UNIVERSITY OF KERALA

CAREER RELATED FIRST DEGREE PROGRAM UNDER

CHOICE BASED CREDIT AND SEMESTER (CBCS) SYSTEM

Group 2 (b)
ELECTRONICS

COURSE STRUCTURE AND SYLLABUS
(2015 admissions onwards)
# I. GENERAL STRUCTURE FOR THE CAREER RELATED FIRST DEGREE PROGRAMME IN ELECTRONICS

## Semester 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Marks for CE</th>
<th>Marks for ESE</th>
<th>Instructional Hrs/week</th>
<th>End Semester Exam.Hrs</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language Course</td>
<td>EN1111</td>
<td>English I Listening and Speaking Skills</td>
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<td>MM1121.8</td>
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<td>Core Courses</td>
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<tr>
<td></td>
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<td>Basic Electrical and Electronics Engg.</td>
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<td>80</td>
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</tr>
<tr>
<td></td>
<td>EX1143</td>
<td>Electrical &amp; Electronics workshop</td>
<td>20</td>
<td>80</td>
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<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>EX1144</td>
<td>Programming Lab</td>
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<td>80</td>
<td>0</td>
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<td>3</td>
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<tr>
<td>Complementary Course</td>
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<td>Programming in C</td>
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## Semester II

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<th>Credits</th>
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<tr>
<td>Language Course</td>
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<td>English II Writing and Presentation Skills</td>
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<td>80</td>
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<td>4</td>
<td>3</td>
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<td></td>
<td>EX1244</td>
<td>Digital Electronics Lab</td>
<td>20</td>
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### Semester III

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<td>EX 1342</td>
<td>Communication Engineering</td>
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<tr>
<td></td>
<td>EX 1343</td>
<td>Microprocessor and Interfacing</td>
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<td>EX 1344</td>
<td>Electronics Circuits Lab</td>
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<td>EX1345</td>
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<th>Credits</th>
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<td>EX 1543</td>
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<td>EX 1545</td>
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### Semester VI

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<th>Credits</th>
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</thead>
<tbody>
<tr>
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<td>80</td>
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<td>9</td>
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<td>20</td>
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### II LIST OF ELECTIVES

**Elective I**

EX1451.1: Industrial Electronics

EX1451.2: Programming in Java

EX1451.3: Principles of Management

EX1451.4: Microcontrollers and Embedded Systems
Open Course (Elective II)

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

Elective III

EX1651.1: Computer Communication
EX1651.2: Microwave Engineering
EX1651.3: Cyber Laws & Human Rights

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Marks</th>
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<td>Attendance</td>
<td>5</td>
</tr>
<tr>
<td>Assignment</td>
<td>5</td>
</tr>
<tr>
<td>Class tests</td>
<td>10 (minimum two tests)</td>
</tr>
</tbody>
</table>

*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

<table>
<thead>
<tr>
<th>Component</th>
<th>Marks</th>
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</thead>
<tbody>
<tr>
<td>Attendance</td>
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</tr>
<tr>
<td>Performance</td>
<td>5</td>
</tr>
<tr>
<td>Laboratory record</td>
<td>5</td>
</tr>
<tr>
<td>Test</td>
<td>5</td>
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</table>

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 and Project**

<table>
<thead>
<tr>
<th>Component</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
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</tr>
<tr>
<td>Performance</td>
<td>5</td>
</tr>
<tr>
<td>Presentation</td>
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<tr>
<td>Report</td>
<td>5</td>
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(d) **Seminar**

<table>
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<th>Marks</th>
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</thead>
<tbody>
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<tr>
<td>Presentation</td>
<td>10</td>
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<tr>
<td>Report</td>
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</table>

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

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<th>Grade</th>
<th>Marks</th>
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<tr>
<td>≥ 90%</td>
<td>100%</td>
</tr>
<tr>
<td>&lt; 90% but ≥ 80%</td>
<td>80%</td>
</tr>
<tr>
<td>&lt; 80% but ≥ 70%</td>
<td>60%</td>
</tr>
<tr>
<td>&lt; 70% but ≥ 60%</td>
<td>40%</td>
</tr>
<tr>
<td>&lt; 60%</td>
<td>20%</td>
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</table>

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:

