1 Circuit/wiring layout/PCB layout	20
2 Assembly/Soldering	15
3 Performance and Troubleshooting	15
3 Result	15
4 Viva voce	15

The examination is to be conducted covering experiments given above. Students shall submit the duly certified record.

EX 1144: DIGITAL ELECTRONICS LAB

1. TTL & CMOS Characteristics
2. Realization of Combinational Circuits using Gates
3. Binary to BCD converter.
4. Clocked SR, JK, Master Slave JK Flip Flops using Gates.
5. Arithmetic Circuits – Half Adder, Full Adder
6. BCD addition using 7483.
7. 1 bit magnitude comparator using gates.
8. Octal to Binary encoder using Gates.
9. Realisation of 4 to 1 MUX using gates and 8 to 1 MUX using 74151.
10. Realisation of 1 to 4 Demultiplexer using gates and 1 to 16 Demultiplexer using 74154.
11. Realisation of Shift registers-SISO, SIPO, PISO, PIPO using flip flops.
12. Realisation of asynchronous decade up counter using flipflops.
13. Design and implementation of MOD 7 synchronous up counter using flip flops.
14. Realisation of Johnson and Ring counter using CD 4017.
15. Implementation of a BCD counter using IC7490
16. Realisation of asynchronous decade up counter using flipflops.
17. Design and implementation of MOD 7 synchronous up counter using flip flops.
18. Realisation of Johnson and Ring counter using CD 4017.
19. Implementation of a BCD counter using IC7490

Continuous Evaluation: 20 marks

1.	Attendance	5
2.	Performance	5
3.	Test 5	
4.	Fair Record	5

End Semester Examination: 80 marks

1	Circuit and design	20
2	Assembly and troubleshooting	15
3	Result	30
4	Viva voce	15

The examination is to be conducted covering experiments given above. Students shall submit the duly certified record.

EX1131: DIGITALELECTRONICS

MODULE I

Number systems – Decimal, Binary, Octal & Hexadecimal – conversions, Digital codes – BCD, Excess 3, Gray code-conversions, ASCII I codes, Boolean algebra & theorems, SOP & POS, De Morgan's theorem, Simplification of Boolean expressions using Boolean Algebra & K Map(upto four variables). Logicgates.

MODULE II

Different Logic families: TTL, CMOS, ECL, Open Collector & its characteristics.

Combinational circuits: Adders - Half adder and Full adder. Subtractors - Half and Full subtractor.

Comparators - 1-bitmagnitude & 2-bitmagnitude. Decoders - 2 to 4 & 3 to 8. Encoders - Octal to Binary & Decimal to BCD, Code converters - Gray to Binary, Binary to Gray and Binary to BCD.

MODULE III

Multiplexers: 2 input, 4 input & 8 input. Demultiplexers: 1 to 4 & 1 to 8. Realization of Boolean expression using multiplexers and demultiplexers. Familiarisation of popular ICs: 7483, 74151, 74154 and its applications. Sequential circuits: Flip Flops: RS latch, clocked RS, D, JK, T and Master slave. Applications – Latches, Shift registers, typical circuits & applications as Ring counter and Johnson counter.

MODULE IV

Counters: State diagram & State table. Asynchronous counters: Concepts and Design of 2bit & 4 bit Up/Down counter, MOD 10 up counter. Synchronous counters: Design for random sequence generator. Familiarization of popular ICs: 7490, 4017 and 7446.

Converters: ADC – Flash, Successive Approximation, Counter Ramp. DAC-Weighted Resistor and R-2R Ladder. Parameters of DAC and ADC. Familiarization of ICs: 0808,0800 and application.

Text Books

1. Anand kumar, *Fundamentals of digital circuits*, PHI, 2/e, 2012.
2. Thomas L Floyd, *Digital Fundamentals*, Pearson, 10/e,2011.

References

1. John MYarbrough, *Digital logic- Application and Design*, Thomson Learning,2006.
2. John Wakerly, *Digital Design Principles and Practice*, Pearson,4/e, 2012.
3. Morris Mano,Ciletti, *Digital Design*, 4/e, Pearson ,4/e, 2009
4. Thomas A.DeMessa, Zack Ciecone: *Digital Integrated Ciruits*, Wiley India,2007
5. Ghoshal, *Digital Electronics*, Cengage, 2012.
6. Malvino & Leach, *Digital principles and applications*,TMH.

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each spanning the entire syllabus and the candidate has to answer all. Part B contains 12 short answer questions of 2 marks each spanning

the entire syllabus and the candidate has to answer 8. Part C contains 9 short essays/problems of 4 marks each spanning the entire syllabus and the candidate has to answer 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer 2.

EN1211: ENGLISH II - WRITING AND PRESENTATION SKILLS

- Objectives:**
1. To familiarize students with different modes of general and academic writing.
 2. To help them master writing techniques to meet academic and professional needs.
 3. To introduce them to the basics of academic presentation
 4. To sharpen their accuracy in writing.

Outcome: On completion of the course, the students should be able to

1. understand the mechanism of general and academic writing.
2. recognize the different modes of writing.
3. improve their reference skills, take notes, refer and document data and materials.
4. prepare and present seminar papers and project reports effectively.

MODULE I

Writing as a skill – its importance - mechanism of writing – words and sentences - paragraph as a unit of structuring a whole text - combining different sources – functional use of writing – personal, academic and business writing – creative use of writing.

MODULE II

Writing process - planning a text - finding materials - drafting – revising – editing -finalizing the draft - computer as an aid - key board skills - word processing - desk top publishing.

MODULE III

Writing models-essay-précis-expansion of ideas-dialogue-letter writing-personal letters - formal letters - CV – surveys – questionnaire - e-mail – fax - job application - report writing.

MODULE IV

Presentation as a skill - elements of presentation strategies-audience-objectives-medium- key ideas-structuring the material-organizing content-audio-visual aids-hand-outs-use of power point-clarity of presentation-non-verbal communication-seminar paper presentation and discussion.

Text Books

1. Write Rightly, A Course for Sharpening Your Writing Skills, CUP.
2. Mary Munter and Lynn Russell, Guide to Presentations, Pearson Education.

References

1. Robert Barraas, Students Must Write, Routledge, 2006.
2. Stephen Bailey, Academic Writing. Routledge, 2006.
3. Hamp-Lyons, Liz, Ben Heasley, Study Writing, 2nd Edition, Cambridge University Press, 2008.
4. Ilona, Leki, Academic Writing, CUP, 1998.
5. McCarter, Sam, Norman Whitby, Writing Skills, Macmillan India,2009.
6. Jay, Effective Presentation, Pearson, 2009.

7. Mayor, Michael et. al, Longman Dictionary of Contemporary English, 5/e, Pearson Longman Ltd, 2009.

EX1241: SOLID STATE ELECTRONICS

MODULE I

Semiconductor Physics: Energy bands in solids, Energy band structure of conductors, insulators and semiconductors, Conduction in solids, Drift and diffusion currents, Fermi Dirac energy distribution.

Intrinsic semiconductors: Conduction in intrinsic semiconductors, Effect of heat and light on conductivity of intrinsic semiconductors, Fermi level in intrinsic semiconductors.

Extrinsic semiconductors: P type and N type semiconductors. Effect of temperature on extrinsic semiconductors, Majority and minority charge carriers, Mass action law, Charge density in an extrinsic semiconductor, Conductivity of semiconductors, Fermi level in an extrinsic semiconductor, Hall Effect.

MODULE II

PN junction diode: Formation of depletion layer in a PN junction, Forward biasing, Reverse biasing, V I Characteristics, Important terms used in a PN junction, break down mechanisms, Transition capacitance, Diffusion capacitance. Diode current equation . PN Diode switching times. Diode applications.

Special purpose diodes: (working principle and VI characteristics are only required) Zener diode, Tunnel diode, Varactor diode, Light emitting diode, Photodiode, Solar cell

MODULE III

Bipolar Junction Transistor: Construction, Operation of a transistor, Transistor currents, Transistor circuit configurations, Current gain, Relation between α and β . Ebers –Moll model. Leakage current, VI characteristics in CB and CE configurations. Hybrid model of transistor in common base configuration.

Field Effect Transistor: Operation of JFET, Transfer and drain characteristics, Comparison of BJT and FET.

