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

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
Foundation Course	MM 1121.8	Mathematics I	20	80	4	0	0	3	3
Core Courses	EX 1141	Environmental Studies	20	80	4	0	0	3	4
	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
	EX1144	Programming Lab	20	80	0	0	4	3	3
Comple-mentary Course	EX 1131	Programming in C	20	80	3	0	0	3	2
		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
Foundation Course	MM 1221.8	Mathematics II	20	80	4	0	0	3	3
Core Courses	EX 1241	Solid State Electronics	20	80	3	0	0	3	3
	EX1242	Network Analysis	20	80	4	0	0	3	3
	EX1243	Basic Electronics Lab	20	80	0	0	4	3	3
	EX1244	Digital Electronics Lab	20	80	0	0	4	3	3
Comple-mentary Course	EX 1231	Digital Electronics	20	80	4	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	3	0	0	3	3
	EX 1342	Communication Engineering	20	80	4	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
	EX1345	Microprocessor Lab	20	80	0	0	4	3	3
Comple-mentary Course	MM 1331.8	Mathematics III	20	80	3	0	0	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	Optical Communication	20	80	3	0	0	3	2
	EX1444	Signals & Systems	20	80	3	0	0	3	3
	EX 1445	Linear IC Lab	20	80	0	0	4	3	3
	EX1446	Communication 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	Antenna and Wave Propagation	20	80	3	0	0	3	3
	EX 1542	Digital Signal Processing	20	80	4	0	0	3	3
	EX 1543	Digital Communication	20	80	4	0	0	3	3
	EX 1544	Principles of Mobile Communication	20	80	3	0	0	3	3
	EX1545	Mini Project	20	80	0	0	4	3	3
	EX1546	Simulation Lab	20	80	0	0	4	3	3
Open Course	EX 1551	Elective – II	20	80	3	0	0	3	2
		Total			17	0	8		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	Instrumentation Systems	20	80	4	0	0	3	3
	EX 1642	Biomedical Engineering	20	80	4	0	0	3	3
	EX 1643	Nanoelectronics	20	80	4	0	0	3	3
	EX 1644	Seminar	20	80	0	0	3	3	3
Elective Course	EX 1651	Elective – III	20	80	4	0	0	3	4
Project	EX1645	Project	20	80	0	0	6	3	4
		Total			16	0	9		20

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

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 and Project

Component	Marks
Attendance	5
Performance	5
Presentation	5
Report	5

(d) Seminar

Component	Marks
Attendance	5
Presentation	10
Report	5

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

Grade	Marks
≥ 90%	100%
< 90% but ≥ 80%	80%
< 80% but ≥ 70%	60%
< 70% but ≥ 60%	40%
< 60%	20%

V. END SEMESTER EXAMINATION

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

(a) T heory

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 and 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
Report	20

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.

Component	Marks
Presentation	40
Viva Voce	15
Report	25

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. P ASS 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.

MM 1121.8: MATHEMATICS - I

MODULE I

Multiple Integrals: Evaluation of double and triple integrals – change of order of integration, coordinate system: Transformation to polar, spherical and cylindrical coordinates. Vector analysis: Vector differentiation – Gradient – Divergence – Curl – relations involving Vector integration – statement only of Greens theorem, stokes theorem, and divergence theorem – verification and use in evaluating integrals.

MODULE II

Ordinary Differential equations- linear differential equations with constant coefficients – Homogeneous linear equations (Cauchy's and Legendre's form) – simultaneous equations with constant coefficients. Integral transforms: Laplace transform – Inverse Laplace transform.

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 2π and Half range series. Partial Differential equations: Solution of wave equation and one dimensional heat equation and Laplace's equation.

References

1. Erwin Kreyzig , Advanced Engineering Mathematics, Wiley Eastern.
2. B S Grewal, Higher Engineering Mathematics, Khanna Publishers.
3. Murray R. Spiegel, Vector Analysis, Schaum's series, Mc Graw Hill.
4. Michael D Greenberg , Advanced Engineering Mathematics, 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, 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. Diaster management: floods, earthquake, cyclone and landslides.

MODULE III (Book 1)

Unit 1 Social Issues and the Environment: From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rahabilitation of people; its problems and concerns. Case Studies. Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. Wasteland reclamation, Consumerism and waste products, Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness.

Unit 2 Human Population and the Environment: Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health. Human Rights, Value Education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environment and human health, Case Studies.

MODULE IV (Chapter 3, Book 2)

Waste management: Pollution prevention, Physical operations for waste treatment, Physico-Chemical processes for waste treatment, Biological process for waste treatment, Tertiary treatment for waste water reclamation, Water and waste water treatment.

Books

1. Erach Bharucha, Environmental studies, University press (India) Pvt.Ltd, 2006.
2. Kurian Joseph & R. Nagendran, Essentails of Environmental studies, Pearson.

References

1. Michael Allaby, Basics of Environmental Science, , *Taylor & Francis Group, 2000.*
2. R.J. Ranjith Daniels & Jagdish Krishna Swamy, Environmental Studies, Wiley India Pvt Ltd, New Delhi.
3. R. Rajagopalan, Environmental Studies from Crisis to Cure, Oxford University press, 2005.