<table>
<thead>
<tr>
<th>Component</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit, Design</td>
<td>20</td>
</tr>
<tr>
<td>Setting up circuit and trouble shooting</td>
<td>15</td>
</tr>
<tr>
<td>Result: waveform, tabulation etc</td>
<td>30</td>
</tr>
<tr>
<td>Viva Voce</td>
<td>15</td>
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</table>

For Software labs, the criterion shall be as follows:

<table>
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<tr>
<th>Component</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow chart/Algorithm</td>
<td>10</td>
</tr>
<tr>
<td>Programme</td>
<td>20</td>
</tr>
<tr>
<td>Compilation, trouble shooting</td>
<td>10</td>
</tr>
<tr>
<td>Result</td>
<td>25</td>
</tr>
<tr>
<td>Viva Voce</td>
<td>15</td>
</tr>
</tbody>
</table>

(c) **Mini Project and Project**

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Marks</th>
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<tbody>
<tr>
<td>Novelty</td>
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<tr>
<td>Demonstration-cum-Result</td>
<td>20</td>
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<tr>
<td>Presentation</td>
<td>15</td>
</tr>
<tr>
<td>Viva Voce</td>
<td>15</td>
</tr>
<tr>
<td>Report</td>
<td>20</td>
</tr>
</tbody>
</table>

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.

(d) **Seminar**

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

<table>
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<td>Presentation</td>
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<tr>
<td>Viva Voce</td>
<td>15</td>
</tr>
<tr>
<td>Report</td>
<td>25</td>
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</table>
The evaluation of the seminar 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


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


MM 1121.8: MATHEMATICS - I

MODULE I


MODULE II


MODULE III

Partial Differentiation: Partial derivatives of first and higher order-Euler’s theorem-chain rule. Fourier series: Dirichlet’s conditions-Euler’s formula-functions with periods $2\pi$ and Half range series. Partial Differential equations: Solution of wave equation and one dimensional heat equation and Laplace’s equation.

References


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, spanning the entire syllabus, of which the candidate has to answer 2.

EX1141: ENVIRONMENTAL STUDIES

MODULE 1 (Book 1)

Unit 1 Multidisciplinary nature of environmental studies

Definition, scope and importance
Unit 2 Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

Unit 3 Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem and Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

MODULE II (Book 1)

Unit 1 Biodiversity and its conservation: Introduction – Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation, Hot-sports of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit 2 Environmental Pollution: Definition, Cause, effects and control measures of a) Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

MODULE III (Book 1)


MODULE IV (Chapter 3, Book 2)


Books

References

EX1142: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

MODULE I


MODULE II

Three phase systems: Generation of three phase voltages- advantages of three phase systems, star and delta connection, relation between line and phase voltages, line and phase currents.

Transformers: construction of single phase and three phase transformers (core type only) – EMF equation, losses and efficiency. DC Machines: DC Generator and DC motor – types - characteristics, applications. AC Machines: Three phase induction motor- construction and principle of operation.

MODULE III (Qualitative treatment only)

Diodes: PN junction diodes, principle of doping, formation of barrier potential, forward and reverse biasing, V-I characteristics. Working of Zener diode. Bipolar Junction Transistors: NPN transistor, typical doping, working, concepts of CB, CE & CC configurations, current gain of each, input & output characteristics of CE configuration. Rectifiers & power supplies: Block diagram, circuit diagram & working of half wave & full wave (including bridge) rectifiers. Amplifiers: Circuit diagram & working of CE amplifier, function of each component.

MODULE IV (Qualitative treatment only)

Radio communication: principle of AM & FM, wave-forms, bandwidths, block diagrams of AM & FM transmitter, block diagram of AM & FM super heterodyne receiver. Satellite communication: concept of geo-stationary satellite, frequency bands used, block diagram of earth
station transmitter & receiver. Optical communication: block diagram of the optical communication system, principle of light transmission through fiber, advantages of optical communication.

Text Books

References

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.