MODULE IV

MOSFET: Types of MOSFET, Working of depletion Type and enhancement type MOSFET, VI characteristics, Complimentary MOSFET.

Thyristors : UJT, SCR, DIAC, TRIAC – operation, structure and VI characteristics.

Text Book

1. Electronic devices and circuits - J B Gupta - S K Kataria and sons (Module I)
2. A Text book of applied electronics -R S Sedha - S Chand and Company Ltd (Module II, III and IV)

References

1. Solid State Devices and Technology –V Sureshbabu - Sanguine Technical Publishers
2. Solid State Electronic Devices, Ben G. Streetman - Pearson Education.
- 3., Basic Electronics & Linear Circuits, Bhargava N. N., D C Kulshreshtha and S C Gupta - TMH
3. Electronic Devices -Thomas L. Floyd - Pearson Education
4. Principles of electronics - V K Mehta - S Chand and company Ltd
5. Electronic devices and circuit theory -Robert L Boylestad and Louis Nashelsky - Pearson Education
6. Electrical and Electronics engineering - B L Theraja - S Chand and Company

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each spanning the entire syllabus and the candidate has to answer all. Part B contains 12 short answer questions of 2 marks each spanning the entire syllabus and the candidate has to answer 8. Part C contains 9 short essays/problems of 4 marks each spanning the entire syllabus and the candidate has to answer 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer 2.

EX1242: NETWORK ANALYSIS

MODULE I

Energy sources: Voltage and current sources - dependent sources and independent sources - Kirchhoff's Laws (using resistance only) - KCL and KVL - Node and mesh analysis (using resistance only) – Network Theorems (using resistance only) - Super position theorem - Thevenin's Theorem - Norton's theorems - Maximum power transfer theorem

MODULE II

Transient and steady state analysis: AC analysis of RC, RL and RLC circuits, time constant. Laplace Transform in the Network Analysis: Initial and Final conditions, Transformed impedance and circuits; Transient analysis of RL, RC, and RLC networks with impulse and step and inputs.

MODULE III

S -Domain analysis: The concept of complex frequency, Network functions for the one port and two port - Poles and Zeros of network functions, Significance of Poles and Zeros, Time domain response from pole zero plot. Stability criteria - Routh Hurwitz Criteria

MODULE IV

Two port network: Short circuited admittance, open circuited impedance, hybrid parameters and transmission parameters.

Resonance: Series resonance, bandwidth, Q factor and Selectivity.

Text Books

1. Roy Choudhary, Networks and Systems, New Age International, 2/e, 2013.
2. Sudhakar and Shyam Mohan, Circuits and Networks- Analysis and Synthesis, TMH, 3/ e,2006.

References

1. Van Valkenburg, Network Analysis, PHI, 3/e, 2011
2. Franklin F. Kuo, Network Analysis and Synthesis, Wiley India, 2/e, 2012.
3. Umesh Sinha, Network Analysis & Synthesis, Satya Prakashan, 7/e, 2012.
4. Ghosh, Network Theory – Analysis & Synthesis, PHI, 2013.
5. B.R.Gupta and Vandana Singhal, Fundamentals of Electrical Networks, S.Chand, 2009.

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each, spanning the entire syllabus and the candidate has to answer all questions. Part B contains 12 short answer questions of 2 marks each, spanning the entire syllabus and the candidate has to answer any 8. Part C contains 9 short essays/problems of 4 marks each, spanning the entire syllabus and the candidate has to answer any 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer any 2.

EX1243: BASIC ELECTRONICS LAB

1. Characteristics of Zener diodes
2. Characteristics of Transistors (CE & CB configuration)
3. Characteristics of FET
4. Characteristics of UJT
5. Characteristics of SCR
6. Frequency response of RC Low pass and high pass filters
7. Integrating and Differentiating circuits
8. Simple Zener Regulator
9. Realization of logic gates using diodes and transistors
10. Clipping and clamping circuits.
11. Rectifiers-half wave, full wave, Bridge with and without filter

Continuous Evaluation: 20 marks

1.	Attendance	5
2.	Performance	5
3.	Test	5
4.	Fair Record	5

End Semester Examination: 80 marks

1	Circuit and design	20
2	Assembly and troubleshooting	15
3	Result	30
4	Viva voce	15

The examination is to be conducted covering experiments given above. Students shall submit the duly certified record.

EX1244: C PROGRAMMING LAB

The laboratory work will consist of 15 experiments from the list shown below:

1. Program to find the largest among three numbers.
2. Program to calculate simple and compound interest.
3. Solution of a Quadratic Equation.
4. Program to compute sum of series using while loop.
5. Program to calculate the sum of N natural numbers
6. Printing of multiplication table using do...while loop.
7. Program to find whether the given number is a positive number, negative number or zero.
8. Program to sort a list of numbers
9. Program to sort the strings.
10. Program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
11. Preparation of the rank list of a class of students.
12. Program to implement Matrix addition
13. Program to implement transpose of a Matrix
14. Program to implement Fibonacci series.
15. Program to find factorial of given N numbers without recursion.
16. Program to find factorial of given N numbers with recursion.
17. Program to count number of characters, words & lines in a text.
18. Program to develop a pattern (eg: pyramid, square)
19. Write a function to swap the values of two variables to illustrate the concept of pass by reference.
20. Write a program to arrange the given N names in alphabetical order.
21. Write a function to calculate the sum and average of given three numbers. Write a main function to call the above function.

Continuous Evaluation: 20 marks

1. Attendance 5
2. Performance 5
3. Test 5
4. Fair Record 5

End Semester Examination: 80 marks

- 1 Flow chart/Algorithm 10
- 2 Programme 20
- 3 Compilation and Troubleshooting 10
- 4 Result 25
- 5 Viva voce 15

The examination is to be conducted covering experiments given above. Students shall submit the duly certified record.

EX1231: PROGRAMMING IN C

MODULE I

Introduction: Concept of Programming Languages - High Level, Low Level, Assembly Language – Concept of Algorithms and Flow Charts - Language translators: Assemblers, Compilers, Interpreters (Only concept and differences) - Overview of C, Features of C fundamentals - Character Set, Identifiers, Keywords, Data Types, Constants, Variables , Operators- Arithmetic, Logical, Relational, Unary, Assignment, Conditional And Bitwise Operators –expressions.

MODULE II

Structure of C Program - Library Functions - Data input and output-,Compilation and Execution of C programs - Control Statements - If Statement, If.....Else Statement, Nesting of If.....Else Statement – Operator - Switch Statement - Loop Controls – For, While, Do-While Loops, Break Continue, Exit, go..to Statement.

MODULE III

Arrays -Single and Multi dimensional arrays, Declaration and Initialization of arrays and strings, pointers and one dimensional arrays-Structures-Definition, declaration of structure variables, accessing structure members unions

MODULE IV

The Need of a Function - definition - User Defined and Library Function - Prototype of a Function - Calling of a function - Function Argument - Passing arguments to function - Return Values - Nesting of Function - main() -recursion. Data files-opening and closing a data file, creating a data file.

Text Book

Balaguruswami, Programming with C, TMH.

References

1. Yashvant P Kanetkar ,Let Us C
2. Mahapatra, Thinking in C, PHI.
3. Brain W Kernighan and Dennis M Ritchie, The C Programming language, PHI.
4. Byron Gottfried, Programming with C, Schaum’s Outline Series, TMH.

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each spanning the entire syllabus and the candidate has to answer all. Part B contains 12 short answer questions of 2 marks each spanning the entire syllabus and the candidate has to answer 8. Part C contains 9 short essays/problems of 4 marks each spanning the entire syllabus and the candidate has to answer 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer 2.

EX1341: ELECTRONIC CIRCUITS

MODULE I

Rectifiers: Half wave, Full wave and bridge rectifiers – average value – ripple factor – efficiency. Filters: simple capacitor filter, RC, LC, CLC filters – comparison of filter circuits. Biasing of BJTs: Transistor biasing circuits, Stability factors, DC analysis of BJTs - Hybrid equivalent circuit. Amplifiers: Concept of amplification, RC coupled amplifier – Frequency response – Analysis of voltage gain, current gain, input impedance and output impedance – concept of gain bandwidth product – emitter follower – applications.