EX1142: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

MODULE I

Passive Components- Resistors: specifications and colour coding. Capacitors: Principle, specifications and color coding. Inductors: Principle, specifications and classification. AC fundamentals: Generation of alternating voltages, waveforms, frequency, period, average value, RMS value and form factor. Phasor representation of alternating quantities- rectangular, polar and exponential forms. Concepts of impedance, admittance, conductance and susceptance. Phasor representation, j notation. Power and power factor in ac circuits- active, reactive and apparent power.

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

1. K Gopakumar, Introduction to Electronics and Communication, Phasor Books, 2013.
2. Mittle V.N. and A. Mittal, Basic Electrical Engineering, Tata McGraw Hill Second Edition, 2012.

References

1. Theraja B. L., A Text Book of Electrical Technology -I, S. Chand & Co, New Delhi, 2013.
2. Bhargava N. N., D C Kulshreshtha and S C Gupta, Basic Electronics & Linear Circuits, TMH, 2013.
3. Kothari D.P., L. J. Nagrath, Basic Electrical Engineering, Tata McGraw Hill, 2011.
4. Kulshreshtha C., Basic Electrical Engineering, Tata McGraw Hill, 2012.
5. Louis E. Frenzel, Principles of Electronic Communication Systems, Tata McGraw Hill, 3/e, 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.

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
3	Result	15
4	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	Progrmme	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

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() - Command Line Argument - Recursion.

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. Brain 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

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.

MM1221.8: MATHEMATICS-II

MODULE I

Linear Algebra: Rank of a Matrix – Elementary operations – reduction to normal form and echoless form – vectors – linear dependence – consistency and solution of linear equations – characteristic equation – eigen values and eigen vectors – cayley Hamilton theorem (no proof) – nature of characteristic roots of diagonal, hermition, skew hermition and unitary matrices.

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. Hoffman & Kurne , Linear Algibra, PHI.
2. Narasingh Deo, Graph Theory, PHI.
3. David C Lay, Linear Algebra and Applications, Pearson.

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

Band theory of solids: Wave properties of matter, Electronic structure of the elements, Energy band theory of crystals - conductors, semiconductors, insulators. Fermi Dirac distribution function – Density of states. Semiconductors: Conductivity, carrier concentration in intrinsic semiconductor, effective mass, doping, Fermilevel in a semiconductor having impurities, diffusion, carrier life time, continuity equation, Hall Effect.

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, break down mechanisms, Photovoltaic effect. Types of diodes: rectifier, switching, zener, varactor, tunnel, schottky and Light Emitting diodes, Solar cell.

MODULE III

Bipolar Junction Transistor: Junction transister, 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

1. Ben G. Streetman, Solid State Electronic Devices, Pearson Education, 2000.
2. Robert F Pierret, Semiconductor Device Fundamentals, Pearson Education, 2006.

References

1. M.S.Tyagi, Introduction to Semiconductor Materials and Devices, John Wiley &Sons.
2. Warner and Grung, Semiconductor Device Electronics, Holt Rinhalt & Winston 1991.
3. S.M.Sze, Physics of Semiconductor Devices, Wiley Eastern.
4. FFY Wang, Introduction to Solid State Electronics, North Holland, 1980.
5. E.H. Nicollian and J.R. Brews, MOS Physics & Technology, John Wiley.
6. Y.P.Tsividis, Operation and Modelling of the MOS Transistor, Mc Graw Hill, 1986.
7. Deepankar Nagchaudhari, Microelectronic Devices, Pearson Education, 2002.

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

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

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

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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.
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 flip flops.
13. Design and implementation of MOD 7 sychronous up counter using flip flops.
14. Realisation of Johnson and Ring counter using CD 4017.
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

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

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 bit magnitude & 2 bit magnitude. 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. Familarisation 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.

EX1341: ELECTRONIC CIRCUITS

MODULE I

Rectifiers : Halfwave, 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. 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.
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

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

Angle modulator Circuits – Varactor Diode Modulators, Transistors Modulators, FM Transmitters – Direct & Indirect Methods. Angle modulation detectors – Foster-Seeley discriminator, Ratio Detector. Pulse Modulation - PAM - TDM, PPM, PWM.

MODULE IV

Noise in analog modulation systems- Noise in linear receivers using coherent detection, noise in AM receivers using envelope detection, noise in FM receivers. Telephone Systems – Standard Telephone Set, Basic Call Procedures, Call progress, Tones & Signals – DTMF, Cordless Telephones, Electronic Telephones.

Text Books

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

References

1. Simon Haykin, Communication Systems, 4/e, John Wiley.
2. John G. Proakis & Masoud Salehi, Communication Systems Engineering, 6/e, Pearson Education.
3. Taub and Schillings, Principles of Communication Systems, PHI.
4. Leon W.Couch II, Digital and Analog Communication Systems, 6/e, Pearson Education.
5. Wayne Tomasi, Advanced Electronic Communications Systems, 6/e, PHI.