EX1143: ELECTRICAL & ELECTRONICS WORKSHOP

PART I (ELECTRICAL)
1. Study of electrical wiring systems, safety, symbols, tools, accessories, wires and cables: This topic covers the safety measures and protection against electric shocks, first aid, tools used for electrical wiring, electrical accessories, wires and cables and standard symbols.
2. Simple wiring circuits: This topic covers Series and Parallel circuits using SPST switches with plug point in PVC conduit system, PVC casing system. a. Circuits for light, fan and call bell control b. Circuit with SPDT switches – Staircase wiring c. Circuit with fluorescent tube light d. Distribution board wiring with ELCB, MCB, isolator (with two sub circuits)
3. Testing of circuits: This topic covers the testing of phase and neutral with Earth using Test lamp

PART II (ELECTRONICS)
1. Study of meters (Multimeter - Digital and Analog): This topic covers the use of multimeter to check voltage, current and also to check various electronic components.
2. Study of CRO: This topic covers the procedure to check the frequency and amplitude of a signal waveform.
3. Study of electronic components: This topic covers the familiarization of some basic electronic components and circuit symbols (Resistors, Capacitors Diodes, transistors, IC’s etc.) and identification of component values using colour codes.
5. Assembling of simple electronic circuits: This topic covers the use of soldering of the following circuits a. Half wave rectifier circuit b. Full wave rectifier circuit c. Simple LED flashing circuit using Transistors ICs

**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  
4. Result 15  
5. Viva voce 15

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

**EX1144: PROGRAMMING LAB**

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

1. Program to calculate simple and compound interest.  
2. Solution of a Quadratic Equation.  
3. Program for Pay bill calculation.  
4. Program to compute sum of series using while loop.  
5. Printing of multiplication table using do…while loop.  
6. Program to find whether the given number is a positive number, negative number or zero.  
7. Program to sort a list of numbers  
8. Program to sort the strings.  
9. Program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.  
10. Preparation of the rank list of a class of students.  
11. Program to implement Matrix addition & multiplication.  
12. Program to implement Fibonacci series.  
13. Program to find factorial of given N numbers without recursion.  
14. Program to find factorial of given N numbers with recursion.  
15. Program to tabulate a survey data.  
16. Program to count number of characters, words & lines in a text.  
17. Program to develop a pattern (eg.: pyramid, square)  
18. Write a function to swap the values of two variables to illustrate the concept of pass by reference.
19. Write a program to add five numbers by getting the values through command line argument.
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.

**EX1131: 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**


**MODULE IV**

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-Data files-opening and closing a data file, creating a data file.
Text Book
1. Balaguruswami, Programming with C, TMH.
2. Byron Gottfried, Programming with C, Schaum’s Outline Series, TMH.

References
1. Mahapatra, Thinking in C, PHI.
2. Brian W Kernighan and Dennis M Ritchie, The C Programming language, 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.

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


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.

References

MM1221.8: MATHEMATICS-II

MODULE I


MODULE II

Graph Theory and special functions: Graph theory terminology, paths and circuits, representation of graphs, path matrix, adjacency matrix, Euler paths and circuits – Hamilton paths and circuits – spanning trees – minimum spanning trees. Special functions – Beta, Gamma, Bessel, Legendare, Hermite, Lengurie function and polynomials.

MODULE III

Complex Analysis: Differentiation of functions of complex variables – Analytic function – Cauchy – Riemann equations – Harmonic functions – orthogonal system – complex potential– onformal mapping – Mapping – Mapping by w=$\frac{1}{z}$, w = $z^2$, w = $e^z$, w = $\sin z$, w = $\cos z$, w = $z$ + $\frac{1}{z}$. Bilinear transformation.

References
1. Hof fman & Kurne , Linear Algibra, PHI.
2. Narasingh Deo, Graph Theory, 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, spanning the entire syllabus, of which the candidate has to answer 2.

EX1241: SOLID STATE ELECTRONICS

MODULE I


MODULE II

PN junction: Theory of PN junction, band structure, contact potential, current components in a p-n diode, voltage-current characteristics, junction capacitance, diode switching times, breakdown mechanisms, Photovoltaic effect. Types of diodes: rectifier, switching, zener, varactor, tunnel, schottky and Light Emitting diodes, Solar cell.

MODULE III

Bipolar Junction Transistor: Junction transistor, transistor current components, coupled diode model, current transfer ratio, Ebers-Moll equation, CB, CE, CC configuration, switching characteristics, small signal model. Field Effect Transistor: Operation of JFET, Pinch off voltage, volt-ampere characteristics, small signal model.

MODULE IV

MOSFET: enhanced and depletion MOSFET characteristics, MOS capacitor, CMOS. Switching devices: UJT, SCR, DIAC, TRIAC – operation, structure and VI characteristics.