MODULE II

Biasing of JFETs, FET Amplifier: Principle of operation – Small signal model – typical amplifier circuits – high frequency effects – comparison of BJT & FET amplifiers. Feedback Amplifiers: Concept of positive and negative feedback in amplifiers – characteristics negative feedback amplifiers - different types of feedback topologies – applications.

MODULE III

Concept of power amplifiers – class A, class B, class C – operation – types of distortions in power amplifiers – typical power amplifier circuits – principle of operation – transistor ratings – use of heat sinks. Oscillators: Principle of sinusoidal oscillators – Barkhausen criteria – RC, LC, Crystal oscillators – typical circuits – principle of operation – calculation of frequency oscillation – applications.

MODULE IV

RC Circuits: Response of high pass and low pass RC circuits to step and square wave inputs. Differentiator, Integrator, clipping and clamping circuits. Multivibrators – Circuit diagram and working of astable, monostable and bistable multivibrators. Schmitt trigger – principle of operation – output wave forms and applications.

Text books

1. Boylstad & Nehlasky, Electronic Devices & Circuit Theory, PHI.
2. Bhargava, Kulshreshtha & Gupta: Basic electronics and linear circuits, TMH

References

1. David Bell, Solid state pulse circuits, PHI.
2. Millmann and Halkias : Integrated Electronics, TMH.
3. Millmann and Taub, Pulse Digital and Switching Waveforms, TMH.
4. Neamen, Donald, Electronic Circuit Analysis and Design, TMH.
5. Spencer & Ghausi, Introduction to Electronic Circuit Design, Pearson Education, 2003.

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each spanning the entire syllabus and the candidate has to answer all. Part B contains 12 short answer questions of 2 marks each spanning the entire syllabus and the candidate has to answer 8. Part C contains 9 short essays/problems of 4 marks each spanning the entire syllabus and the candidate has to answer 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer 2.

EX1342: COMMUNICATION ENGINEERING

MODULE I

Introduction to communication system: Block diagram of a communication system, Bandwidth, Modulation, Need for modulation, various modulation schemes.

Amplitude Modulation: Introduction, AM signals and spectra, Power relations, block diagram of an AM transmitter, block diagram of a Superheterodyne receiver, sensitivity, image rejection.

MODULE II

Single Sideband Modulation: Principles, Balanced Modulators – SSB Generation – Filter Method. SSB Reception. Angle modulation- FM spectrum, modulation index, phase modulation.

Study of various modulation schemes: Comparison of various modulation schemes, angle modulation and demodulation circuits, AFC, amplitude limiters, pre-emphasis and de-emphasis.

MODULE III

Angle modulator Circuits: Varactor Diode Modulator, FM Transmitters (block diagram only) – Direct & Indirect Methods.

Angle modulation detector: Foster-Seeley discriminator. Pulse Modulation - PAM - TDM, PPM, PWM.

MODULE IV

Telephone Systems: Standard Telephone Set, functions of a telephone set, tones in auto exchange – dial tone, ring tone, busy tone, number unobtainable tone (brief explanation with waveforms only), concept of DTMF and multi frequency; cordless telephones, electronic telephones (block diagram and explanation only).

Text Books

1. George Kennedy, Communication System, TMH.
2. Biswas, N N, Principles of Telephony, Radiant Books, Bangalore
3. Thankachan, Anish P, Analog Communication Engineering, Phoenix, Kollam

References

1. Dennis Roody & John Coolen, Electronic Communication, 4/e. PHI.
2. Leon W.Couch II, Digital and Analog Communication Systems, 6/e, Pearson Education.
3. Taub and Schillings, Principles of Communication Systems, PHI.
4. Simon Haykin, Communication Systems, 4/e, John Wiley.

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each, spanning the entire syllabus and the candidate has to answer all questions. Part B contains 12 short answer questions of 2 marks each, spanning the entire syllabus and the candidate has to answer any 8. Part C contains 9 short essays/problems of 4 marks each, spanning the entire syllabus and the candidate has to answer any 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer any 2.

EX1343: MICROPROCESSOR & INTERFACING

MODULE I

Introduction to Microcomputer- types, CISC and RISC architecture overview and comparison. Microprocessors – Evolution. Intel 8085 Microprocessor – Internal architecture – address, data and control buses- Pin functions of 8085, addressing modes, instructions sets and programming.

MODULE II

Timing – Instruction cycle, machine cycle, fetch and execute cycles, 8085 bus activities during a read/write operation, timing diagrams for simple instructions. Stacks and subroutines. Addressing memory and ports, memory mapping and I/O mapping.

MODULE III

Interrupt structure of 8085 and interrupt response, hardware and software interrupt applications. Interfacing peripherals: 8255 PPI – block diagram description, modes of operation, Mode0, mode1 and mode2.

MODULE IV

Functional block diagram description of 8259 priority interrupt controller, 8257 DMA controller and 8251 USART. 8086 – internal architecture, programming model, registers, memory segmentation.

Text Books

1. R. S. Gaonkar, *Microprocessor Architecture Programming and Application with 8085*, Penram International Publishers.
2. A. Nagoor Kani, *8085 Microprocessor and Its Applications*, McGraw Hill Education Publishers.

References

1. D. V. Hall, *Microprocessors and Interfacing: Programming and Hardware*, Tata McGraw Hill, 1999.
2. N. Mathivanan, *Microprocessors, PC Hardware & Interfacing*, Prentice Hall (India).

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each spanning the entire syllabus and the candidate has to answer all. Part B contains 12 short answer questions of 2 marks each spanning the entire syllabus and the candidate has to answer 8. Part C contains 9 short essays/problems of 4 marks each spanning the entire syllabus and the candidate has to answer 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer 2.

EX1344: ELECTRONICS CIRCUITS LAB

- 1 Biasing Circuits – Fixed Bias with and without R_E – measure operating point – draw the DC load line – observe \hat{a} dependency with another transistor.
- 2 Biasing Circuit – Voltage Divider – design – measure operating point – draw DC load line – observe the dependency on \hat{a}
- 3 Single stage RC coupled amplifier – design – measure DC operating point – frequency response plot – find bandwidth, mid band voltage gain
- 4 FET Amplifier (self bias) – design – measure DC operating point – plot the frequency response find mid band gain, bandwidth.
- 5 Negative feedback amplifier (current series) – design – measure dc operating point – plot frequency response – find gain band width product.
- 6 Sinusoidal oscillator (RC phase shift) – design – measure operating point – measure frequency of oscillation.
- 7 Sinusoidal oscillator (Wein bridge) – design – measure operating point – measure frequency of oscillation.
- 8 Mutivibrators (astable) – design – measure frequency of oscillation – plot output waveforms
- 9 Mutivibrators (mono stable) - design – measure the time constant – plot output waveforms
- 10 Series Voltage regulator-design-observe the regulated output voltage-measure regulation factor.
- 11 Schmitt trigger – design – observe the UTP and LTP – plot the hysteresis graph.
- 12 UJT Relaxation oscillator- design- measure frequency of oscillation-plot output waveforms.

Continuous Evaluation: 20 marks

1.	Attendance	5
2.	Performance	5
3.	Test	5
4.	Fair Record	5

End Semester Examination: 80 marks

1	Circuit and design	20
2	Assembly and troubleshooting	15
3	Result	30
4	Viva voce	15

The examination is to be conducted covering experiments given above. Students shall submit the duly certified record.

EX1345: MICROPROCESSOR LAB

Any 10 experiments from the following are to be done using 8085 trainer kit.

1. Addition and subtraction of two numbers.
2. Addition of an array of 8-bit numbers.
3. Addition of an array of 8-bit BCD numbers.
4. Multiplication of two 8-bit numbers.
5. Division of two 8-bit numbers.
6. Largest and smallest number among an array of 8-bit numbers.
7. Ascending and Descending order sorting of an array of 8-bit numbers.
8. Block transfer.
9. Square root of a given 8-bit number.
10. Conversion of BCD number to binary and binary number to BCD.
11. Interfacing with stepper motor and seven segments LED display.
12. Interfacing with ADC and DAC.

Continuous Evaluation: 20 marks

1.	Attendance	5
2.	Performance	5
3.	Test 5	
4.	Fair Record	5

End Semester Examination: 80 marks

1	Flow chart/Algorithm	10
2	Programme	20
3	Compilation and Troubleshooting	10
3	Result	25
4	Viva voce	15

The examination is to be conducted covering experiments given above. Students shall submit the duly certified record.