Text Book

References

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


MODULE II


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, properties of driving point and transfer functions, 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. Attenuators – different types: T, p and lattice type (Basic study). Resonance: Series resonance, bandwidth, Q factor and Selectivity, Parallel resonance.

Text Books


References

1. Van Valkenburg, Network Analysis, PHI, 3/e, 2011

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.
EX1243: BASIC ELECTRONICS LAB

1. Characteristics of silicon and germanium Diodes  
2. Characteristics of Zener diodes  
3. Characteristics of Transistors (CE & CB configuration)  
4. Characteristics of FET  
5. Characteristics of UJT  
6. Characteristics of SCR  
7. Frequency response of RC Low pass and high pass filters  
8. Integrating and Differentiating circuits  
9. Simple Zener Regulator  
10. Realization of logic gates using diodes and transistors  
11. Clipping and clamping circuits.  
12. 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.

EX 1244: DIGITAL ELECTRONICS LAB

1. TTL & CMOS Characteristics  
2. Realization of Combinational Circuits using Gates  
3. Binary to BCD converter.  
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.  
12. Realisation of asynchronous decade up counter using flip flops.
13. Design and implementation of MOD 7 synchronous up counter using flip flops.
15. Implementation of a BCD counter using IC 7490

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.

EX1231: DIGITAL ELECTRONICS

MODULE I


MODULE II

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


MODULE III


MODULE IV

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

References
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.

EX1341: ELECTRONIC CIRCUITS

MODULE I


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

MODULE IV


Text books
1. Boylstad & Nehlasky, Electronic Devices & Circuit Theory, PHI.
2. Gopakumar, Design and Analysis of Electronic Circuits, Phasor books.

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.

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
Overview of communication system, Bandwidth, Modulation, Need for modulation. Amplitude Modulation, AM signals and spectra, Power relations, AM transmitter block diagram. Receivers- Superheterodyne receivers, tracking, sensitivity and gain, image rejection.

MODULE II
Single Sideband Modulation - Principles, Balanced Modulators – SSB Generation – Filter Method. SSB Reception. Angle modulation- FM spectrum, modulation index, phase modulation, comparison of various modulation schemes, angle modulation and demodulation circuits, AFC, amplitude limiters, pre-emphasis and de-emphasis, FM broadcast transmitters and receivers

MODULE III

MODULE IV
Text Books
1. George Kennedy, Communication System, TMH.
2. Dennis Roody & John Coolen, Electronic Communication, 4/e, PHI.

References
3. Taub and Schillings, Principles of Communication Systems, PHI.
5. Wayne Tomasi, Advanced Electronic Communications Systems, 6/e, 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.

EX1343: MICROPROCESSOR & INTERFACING

MODULE I

Introduction to Microcomputer- types, overview of structure. CISC and RISC. 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, interfacing of keyboard, LED display and ADC using 8255. Display and keyboard interfacing with 8279.

MODULE IV

Working of 8259 priority interrupt controller, 8257 DMA controller, 8251 USART and 8253 programmable timer. 8086 – internal architecture and addressing modes.

Text Book
References


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 $\beta$ dependency with another transistor.
2. Biasing Circuit – Voltage Divider – design – measure operating point – draw DC load line – observe the dependency on $\beta$.
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.
7. Sinusoidal oscillator (Wein bridge) – design – measure operating point – measure frequency of oscillation.
9. Multivibrators (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

The following experiments 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. Ascending and Descending order sorting of an array of 8-bit numbers.
6. Largest and smallest number among an array of 8-bit numbers.
7. Conversion of BCD number to binary and binary number to BCD.
8. Exchange of Block of data between memory.
9. Interfacing with stepper motor and seven segment LED display
10. 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 Progrmme 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.

MM 1331.8: MATHEMATICS III

MODULE I

Random variables and Distributions: Random variables, Discrete probability distribution, Binomial, Poison, Hyper geometric distribution, Density function and distribution factor, continuous random variable, Normal, Uniform, Experimental, Beta distributions, students t distribution, Expectation and higher order moments, central limit theorem.

MODULE II

Statistics and Sampling theory: Linear co-relation and regression, Multiple co-relation and multiple regression, sampling theory, population and sample, sampling survey methods. Testing of hypothesis, types of errors, null hypothesis, confidence limits, Large sample tests, testing of
proportion of attributes, confidence limits for unknown mean, test of significance of means of two large samples, use of student’s distribution for small sample tests, significance test of a sample mean, significance test of difference between sample means.

**MODULE III**

Complex Analysis: Integration: Line integrals, simple problems, statement of Cauchy’s integral theorem, integral formula, Formula for higher derivations, evaluation of integrals using the above results, Taylor series and Laurent’s series (NO PROOF), simple problems. Evaluation of definite integrals of the following types:

\[ \int_{0}^{2\pi} f(\sin \theta, \cos \theta) \, d\theta \]

\[ \int_{-\infty}^{+\infty} \left\{ \frac{\sin mx}{f(x)} \right\} \, dx \]

**References**

1. Spiegal, Probability theory and Statistics, Schaum Series, MGH.

**Structure of the question paper**

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**EX1332: COMPUTER ORGANIZATION**

**MODULE I**

Basic structure of computers: Functional units, operational concepts. CPU: data path, microoperations on datapath, control signals. Addressing modes. Execution of instructions, fetch cycle, execution cycle. ALU and bit sliced ALU.

**MODULE II**

Arithmetic Processor as a coprocessor and as an auxiliary processor. Interrupt cycle – interrupt servicing, sources, priorities. Controller design: control transfer, instruction interpretation and execution: Hardwired control unit and microprogrammed control unit.

**MODULE III**

CPU-Memory interaction, semiconductor memory: static memory cell, dynamic memory cell, ROM. Memory Hierarchy: Cache memory and address mapping. Virtual memory: logical and physical address, address translation.

**MODULE IV**

Text Book


References

3. M. Morris Mano, Computer System Architecture, PHI.
4. J.P. Hayes, Computer Organization and Architecture, 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.

EX 1441: APPLIED ELECTROMAGNETIC THEORY

MODULE I


MODULE II


MODULE III


MODULE IV

Text book

1. Joseph A Edminister, Electromagnetics, 2/e, Schaum’s Outline Series.

References

2. William Haytt, Engineering Electromagnetics, 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.

EX1442: LINEAR INTEGRATED CIRCUITS

MODULE I


MODULE II


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

Text Books

References
5. George Clayton & Steve Winder, Operational Amplifiers, Elsevier.

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.

EX1443: 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- V number –Mode field diameter, Cut off wavelength

MODULE II


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- Introduction to optical fiber networks.
Text Books

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

References:

5. Subir Kumar Sarkar, Optical Fibre and Fibre Optic Communication, S Chand & Co. Ltd.
6. Djafer K Mynbaev, Fibre Optic Communication technology, 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.

EX1444: SIGNALS AND SYSTEMS

MODULE I


MODULE II


MODULE III


MODULE IV

Text Books
1. Alan V. Oppenheim and Alan Willsky, Signals and Systems, PHI, 2/e, 2009

References

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.

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.
7. Schmitt trigger using IC 741 - design, output waveform.
8. Timer IC 555 – Astable and Multivibrator - design, output waveform.
10. Fixed voltage Regulators using 78xx and 79xx - 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.
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: COMMUNICATION LAB

1. Amplitude Modulator and Demodulator
2. Frequency Modulator and Demodulator
3. Pulse Modulator and Demodulator
4. Pre-emphasis and De-emphasis
5. Mixer Circuit
6. Delta Modulator and Demodulator
7. ASK Modulator and Demodulator
8. Time division Multiplexing
9. FSK Modulator and Demodulator
10. BPSK Modulator and Demodulator

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.

EX1451.1: INDUSTRIAL ELECTRONICS

MODULE I

Power semiconductor devices: Characteristics of SCR, gate trigger and communication circuits, series and parallel connection of SCRs, Diac, Triac, UJT, Power MOSFETS and IGBT.

MODULE II

Controlled Rectifier Half wave and full wave with resistive and inductive loads, Free-wheeling diode, three phase rectifier. Bridge rectifiers–half controlled and fully controlled.
MODULE III


MODULE IV

Induction Heating, effect of frequencies and power requirements, Dielectric heating and applications. Applications of industrial electronics Switched mode power supply (SMPS), Uninterruptible power supplies, Solid state relays.

Text Books
1. Muhammad H. Rashid, Power Electronics: Circuits, Devices and Applications, Pearson / PHI.
2. Dr. P. S. Bimbhra, Power Electronics, Khanna Publishers.