EX 1332: COMPUTER ORGANIZATION

MODULE I

Basic structure of computers: SMPS, Motherboard, BIOS, CMOS, Ports and Interfaces, Expansion Cards, Ribbon Cables, ASCII, operational concepts. CPU: data path, micro-operations on data path, control signals. Addressing modes. Execution of instructions, fetch cycle, execution cycle. ALU and bit sliced ALU.

MODULE II

Processing units: Fundamental concepts, execution of complete instructions, Multibus organization.

Memory Structure: Concepts of main memory, semiconductor RAM memories, semiconductor ROM memories, memory location and addresses, memory operations, Cache and Virtual memory.

Secondary storage devices: Magnetic storage systems – basic concept, working of pen drive, Hard disk.

MODULE III

Optical storage devices: Concept of optical storage devices, CD, DVD. Concept of I/O units, Concept of Video terminals, video displays, alphanumeric displays, graphic displays, Concept of graphic input devices – Concept of multimedia hardware

Operating systems: Concept of operating systems, Introduction to Linux, Real Time Operating Systems – concept of multitasking – concept of LAN, WAN, MAN. Network topologies

MODULE IV

Computers in the corporate world: Introduction to Information Systems, resources, classification, organizational foundation of information systems, contemporary approach to information systems, System concept, classification of information system, transaction processing system, decision support system (DSS), process of developing DSS, decision making concept, brief introduction to GDSS and EDSS.

Text Books:

1. Mano, Morris M, Computer System Architecture, PHI
2. De, Rahul, Managing Information Systems in Business, Government and Society, Wiley, India

References:

1. Hamacher, Computer Organization, Mc Graw Hill
2. Hayes, J P, Computer Organization and Architecture, PHI
3. Pratap, Bhanu, Computer Fundamentals, Cyber Tech Publications, New Delhi
4. Jain, V K, Computer Fundamentals, BPB Publications, New Delhi
5. Babu, Ramesh V, Samyukta, R and Munirathnam, M Digital Computer Fundamentals, VRB Publications, Chennai

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each, spanning the entire syllabus and the candidate has to answer all questions. Part B contains 12 short answer questions of 2 marks each, spanning the entire syllabus and the candidate has to answer any 8. Part C contains 9 short essays/problems of 4 marks each, spanning the entire syllabus and the candidate has to answer any 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer any 2.

EX 1441: APPLIED ELECTROMAGNETIC THEORY

MODULE I

Review of Vector Analysis: Vector algebra, dot product, cross product, Physical interpretation of gradient, divergence, curl. Vector field & scalar field. Review of rectangular, cylindrical and spherical co-ordinate systems and transformation equations (No derivations required). The Del operator, Laplacian operator

MODULE II

Electrostatics: Coulomb's law, Electric field intensity, electric potential due to point charge, Gauss Law, Poisson's equation, Laplace equation. Overview of capacitance, dielectrics and dielectric polarization. Electrostatic energy stored in electric fields (derivation). Boundary conditions for dielectric interface & conductor- dielectric interface.

MODULE III

Magneto statics: Faraday's Law of Magnetic Induction, Magnetic flux, Flux density, magnetic field intensity, Biot-Savart's Law, Ampere's circuital (work) law in integral form, Energy stored in magnetic field. Magnetic vector potential. Boundary conditions for magneto static fields

MODULE IV

Maxwell's Equations: Inconsistency of Ampere's circuital law. Conduction current and displacement current- Maxwell's equations- differential and integral form, word statement and interpretation. Poynting theorem and Poynting vector- Uniform Plane waves- Solution for free space condition-Intrinsic impedance. Concepts of TE, TM and TEM waves.

Text Book:

Applied Electromagnetic field theory with applications -B.Premlet - Phasor Books

Reference 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)

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EX1442: LINEAR INTEGRATED CIRCUITS

MODULE I

Basic Differential Amplifier Circuit-Operation-AC and DC Analysis. Operational Amplifiers: block diagram-ideal characteristics-Op amp Parameters-Inverting and Non-Inverting Amplifier-Voltage Follower- Summing Amplifier-Differential Amplifier- Instrumentation Amplifier- V to I and I to V converter- Integrator-Differentiator-Typical circuits-Applications.

MODULE II

Active filters: Introduction – First order and second order– Butter worth – Low pass, High pass, Band pass, Band Reject, and Notch Filters – Typical circuits. Wave form generators: sine wave oscillators (Phase shift, Wien Bridge Oscillators), multivibrators (astable and monostable), sawtooth wave generator. Introduction to Timer-Monostable and Astable Multivibrator using 555.

MODULE III

Basic circuit configuration and characteristics of voltage regulators – Basic blocks of linear voltage regulator – three terminal fixed regulators, Variable voltage Regulators (723) –Typical circuits for low and high voltage regulation. Introduction to switching regulators. ADC and DAC
- DAC characteristics, Weighted resistor and R-2R DAC, ADC characteristics, Counter ramp and Successive approximation ADC.

MODULE IV

Basic comparator – Characteristics -Typical comparator circuits using op amp – zero crossing detector
- Schmitt trigger - Operation - Application-Window detector. Precision Rectifiers (half wave and full wave). Positive and negative clampers-Peak detectors. Sample and Hold circuit. PLL – block diagram, operating principle, applications and typical circuits.

Text

1. Gayakwad , Op-Amps and Linear Integrated Circuits , PHI,4/e.2013.
2. Roy Chowdhary, Linear Integrated Circuits, New Age International, 2/e, 2010.

References

1. Franco, Design with Operational Amplifiers and Analog Integrated Circuits, TMH,3/e,2008.
2. Botkar, Integrated Circuits, Khanna Publishers,9/e, 2003.
3. George Clayton & Steve Winder, Operational Amplifiers, Elsevier.
4. Salivahanam and Kanchana Bhaskaran, Linear Integrated Circuits, TMH, 2008.

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each spanning the entire syllabus and the candidate has to answer all. Part B contains 12 short answer questions of 2 marks each spanning the entire syllabus and the candidate has to answer 8. Part C contains 9 short essays/problems of 4 marks each spanning the entire syllabus and the candidate has to answer 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer 2.

EX 1443: ELECTRONIC INSTRUMENTATION

MODULE I

Introduction, General measurement system, characteristics, definitions; Transducers, different types of Transducers, Static – Resistive, Strain gauge, Capacitive, Inductive, LVDT; Dynamic Transducers - Piezo electric, Temperature, Thermocouple, Thermistors, Photoelectric.

MODULE II

Signal conditioning (concept only), Bridges – Wheat Stone, Maxwell, Hays, Scherring. Amplifiers – Instrumentation, Chopper.

MODULE III

Recording instruments, Graphic and Self balancing potentiometer, X –Y and Magnetic recorders. Multimeter – Analog and Digital; Signal generators – Introduction, Sine and Square wave only.

MODULE IV

Cathode Ray Oscilloscope – Introduction, Block Diagram, Lissagous Figures, Introduction to Digital Storage Oscilloscope, Applications. Analysers - Logic, Spectrum, (Block diagram description only).

Text books

1. Sawhney, A K, Electrical & Electronic Measurement & Instrumentation, Dhanpat Rai & Sons.
2. Kalsi, H S, Electronic Instrumentation, TMH .

References

1. Bell, David A, Electronic Instrumentation and Measurements - (module 4)
2. Hellfric & Cooper, Modern electronic instrumentation & measuring technique, PHI.

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each, spanning the entire syllabus and the candidate has to answer all questions. Part B contains 12 short answer questions of 2 marks each, spanning the entire syllabus and the candidate has to answer any 8. Part C contains 9 short essays/problems of 4 marks each, spanning the entire syllabus and the candidate has to answer any 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer any 2.

EX 1444: MICROCONTROLLERS AND ITS APPLICATIONS

MODULE I

Introduction to microcontrollers, General architecture of microcontrollers, types of Microcontrollers(**CISC and RISC**). Overview of the 8051 family. 8051 architecture- Block diagram, Memory organization, Registers and I/O ports. Addressing modes, instruction sets, and assembly language programming.

MODULE II

Timer/counter module in 8051. Interrupts and their handling. Watchdog timer, Power down mode: idle/sleep mode. Peripheral devices interfacing with 8051 - ADC, DAC and I/O devices(LED, Switch , motor ,relay ,etc).