References
2. S.K. Dutta, Power Electronics and Control, 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.

EX1451.2: PROGRAMMING IN JAVA

MODULE I

Object oriented programming concepts-encapsulation, Inheritance, polymorphism, Introduction to Java programming – java features, java virtual machine, security, java compilers, jdk, java and internet, web browsers, java interaction with web. Declaration of constants, variables and data types, Types of java programs-Application and Applets, Structure of a java program.

MODULE II

Java keywords, identifiers, operators- arithmetic operators, logical operators, relational operators, bitwise operators & conditional operators, operator precedence, data types, Control Statements, selection statements, Iterative statements, jump statements, Loops: while loop, do while loop & for loop, Arrays: one dimensional & multidimensional arrays.

MODULE III

Classes: Declaration, object references, instantiation, method declaration, method calling, this, new, dot operators, constructor: method overloading, constructor overloading, method overriding, inheritance, dynamic method dispatch, final, static & abstract classes, destructors, Interfaces.
MODULE IV


Text Book
1. E. Balaguruswami, Programming with Java: A Primer, 4/e, TMH.

References
1. Bruce Eckel, Thinking in Java, Pearson Education.
2. P Dietel & H Dietel, Java: How to Program, 9/e.

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.

EX1451.3: PRINCIPLES OF MANAGEMENT

MODULE I

Management: Definitions of Management as put forward by Harold Koontz, Henry Fayol, Peter Drucker, F.W.Taylor and E.F.L. Brech; Nature and Characteristics of Management; Scope and Functional areas of Management; Management as a Science, Art, Profession; Management and Administration, Principles of Management; Social Responsibility of Management, Contributions of F W Taylor and Henry Fayol, Emergence of Japan as an Industrial giant, global, social and ethical environment.

MODULE II

Planning: Nature of Planning, Importance and purpose of Planning; Planning Process; Objectives of Planning, Types of Plans; MBO – Features and steps, forecasting techniques, managerial decision making, factors affecting decision making, group decision making, errors in decision making.

MODULE III

Organizing and Staffing: Nature and Purpose of organization, principles of organisation; types of organisation; Organization Chart; Organisation Manual; Departmentation; Committees; Authority; Delegation of Authority; Responsibility and Accountability; Centralisation Vs Decentralisation of authority; Nature and importance of Staffing; human resources management, Process of Selection and Recruitment.

MODULE IV

Directing: Meaning and nature of Directing; Motivation – Meaning and Importance; Theories of Motivation – Maslow’s, Herzberg, Mc Gregor’s Theory of X and Y; Leadership – meaning and styles; Managerial grid by Blake and Mounton; Likert’s four level model; Co-ordination –
meaning and importance, conflict management. Communication, types of communication. Controlling: Meaning and steps in controlling; Essentials of a sound control system; Methods and tools of control, budgetary control, quality control, operational control techniques.

**Text Books**


**Reference**

1. Stephan P Robbins & Mary Coulter, Management, 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.

**EX1451.4: MICROCONTROLLERS AND EMBEDDED SYSTEMS**

**MODULE I**

Introduction to microcontrollers, General architecture of microcontrollers, types of microcontrollers. 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**


**MODULE III**

PIC microcontrollers - introduction, architecture of 16F877 (block diagram explanation only). Introduction and functional diagram of ATMEGA 328. ARM processor fundamentals. Embedded systems- definition and classification and challenges– Overview of Processors and hardware units in an embedded system.

**MODULE IV**

I/O Device- types and examples, Synchronous and Asynchronous Communications from Serial Devices - Examples of Internal Serial-Communication Devices - UART and HDLC - Parallel Port Devices - Sophisticated interfacing features in Devices/Ports- Timer and Counting Devices I/C, USB, CAN. Wireless and Mobile System Protocols – Bluetooth, ZigBee.
Text Books

2. Rajkamal, Embedded Systems Architecture, Programming and Design, TMH.
4. PIC 16F877 Datasheet.
5. Datasheet of ATMEGA 328.
6. ARM Processor Databook.

References

1. Jonathan W Valvano, Introduction to Embedded Microcomputer System, Motorola 6811/6812 Simulator

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.

EX1541: ANTENNA & WAVE PROPAGATION

MODULE I


MODULE II


MODULE III

MODULE IV


Text book
1. G.S.N Raju, Antennas and Wave Propagation, PEARSON.