MODULE III

PIC microcontrollers - introduction, architecture of 16F877A (block diagram explanation only).Device overview , Memory organization , instruction sets, , Registers ,Special features of CPU

MODULE IV

I/O Ports, Serial Interfaces- USART, SPI, I2C, counter/timer, capture and compare ,Interrupts. Interfacing -LED, Switch, LCD, Stepper motor ,Temperature sensor with PIC16F877A

Text Books

1. Muhammad Ali Mazidi, The 8051 microcontroller and Embedded System, Pearson.
2. PIC 16F877A Datasheet.
3. PIC Microcontroller and Embedded Systems: Using assembly and C for PIC 18, 1e Paperback – 2008 by Mazidi.

References

1. Kenneth Ayala, The 8051 Microcontroller, 3/e, Thomson Publishing, New Delhi.
2. programming 8 bit pic microcontrollers in c with interactive hardware simulation, martin P. Bates

EX1445: LINEAR IC LAB

1. OPAMP - Noninverting & inverting Amplifier using IC 741
2. Adder & subtractor using IC 741
3. RC phase shift oscillator using IC 741 - design, output waveform.
4. Wein Bridge oscillator using IC 741 - design, output waveform.
5. Astable Multivibrator using IC 741 - design, output waveform.
6. Mono stable Multivibrator using IC 741 - design, output waveform.
7. Schmitt trigger using IC 741 - design, output waveform.
8. Timer IC 555 – Astable and Multivibrator - design, output waveform.
9. Timer IC 555 - Mono stable Multivibrator - Design, output wave forms.
10. Fixed voltage Regulators using 78xx and 79xx - calculation of regulation
11. Variable voltage regulator using 723 - Calculation of regulation.
12. PLL NE 565 - Characteristics - Lock range, capture range.
13. Active 1st order filters - LPF, HPF, BPF using IC 741 - design, frequency response.
14. Integrators & Differentiators using IC 741- design, waveforms.
15. Precision rectifiers (Half wave & Full wave) using IC 741

Continuous Evaluation: 20 marks

1.	Attendance	5
2.	Performance	5
3.	Test 5	
4.	Fair Record	5

End Semester Examination: 80 marks

1	Circuit and design	20
2	Assembly and troubleshooting	15
3	Result	30
4	Viva voce	15

The examination is to be conducted covering experiments given above. Students shall submit the duly certified record.

EX 1446: MICROCONTROLLER LAB

I. ASSEMBLY LANGUAGE PROGRAMMING -8051

The following experiments are to be done using keil uvision

1. Data Transfer - Block move, Sorting, Finding largest element in an array.
2. Arithmetic Instructions - Addition/subtraction, multiplication and division
3. Code conversion: ASCII – Decimal; Decimal - ASCII;
4. HEX - Decimal and Decimal - HEX.
5. Programs to generate delay

II. INTERFACING

The following experiments are to be done using 8051 trainer kit.

1. Stepper and DC motor interface to 8051.
2. Temperature sensor interface with 8051.
3. Generate Sine, Square waveforms using 8051

III. Experiments Using PIC 16F877A

Following experiments can be done with Micro C/PIC C/ HITEC C/ MP LAB IDE.

1. Interfacing I/O devices: Switch and LED.
2. Interfacing LCD module.
3. Interfacing Acceleration sensor.
4. Frequency counter using Timer.
5. Motor speed control using PWM.
6. Interfacing DS 1307 (I²C Real Time Clock).

Continuous Evaluation: 20 marks

1. Attendance	5
2. Performance	5
3. Test	5
4. Fair Record	5

End Semester Examination: 80 marks

1 Flow chart/Algorithm	10
2 Programme	20
3 Compilation and Troubleshooting	10
3 Result	25
4 Viva voce	15

The examination is to be conducted covering experiments given above. Students shall submit the duly certified record.

EX1451.1: PRINCIPLES OF MOBILE COMMUNICATION

MODULE I

Introduction to wireless networks, examples of wireless communication systems, examples of mobile radio systems - paging systems, cordless telephone systems, cellular telephone systems, differences between wireless and fixed telephone networks. PSTN, limitations in wireless networking, evolution of mobile radio communications.

MODULE II

Radio Transmission techniques- Simplex, Half duplex, Full duplex, Frequency division duplexing, Time division duplexing techniques. Mobile Radio Propagation: Free space loss, Fading, Doppler shift, Overview of Multiple Access Techniques for Wireless Communications: FDMA, TDMA, CDMA. Cellular Concept. Operational Channels- Forward voice channel, Reverse voice channel, Forward control channel, Reverse control channel.

MODULE III

A basic cellular system, Frequency reuse, Channel assignment strategies -fixed and dynamic, Hand off strategies, Prioritizing Handoffs, Practical Handoff Considerations, definition of co-channel interference and adjacent channel interference, Co channel interference reduction factor, Capacity of cellular systems, Methods to improve Coverage and Capacity in Cellular Systems, Cell Splitting- permanent and dynamic, Sectoring, repeaters for range extension, micro cell zone concept.

MODULE IV

How a mobile call is actually made. Traffic routing in wireless networks- circuit switching and packet switching. Global System for Mobile (GSM), GSM services and features, GSM system architecture, GSM radio subsystems.

Text books

1. T. S. Rappaport, Wireless Communications: Principles and Practice, 2/e, Pearson.
2. William C.Y. Lee, Mobile Cellular Telecommunications, Analog and Digital Systems, MGH.

References

1. Jochen Schiller Mobile Communications, 7/e, Pearson Education, 2003.

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each spanning the entire syllabus and the candidate has to answer all. Part B contains 12 short answer questions of 2 marks each spanning the entire syllabus and the candidate has to answer 8. Part C contains 9 short essays/problems of 4 marks each spanning the entire syllabus and the candidate has to answer 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer 2.

EX 1451.2: PRINCIPLES OF MANAGEMENT

MODULE I

Introduction to Management: Meaning and definition of management, scope and importance of management, management and administration, levels of management – management as a science, art and profession- Henry Fayol's principles of management (conceptual framework only).

MODULE II

Planning: Meaning, objectives in planning, types of plans, steps in planning and limitations of planning (conceptual framework only).

MODULE III

Organizing: Concept, significance, types- formal and informal, line and staff and functional, centralisation, decentralisation, delegation and departmentation (conceptual framework only).

MODULE IV

Staffing: Importance, sources of recruitment and selection, training and development (conceptual framework only).

MODULE V

Directing: Meaning of direction, elements of direction (conceptual framework only).

Controlling: Meaning of controlling, steps in controlling, methods of establishing control (conceptual framework only).

Text Books:

1. Nair, KGC; Dipa and James, Biji, Principles of Management, Chand Books, Trivandrum
2. Abraham, M M, Business Management, Prakash Publications
3. Ibrahim, Arish, Principles of Management, Edudrive Publishers, Trivandrum

Reference Books:

1. Donnel, Koontz O, Principles of Management, Tata Mc Graw Hill, Publishing Co, New Delhi.
2. Prasad, L M , Principles and Practice of Management, Sultan Chand and Sons, New Delhi
3. Bhatia, R C, Business Organisation and Management, Ane Books Pvt Ltd, New Delhi
4. Tripathi, P C & Reddy, P N, Principles of Management, TMH.

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each spanning the entire syllabus and the candidate has to answer all. Part B contains 12 short answer questions of 2 marks each spanning the entire syllabus and the candidate has to answer 8. Part C contains 9 short essays/problems of 4 marks each spanning the entire syllabus and the candidate has to answer 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer 2.

EX 1541: DIGITAL SIGNAL PROCESSING

MODULE II

Digital Signal Processing Systems : Block Diagram - Applications – Advantages - Limitations.

Signals : Introduction - Classification of signals – Representation methods of Discrete time Signals -Elementary of Discrete Time Signals - Mathematical operations on Discrete Time Signals.**Systems** : Definition - Discrete Time Systems - Various Classifications of Discrete Time Systems .

Z transform – Definition - Properties - Linearity, Time Shifting, Time Reversal, Multiplication by an Exponential Sequence, Differentiation, Convolution Theorem. Inverse Z Transform – Relation Between DTFT And Z-Transform.

MODULE II

Discrete Fourier Transform: Properties of DFT- Periodicity, Linearity, Time Reversal, Time Shifted sequences, Circular Convolution .Computation of DFT – Circular Convolution using DFT-IDFT method ,Graphical method and matrix method. Inverse Discrete Fourier Transform (IDFT) - Computation of IDFT.

MODULE III

Fast Fourier Transform : Introduction - FFT Algorithms(Radix 2 only) – Signal flow graph for 8-point DIT radix-2 FFT(Butterfly Diagram) - Computation of 8 point DFT using radix-2 DIT-FFT - signal flow graph for 8-point DIF radix-2 FFT - Computation of 8 point DFT using radix-2 DIF-FFT.

MODULE IV

Realization of IIR and FIR systems: Block Diagram representation of LTI systems - Realization of IIR systems - Direct form I, Direct form II, Cascade representation and Parallel representation. Realization of FIR systems - Direct form representation and Cascade representation.

Filters: Comparison between Analog and Digital filters – Design of analog butterworth Low Pass Filters - comparison between FIR and IIR filters - IIR Filter Design by Impulse Invariance, Bilinear Transformation .

Text book:

1. Digital signal processing – A. Nagoor kani ,RBA publications. (*Refer chapter 1,2 ,3 and 4*)

References:

1. Digital Signal Processing - P.Ramesh Babu ,Scitech Publications
2. Digital signal processing – Salivahan,vallavaraj and gnanapriya ,TMH Publications.
3. Digital signal processing – Anand kumar ,PHI Publications.
4. Digital Signal Processing – Rabiner & Gold,
5. Digital Signal Processing – Oppenheim & Ronald W Schafer, PHI

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each spanning the entire syllabus and the candidate has to answer all. Part B contains 12 short answer questions of 2 marks each spanning the entire syllabus and the candidate has to answer 8. Part C contains 9 short essays/problems of 4 marks each spanning the entire syllabus and the candidate has to answer 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer 2.

EX1542: DIGITAL COMMUNICATION

MODULE I

Introduction to Digital Communication: Pulse modulation – Processes of Sampling (brief explanation only), *Nyquist Rate*, Aliasing; Pulse Amplitude Modulation (PAM): Generation of PAM (Flat top sampling). Pulse Width Modulation, Pulse Position Modulation.

MODULE II

Pulse Code Modulation (PCM): Block diagram, Block diagram of PCM generator and receiver.

Differential Pulse Code Modulation (DPCM) Schemes: Block diagram and working of DPCM; Block diagram and working of Delta Modulation.

MODULE III

Multiplexing Techniques: TDM and FDM (explanation and block diagram only).

Digital Transmission schemes: Introduction - ASK, FSK and PSK (waveform only), QPSK (transmitter and receiver).

Jamming in communication systems: Concept of jamming, avoidance of jamming.

MODULE IV

Spread Spectrum Techniques: Principle of spread spectrum modulation, Pseudorandom Noise Sequence, generation of PN sequence, Direct sequence Spread Spectrum, Block diagram of DSSS transmitter and receiver; Frequency Hopping Spread Spectrum, Block diagram of FHSS transmitter and receiver; Advantages of spread spectrum modulation.

Text books

1. Simon Haykin, Communication systems, 4/e, John-Wiley & sons.
2. Bernard Sklar, Digital Communication, 2/e, Pearson Education, 2001.

References

1. Harold Kolimbris, Digital Communication Systems, 1/e, Pearson Education, 2000.
2. Sam Shanmugham, Digital and Analog Communication systems, Wiley India.
3. Leon W.Couch II, Digital and Analog Communication Systems, 6/e, Pearson Education.
4. John G. Proakis, Masoud Salehi, Communication Systems Engineering, 3/e, Pearson Education.

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each spanning the entire syllabus and the candidate has to answer all. Part B contains 12 short answer questions of 2 marks each spanning the entire syllabus and the candidate has to answer 8. Part C contains 9 short essays/problems of 4 marks each spanning the entire syllabus and the candidate has to answer 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer 2.

EX1543: COMPUTER NETWORKS

MODULE I

Concepts of Packet Switching, Circuit Switching, Protocol. Protocol Layering- Application layer, Transport Layer, Link Layer, Physical layer, OSI Model. Transport layer -Multiplexing and De multiplexing, Connectionless transport: UDP-UDP segment structure, Connection oriented transport: TCP-TCP Segment structure. Principles of congestion Control-Causes of congestion, TCP Congestion Control.

MODULE II

Network Layer- IPv4 addressing, IPv6 addressing, Forwarding and Routing-Routing Algorithms-Distance Vector Routing (Concepts only), Link State Routing (Concepts only), Hierarchical Routing (Concepts Only), Intra Autonomous System Routing- OSFP, Inter Autonomous System Routing- BGP. Concepts of Broadcast and Multicast routing.

MODULE III

Data link Layer- Error detection and correction techniques-Parity checks, cyclic redundancy check, Checksum method. Link layer addressing-MAC addresses, Address Resolution Protocol. Ethernet- Frame structure, Concepts of Ethernet Technologies, CSMA/CD.

MODULE IV

Physical layer: Cables for Networking Coaxial cables, UTP, Fiber Optic cables. Wireless networks-CDMA, WiFi- 802.11 Wireless LAN, Architecture. Concepts of Bluetooth and ZigBee. Concepts of 4G-LTE, VoIP. Importance of Network Security.

Text Books

1. *J F Kurose, Computer Network A Top down Approach Featuring the Internet - 3/e, Pearson.*
2. *Peterson, Larry and Davie, Bruce S, Computer Network - A System Approach, 4/e, Elsevier India*

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each, spanning the entire syllabus and the candidate has to answer all questions. Part B contains 12 short answer questions of 2 marks each, spanning the entire syllabus and the candidate has to answer any 8. Part C contains 9 short essays/problems of 4 marks each, spanning the entire syllabus and the candidate has to answer any 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer any 2.

EX1544: MINI PROJECT

Each student should conceive, design, develop and realize an electronic product. The basic elements of product design - the function ergonomics and aesthetics - should be considered while conceiving and designing the product. The electronic part of the product should be an application of the analog & digital systems covered so far. The realization of the product should include design and fabrication of PCB. Study of PCB design (single sided and double sided) may use any available software. The student should submit the report at the end of the semester. The product should be demonstrated at the time of examination.

Continuous Evaluation: 20 marks

- | | | |
|----|--------------|---|
| 1. | Attendance | 5 |
| 2. | Presentation | 5 |

3.	Performance	5
4.	Report	5

End Semester Examination: 80 marks

1	Novelty	10
2	Presentation	15
3	Demonstration and Result	20
3	Report	20
4	Viva voce	15

Students shall submit the duly certified record.

EX 1545: COMMUNICATION LAB

1. Study of AM generator using AD534 or AD633 multiplier Integrated circuit - Double side band suppressed carrier and double side band double side band full carrier – plot the waveforms of modulating signal, carrier wave and modulated signal – calculate modulation index.
2. Study of Frequency Modulator using IC555 – design - draw the waveforms of the baseband signal, carrier wave, and modulated signal – calculate frequency deviation.
3. Realization of Pulse Amplitude Modulator and Demodulator using CD4016 Integrated circuit - Natural PAM – design - draw the waveforms of the baseband signal, sampling pulse wave, and modulated signal – verify Nyquist rate condition and aliasing condition
4. Realization of Pre-emphasis and De-emphasis using passive components – design – plot characteristics curve.
5. Study of Mixer Circuit – design a frequency converter circuit to produce an output of 455 KHz using discrete components from two input waveforms - measure output frequency
6. Realization of delta modulator circuit using Integrated circuits - design – plot waveforms
 7. Study of BASK Modulator using Integrated circuits (4016, 7404) – design – draw the inputs and output waveforms.
 8. Study of Frequency multiplier using CD4046 Integrated circuit – design – plot the waveforms at the input and output.
9. Study of BFSK Modulator circuit – design – plot the waveforms at the inputs and output.
 10. Study of BPSK Modulator (using 4016, 741 and 7404), – design – plot the waveforms of input and output.

Continuous Evaluation: 20 marks

1.	Attendance	5
2.	Performance	5
3.	Test	5
4.	Fair Record	5

End Semester Examination: 80 marks

1	Circuit and design	20
2	Assembly and troubleshooting	15
3	Result	30
4	Viva voce	15

The examination is to be conducted covering experiments given above. Students shall submit the duly certified record.