References
1. John D. Krauss, Antennas for all Applications, 3/e, 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.

EX1542: DIGITAL SIGNAL PROCESSING

MODULE I


MODULE II


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

Text Books

References
4. Salivahan, Vallavaraj & Gnanapriya, Digital Signal Processing, 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.

EX1543: DIGITAL COMMUNICATION

MODULE I

Pulse modulation – Sampling process, Nyquist Rate, Aliasing, PAM: Generation of PAM (Flat top sampling). PPM & PWM – Generation of PPM and PWM. PCM- Block diagram, PCM generator, Block diagram of PCM Receiver, companding in PCM.

MODULE II


MODULE III


MODULE IV


Text books
References

2. Sam Shanmugham, Digital and Analog Communication systems, 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.

EX1544: PRINCIPLES OF MOBILE COMMUNICATION

MODULE I


MODULE II

Evolution of Mobile Radio Communications, Present Day Mobile communication, Fundamental techniques. How a mobile call is Actually made, Cellular Concept. Operational Channels- Forward voice channel, Reverse voice channel, Forward control channel, Reverse control channel, Making a Call, Future Trends. A basic cellular system, Performance criteria, Uniqueness of mobile radio environment- description of mobile radio transmission medium. Model of transmission medium, Mobile fading characteristics, the radius of active scattered region, standing waves expressed in a linear scale and a log scale, first order and second order statistics of fading, delay spread and coherence bandwidth, direct wave path, line of sight path and obstructive path.

MODULE III

Operation of cellular systems, What is a Cell, Channel Assignment Strategies, Fixed Channel Assignment (FCA), Dynamic Channel Assignment (DCA), Maximum number of calls per hour per cell, Maximum no. of frequency channels per cell, concept of frequency Reuse, number of customers in the system, Co channel interference reduction factor, Adjacent channel interference, Handoff mechanism, Cell splitting- Permanent & Dynamic-sectoring.

MODULE IV

Traffic routing in wireless networks- circuit switching, packet switching- Personal communication services /networks, Cellular Packet switched architecture, Network database-distributed database for mobility management, Universal Mobile Telecommunication System, Global System for Mobile(GSM), GSM services and features, GSM system architecture, GSM radio subsystem, GSM channel types, GSM call, Frame structure for GSM, signal processing in GSM.
Text books

References

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.

EX1545: 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
4. Report 20
5. Viva voce 15

Students shall submit the duly certified record.

EX1546: 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, Random, 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
2. 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.

**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

MODULE II


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

References
1. Ajay Sharma, Audio video and TV Engineering-Consumer Electronics, Dhanpat Rai and co.

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, paging systems, cellular telephone systems, how a cellular telephone call is made, differences between wireless and fixed telephone networks, PSTN, limitations in wireless networking, merging wireless networks and PSTNs, first generation, second generation and Third generation networks.

MODULE II

Radio Transmission techniques- Simplex, Half duplex, Full duplex, Frequency division duplexing, Time division duplexing techniques. Mobile Radio Propagation: Free space loss,

**MODULE III**

How a mobile call is actually made, Cellular Concept. Introduction, Frequency reuse, Channel assignment strategies, Handoff strategies, definition of co-channel interference and adjacent channel interference, Cell splitting, Sectoring, Repeaters for Range extension, a Microcell Zone concept. Traffic routing in wireless networks- circuit switching, packet switching.

**MODULE IV**

Global System for Mobile (GSM), GSM services and features, GSM system architecture. *Global mobile satellite systems - Iridium system, global star system. Wireless application protocol* – Architecture. Third generation mobile services - Wireless local loop - Bluetooth technology.

**Text books**


**References**

1. Wayne Tomasi, Electronic Communication, Pearson Education.
4. Andreas F Molisch, Wireless Communications, 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 1641: INSTRUMENTATION SYSTEMS**

**MODULE I**

Introduction, General measurement system, characteristics, definitions ; Transducers, different types of Transducers, Static – Resistive, Strain gauge, Capacitive, Inductive, LVDT (Variable Inductive Transducers) ; Dynamic Transducers - Piezo electric, Temperature, Thermo couple, Thermisters, Photoelectric.

**MODULE II**

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

**MODULE III**

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


Text books
2. H S Kalsi, Electronic Instrumentation, TMH.