EX1551.1: ENTERTAINMENT ELECTRONICS TECHNOLOGY

MODULE 1

Recording and reproduction principles - Optical recording on compact disc, play back process, Advantage of compact disc. Hi-Fi Stereo reproducing system-Pre amplifiers, recording amplifiers. Microphones: construction, working principles and applications of Carbon, Moving coil and Crystal microphones. Headphones: Principle of operation of crystal and dynamic headphones.

MODULE II

Loud Speakers: construction, working principles and applications of crystal, condenser and dynamic loudspeakers. Tweeters and Woofers. Acoustics: reflection and absorption of sound, reverberation, acoustic design of auditorium. Principle of video recording on magnetic tapes, block diagram of VCR, VHS tape transport mechanism.

MODULE III

Public address system - Block diagram, need and use, Requirements of Public Addressing system for public meeting in a park and for an auditorium. Television: Television standards, frequency bands, Scanning, interlacing and synchronization, bandwidth, block diagram of monochrome transmitter and receiver, color concepts, concepts of luminance, Hue and Saturation, Color TV (PAL Systems). Cable TV concepts, Closed Circuit Television.

MODULE IV

Principle of operation of digital clocks, electronic calculator, microwave ovens, cellular phones, washing machines, air conditioners, ATMs and set-top-boxes.

Text Book

1. S P Bali, Consumer Electronics, Pearson.

References

1. Ajay Sharma, Audio video and TV Engineering-Consumer Electronics, Dhanpat Rai and co.
2. R.G. Gupta, Audio and Video systems, Tata Mc Graw Hill Publishing Co.Ltd.
3. R. Gulati, Monochrome and Color Television, New Age International (P) Ltd, New Delhi.

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each spanning the entire syllabus and the candidate has to answer all. Part B contains 12 short answer questions of 2 marks each spanning the entire syllabus and the candidate has to answer 8. Part C contains 9 short essays/problems of 4 marks each spanning the entire syllabus and the candidate has to answer 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer 2.

EX1551.2: INTRODUCTION TO MOBILE COMMUNICATION

MODULE I

Introduction to wireless networks, examples of wireless communication systems, examples of mobile radio systems - paging systems, cordless telephone systems, cellular telephone systems, differences between wireless and fixed telephone networks, evolution of mobile radio communications.

MODULE II

Radio Transmission techniques- Simplex, Half duplex, Full duplex, Frequency division duplexing, Time division duplexing techniques. Cellular Concept. Operational Channels- Forward voice channel, Reverse voice channel, Forward control channel, Reverse control channel.

MODULE III

A basic cellular system, Concept of Frequency Reuse & Handoff, Capacity of cellular systems, Methods to improve Coverage and Capacity in Cellular Systems, Cell Splitting- permanent and dynamic, Sectoring, repeaters for range extension, micro cell zone concept.

MODULE IV

How a mobile call is actually made. Traffic routing in wireless networks- concepts of circuit switching and packet switching. Global System for Mobile (GSM), GSM services and features, GSM system architecture.

Text books

1. T. S. Rappaport, Wireless Communications: Principles and Practice, 2/e, Pearson.
2. William C.Y. Lee, Mobile Cellular Telecommunications, Analog and Digital Systems, MGH.

References

2. Jochen Schiller Mobile Communications, 7/e, Pearson Education, 2003.

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each spanning the entire syllabus and the candidate has to answer all. Part B contains 12 short answer questions of 2 marks each spanning the entire syllabus and the candidate has to answer 8. Part C contains 9 short essays/problems of 4 marks each spanning the entire syllabus and the candidate has to answer 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer 2.

EX 1641: OPTICAL COMMUNICATION

MODULE I

Advantages of optical Communication-Recollection of basic principles of optics transmitting light on a fiber, light propagation in fibers and characteristics, Critical angle - Total internal reflection. Classification of Fibers: Single mode and multimode Fibers, Step index and Graded index Fibers –Refractive Index profile
- Effect of index profile on propagation - Acceptance angle - acceptance cone – Numerical aperture - Mode field diameter, Cut off wavelength

MODULE II

Signal degradation in optical fibers: Attenuation in single mode and multimode fibers – Absorption loss, scattering loss, Bending loss - Dispersion – Material dispersion, Waveguide dispersion, modal dispersion, Polarization mode dispersion - Band Width limitation.

MODULE III

Optic fiber couplers: types of couplers – Fiber to fiber joints: Splicing techniques- Fusion splice, V groove splice, Elastic tube splice - Optical fiber connectors -Structure of a connector Optical Communication System, point to point transmission systems, modulation, transmission system limits and characteristics, optical systems engineering,

MODULE IV

Optical sources and detectors: light production, LEDs, characteristics, lasers, DFB lasers, tunable DBR lasers, photoconductors, photodiodes, and phototransistors, Optical receiver - Optical amplifiers- SOAs – EDFAs

Text Books

1. G. Keiser, Optical Fiber Communications, 3/e, MGH 2000
2. John M senior, Optic Fibre Communication, PHI.

References:

1. J.R. Dutton, Understanding Optical Communications, Prentice Hall, 1999.
2. D K Myabaev & L L Scheiner, Fiber Optics Communications Technology, Pearson Education, 2001.
3. G.P. Agrawal, Fiber Optic Communication, John Wiley & Sons.
4. J H Franz & V.K Jain, Optical Communication, Narosa Publishing House, 2001.
5. Subir Kumar Sarkar, Optical Fibre and Fibre Optic Communication, S Chand & Co. Ltd.
6. Djafer K Mynbaev, Fibre Optic Communication technology, Pearson Education.

EX 1642: BIOMEDICAL ENGINEERING

MODULE I

Human Physiological Systems

Introduction, Cells and their structure, the human cell, cell as a bioelectric generator, transport of ions through the cell membrane, the excitable cell, resting and action potential, propagation of action potentials.

Bio Potential Electrodes and Transducers

Design criteria of medical instruments, components of the bio-medical instrument system, electrode theory, biopotential electrodes, microelectrodes, body surface electrodes, depth and needle electrodes, surface electrodes (basic theory only).

MODULE II

Bio Potential Recorders: Characteristics of a recording system, writer and pen damping effects, The ECG Amplifier, basic characteristics of ECG recorder, Electrocardiography, Lead systems for recording ECG, brief introduction to Electroencephalography; Electromyography (basic theory only).

Operation Theatre Equipment: Introduction, Pacemakers and their pacing modes, ventilators, defibrillators, diathermy- short wave, microwave and ultrasonic types, therapeutic effect of heat.

MODULE III

Radiodiagnosis and Imaging Systems: Principles of medical imaging, X-ray, CT Scan, Ultrasound, MRI, brief introduction to thermography and thermal imaging (basic theory only).

MODULE IV

Safety Instrumentation: Introduction to electrical safety, Radiation safety instrumentation, Physiological effects due to 50Hz current passage, Micro current and Macro current shocks and their hazards, devices to protect against electrical hazards (basic theory only).

Text Books

1. L. Cromwell, F. J. Weibell, and L. A. Pfeiffer, *Biomedical Instrumentation and Measurements*, Pearson Education, Delhi, 1990
2. J. J. Carr and J. M. Brown, *Introduction to Biomedical Equipment Technology*, 4th ed., Pearson Education, Delhi, 2001
3. Arumugam, M, *Biomedical Instrumentation*, Anuradha Agencies, Chennai, 2009

Reference Books

1. J. G. Webster, *Medical Instrumentation Application and Design*, 3rd ed., John Wiley & Sons, N.Y., 1998
2. R. S. Khandpur, *Handbook of Biomedical Instrumentation*, 2nd ed., Tata McGraw Hill, New Delhi
3. Aggrawal, A, *Modern Diagnostics*, National Book Trust, India, 2001

EX1643: NANOELECTRONICS

MODULE I

Introduction nanoelectronics, Impacts, Limitations of conventional microelectronics. Introduction to methods of fabrication of nanomaterials- grinding with iron balls, sol gel, fabrication of nano-layers - PVD, CVD, laser ablation, Ion Implantation.

MODULE II

Introduction to characterization tools of nano materials- -principle of operation of STM, AFM, SEM, TEM, XRD, PL, IR, Raman & UV instruments.

MODULE III

Nano Materials-carbon nano materials, nano tubes and nano wires, types of nano tubes and nano wires, production of nano tubes and nano wires, properties and applications of nano tubes and nano wires, Graphene, Quantum wells, wires and dots(Qualitative)

MODULE IV

Semiconductor Nanodevices: Single Electron devices- Nano scale MOSFET – Resonant Tunneling Transistor – Single Electron Transistors - Nanorobotics and Nanomanipulation - Mechanical Molecular Nanodevices – MEMS-NEMS

Text Books

1. B Premlet, Nanoelectronics, Phasor books

References

1. J.M. Martinez-Duart, R J Martin Palma & F Agulle Rueda, Nanotechnology for Microelectronics and Optoelectronics, Elsevier, 2006.
2. T Pradeep, NANO: The Essentials-Understanding Nanoscience and Nanotechnology” McGraw-Hill.
3. Poole, Introduction to Nanotechnology, John Wiley,2006.
4. K.P.Jain, “Physics of semiconductor Nanostructures”, Narosa Publishers, 1997

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each spanning the entire syllabus and the candidate has to answer all. Part B contains 12 short answer questions of 2 marks each spanning the entire syllabus and the candidate has to answer 8. Part C contains 9 short essays/problems of 4 marks each spanning the entire syllabus and the candidate has to answer 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer 2.

EX1644: SIMULATION LAB

PART I - SPICE Based:

Models of resistor, capacitor, inductor, energy sources (VCVS, CCVS, Sinusoidal source, pulse, etc), transformer, Models of DIODE, BJT, FET, MOSFET, etc. sub circuits. Simulation of following circuits with BJT using spice (Schematic entry of circuits using standard packages. Analysis- transient, AC, DC)

1. Rectifiers
2. Integrator & Differentiator
3. Diode Characteristics.
4. BJT Characteristics.
5. FET Characteristics.
6. RC Coupled amplifiers - Transient Analysis and Frequency response.
7. Astable Multivibrator
8. Zener regulator
9. Clipping & Clamping
10. Schmitt Trigger

PART II - MATLAB Based:

Introduction to Matlab, Study of Matlab Functions and Simulation using Simulink.

1. Writing simple programs using Matlab for handling arrays, files, plotting of functions etc.
2. Writing M files for Creation of analog & discrete signals, plotting of signals etc.
3. Filtering of analog & digital signals using convolution
4. Generation of noise signals (Gaussian, Rrandom, Poisson etc)
5. Design of analog low pass, band pass, high pass and band elimination filters using Butterworth approximation.
6. Design of analog low pass, band pass, high pass and band elimination filters using Chebyshev approximation.
7. Bode plot of transfer functions

Continuous Evaluation: 20 marks

1.	Attendance	5
2.	Performance	5
3.	Test	5
4.	Fair Record	5

End Semester Examination: 80 marks

1	Programme	20
3	Compilation and Troubleshooting	15
3	Result	30
4	Viva voce	15

The examination is to be conducted covering experiments given above. Students shall submit the duly certified record.

EX1651.1: INTERNET OF THINGS AND APPLICATIONS

Module I

Introduction, IoT Architecture. Internet principles-Overview of internet communication, IP address-static and dynamic, DNS, MAC address, NAT , IPv6.Application layer protocols-HTTP, Transport services: TCP, UDP, socket programming. Network layer- forwarding & routing algorithms -Link, Distance Vector, routers.

Module II

Local Area Networks, link protocols -point-to-point protocols, Ethernet, WiFi 802.11, Cellular Internet access, IoT Standards. Applied Internet of Things-Introduction, Sensor to Gateway Communication, Sensors, Gateway hardware. Characteristics and challenges of Internet of Vehicles(IoV).Typical IoT applications.

Module III

Sensors, Actuators, and Smart Objects, Sensor Networks, Interoperability in IoT, Architecture of Arduino UNO, Introduction to Arduino Programming: Integration of Sensors and Actuators with Arduino, Case study: Aurdino based IoT application -Home automation

Module IV

Introduction to Python language – Functions, Parameters and arguments Boolean expressions,logical operators,Control statements,Strings,List,Tuples and Dictionaries,Files, Introduction to objects, Introduction to Object-oriented programming – Basic principles of Object- oriented programming in Python – Class definition, Inheritance, Polymorphism, Operator overloading.

Text:

1. Designing the Internet of Things -- Adrian McEwen, Hakim Cassimally,(Wiley)

References

2. Internet of Things Principles and Paradigms -Rajkumar Buyya ,Amir Vahid Dastjerdi, MK
3. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
4. Internet of Things: A Hands-on Approach, by Arshdeep Bahga and Vijay Madiseti (Universities Press)
5. Internet of things with Audrino blue prints, Pradeeka Seneviratne , pckt publishing -open source
6. David Hanes, “ IoT Fundamentals: Networking Technologies, Protocols and Use Cases for the Internet of Things”, Cisco Press, Pearson, 2017.
7. Learning Python -- Mark Lutz, O’Reilly.
8. Programming in Python 3, A Complete Introduction to the Python Language-- Mark Summerfield Second Edition.

EX1651.2: MICROWAVE ENGINEERING

MODULE I

Introduction to Microwaves: Microwave region and band designation, advantages and applications.

Transmission lines: Introduction, Two wire parallel transmission lines, voltage and current relationships on a transmission line, characteristic impedance, reflection coefficient, input impedance, standing waves, VSWR, impedance at a voltage minimum and at a voltage maximum, losses due to mismatch in transmission lines, impedance matching.

MODULE II

Wave guides, comparison with transmission lines, Types of waveguides, propagation of waves in rectangular waveguides, propagation of TEM modes, TE and TM modes, cutoff frequency of a waveguide, guide wavelength, group velocity, phase velocity. Waveguide couplings, Bends and Corners, Taper and Twists, T junctions, Magic Tees, Directional Couplers, Isolators, Circulators.

MODULE III

Microwave Tubes: Two cavity Klystron -operation-performance characteristics, applications (mathematical analysis not required), Reflex klystron- construction-operation-operating characteristics (mathematical analysis not required). Magnetrons- cavity magnetron-operation (mathematical analysis not required)- performance characteristics- applications.

MODULE IV

Transferred electron devices. Gunn diode-operation performance characteristics-applications, Varactor diodes- construction-figure of merit- applications. PIN diode-operation, applications. Constructional features and operational characteristics of IMPATT diode.

Text Books

Microwave and Radar Engineering, Dr. M. Kulkarni, 5th Edition, Umesh Publications, Delhi

References

1. Samuel Y. Liao, Microwave Devices and Circuits, 3/e, Pearson Education.
2. Anoop singh & Seema Verma, Fundamentals of Microwave Engineering: Principles, Waveguides, Microwave Amplifiers and Applications, PHI.
3. David M Pozar, Microwave Engineering, 3/e, Wiley India

Structure of the question paper

Question paper shall consist of four parts. Part A contains 10 questions of 1 mark each spanning the entire syllabus and the candidate has to answer all. Part B contains 12 short answer questions of 2 marks each spanning the entire syllabus and the candidate has to answer 8. Part C contains 9 short essays/problems of 4 marks each spanning the entire syllabus and the candidate has to answer 6. Part D contains 4 long answer questions of 15 marks each, one from each module, of which the candidate has to answer 2.

EX 1645: PROJECT

The objective of the project is to estimate the ability of the student in transforming the theoretical knowledge acquired so far and the practical training received through internship program into the design of a working model in allied areas of electronics. In this practical course, each group consisting of a maximum of four students is expected to design a project coming under allied areas of electronics and with practical applications. The basic concepts of product design may be taken into consideration while designing the project. Literature survey is to be carried out as part of project finalization/design. The project may be implemented using software, hardware, or a combination of both. The project work may be undertaken in Electronics/Communication/ Computer science or any allied area and **should be done within the Institution**. Students should execute the project work using the facilities of the institute. The student is expected to complete the project work assigned to him/her and submit the project report by the end of semester. This report shall be of a hard bound type.

Continuous Evaluation: 20 marks

1.	Attendance	5
2.	Presentation	5
3.	Performance	5
4.	Report	5

End Semester Examination: 80 marks

1	Novelty	10
2	Presentation	15
3	Demonstration and Result	20
3	Report	20
4	Viva voce	15

Students shall submit the duly certified report.