References
1. Leslie Chromwell, Bio Medical Instrumentation, PHI.
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. 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.

EX1642: 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: 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.

MODULE II

Bio Potential Recorders: Characteristics of a recording system, Electrocardiography, Basic characteristics of ECG, Block Diagram, Lead systems for recording ECG, augmented unipolar limb leads, chest leads, The ECG Amplifier, Brief introduction to EEG, EEG Waveforms, Introduction to Electromyography, Electroretinograph, Electro oculograph and Electrogastrograph (Basics only). Operation Theatre Equipment: Introduction, Pacemakers and their pacing modes, ventilators, defibrillators, diathermy- short wave, microwave and ultrasonic types, irritation produced due to various diathermic techniques, basic working of anesthesia machine (Block Diagram only).

MODULE III

Radiodiagnosis and Imaging Systems: Principles of Medical Imaging, X-ray, CT Scan, Ultrasound, MRI, Brief introduction to Mammography, Biopsy (basic theory only).
MODULE IV

Safety Instrumentation: Introduction to electrical safety, Physiological effects due to 50Hz current passage, Micro current and Macro current shocks and their hazards, devices to protect against electrical hazards, hospital architecture of a biomedical engineer (basic theory only).

Text Books
1. L. Cromwell, F.J Weibell & L A Pfeiffer, Biomedical Instrumentation and Measurements, Pearson.

References
2. R. S. Khandpur, Handbook of Biomedical Instrumentation, 2nd ed., 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.

EX1643: NANOELECTRONICS

MODULE I


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


Text Books

References

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: SEMINAR

To assess the ability of the student to study and present a seminar on a topic of current relevance in electronics/computer hardware/communication/instrumentation or allied areas. It enables the students to gain knowledge in any of the technically relevant current topics and acquire the confidence in presenting the topic. The student will undertake a detailed study for presentation on the chosen topic under the supervision of a faculty member, by referring papers published in reputed journals and conferences. Each student has to submit a seminar report, based on these papers, and should not be reproduction of any original paper.

Continuous Evaluation: 20 marks
1. Attendance 5
2. Presentation 10
3. Report 5

End Semester Examination: 80 marks
1. Presentation 40
2. Report 25
3. Viva voce 15

Students shall submit the duly certified record.

EX1651.1: COMPUTER COMMUNICATION

MODULE I


MODULE II

Forwarding and routing, Routing Algorithms- Distance Vector Routing, Link State Routing, Hierarchical Routing and Inter Autonomous System Routing (BGP).

MODULE III


MODULE IV


Text Books
2. Larry Peterson and Bruce S Davie, Computer Network- A System Approach, 4/e, Elsevier India.

References

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.

EX1651.2: MICROWAVE ENGINEERING

MODULE I

Introduction to Microwaves: History, 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. Microwave Tubes: Two cavity Klystron-operation-performance characteristics, applications (mathematical analysis not required), Reflex klystron- construction-operation-operating characteristics (mathematical analysis not required).
MODULE III


MODULE IV

Varactor diodes- construction-figure of merit- applications. PIN diode-operation-applications. Microwave Communication – Advantages – analog and digital microwave – FM microwave radio system, Repeaters, Diversity reception, Protection Switching arrangements, FM microwave radio stations, Path characteristics, System gain.

Text Books
1. Samuel Y. Liao, Microwave Devices and Circuits, 3/e, Pearson Education.

References
1. David M Pozar, Microwave Engineering, 3/e, Wiley India
3. Robert E. Collin, Foundation of Microwave Engineering, 2/e, Wiley India.
4. Wayne Tomasi, Advanced Electronic Communication Systems, 6/e, 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.

EX1651.3: CYBER LAWS & HUMAN RIGHTS

MODULE I


MODULE II


MODULE III

Electronic Evidence- Digital forensics, Evolution of computer forensic procedures and tools, Acquisition of data, Data authentication and validation, Evidence recovery, Data analysis, e-mail tracking, Finding originating IP address. Information Technologies Act- 2000 by Govt. of
India, creation and verification of digital signature, Regulation certifying authorities, IT offences, Cyber regulations appellate.

**MODULE IV**


**Text Books**


**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**

To estimate the ability of the student in transforming the theoretical knowledge studied so far 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
4. Report 20
5. Viva voce 15

**Students shall submit the duly certified report.**