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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

1. R. S. Gaonkar, *Microprocessor Architecture Programming and Application with 8085*, Penram International 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).

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EX1344: ELECTRONICS CIRCUITS LAB

1 Biasing Circuits – Fixed Bias with and without R_E – measure operating point – draw the DC load line – observe â dependency with another transistor.

2 Biasing Circuit – Voltage Divider – design – measure operating point – draw DC load line – observe the dependency on â

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

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:

Integral (0 to 2π) $\{f(\sin \theta, \cos \theta) d \theta\}$

Integral $(-\infty$ to $+\infty)$ { [Sin mx / f(x)] } dx

References

1. Spiegal, Probability theory and Statistics, Schaum Series, MGH.
2. Miller and Freud, Probability and statistics for Engineers, Pearson Education.
3. Michael O Greenberg, Advanced Engineering Mathematics, Pearson Education.
4. B.S. Grewal, Higher Engineering Mathematics , Khanna Publishers.

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

Input Output processing: data transfer techniques, bus interface – parallel and serial I/O interface. I/O data transfer – programmed I/O and DMA. I/O interrupt – daisy chaining, polling, vectored interrupt and interrupt handling.

Text Book

1. Pal Chaudhuri, Computer Organization and Design, PHI, 3/e.

References

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, *Computer Organisation*,TMH, 5/e,2013
2. William Stallings, Computer Organization and Architecture, Pearson.
3. M. Morris Mano, Computer System Architecture, PHI.
4. J.P. Hayes, Computer Organization and Architecture, PHI.

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EX 1441: APPLIED ELECTROMAGNETIC THEORY

MODULE I

Review of Vector Analysis: Three types of co ordinate system, Basics of rectangular, cylindrical and spherical co-ordinate systems , co-ordinate transformations(No derivations needed). Gradient, Divergence, curl in rectangular co ordinate system. Physical interpretation of gradient, divergence, curl. Vector field & scalar field. Physical interpretation of line integral, surface integral and volume integral. Statement of Divergence theorem & Stokes theorem.

MODULE II

Electrostatics: Coulomb's law, Electric field intensity, potential due to point charge and distribution of charges. equipotential surfaces. 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. Magneto statics: Faraday's Law of Magnetic Induction, Magnetic flux, Flux density, magnetic field intensity, current density vector, Equation of continuity, Ohm's law in point form. Biot-Savart's Law, Ampere's circuital (work) law in integral form, Energy stored in magnetic field. Magnetic vector potential.

MODULE III

Maxwell's Equations: Inconsistency of Ampere's circuital law. Maxwell's equations-differential and integral form, word statement and interpretation. Maxwell's equations in free space and for harmonically varying fields. Boundary conditions. Flow of energy in electromagnetic system, Poynting vector, Complex Poynting vector.

MODULE IV

Electromagnetic waves Wave equation-Wave propagation in free space & in dielectrics-. Poynting's theorem & wave power. Propagation in good conductors, Skin effect. Reflection of uniform plane wave at normal incidence. Derivation of Reflection and Transmission coefficients. Snell's law, Brewster's law.

Text book

1. Joseph A Edminister, Electromagnetics, **2/e,** Schaum's Outline Series.
2. Nannapaneni Narayana Rao, Elements of Engineering Electromagnetics, **5/e**, Pearson Education.

References

1. Umran S. Inan & Aziz S. Inan: Engineering Electromagnetics,Pearson Education,1999.
2. William Haytt, Engineering Electomagnetics, TMH.
3. B.Premlet, Electromagnetic Theory with Applications, 3rd Ed, Phasor books.
4. Matthew N.O. Sadiku, Elements of Electromagnetics, 3/e, Oxford University press.
5. G.S.N.Raju, Electromagnetic Theory and Transmission Lines, 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 Astale 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 Books

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. Soclof, Design & Applicatications of Analog Integrated Circuits, PHI, 2008.
3. David A. Johns and Ken Martin: Analog Integrated Circuit Design, Wiley India, 2008.
4. Botkar , Integrated Circuits, Khanna Publishers,9/e, 2003.
5. George Clayton & Steve Winder, Operational Amplifiers, Elsevier.
6. Salivahanam and Kanchana Bhaskaran, Linear Integrated Circuits, TMH, 2008.

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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

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. Optic fiber cables.

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:

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.

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EX1444: SIGNALS AND SYSTEMS

MODULE I

Introduction to signals: classification - Continuous-time and Discrete-time, Analog and Digital, Periodic and Aperiodic, Energy and Power, Even and Odd. Discrete time and continuous time Signals – step, impulse, ramp - Mathematical operations on both dependent and independent variables.

MODULE II

Systems: Definition and classifications of discrete time and continuous time systems - Static & Dynamic, Time Invariant & Time Variant, Linear & Nonlinear, Causal & Non Causal, and Stable & Unstable. Differential Equation representation of continuous time systems. Difference equation Representation of discrete systems. Continuous Time LTI systems and Convolution Integral, Discrete Time LTI systems and linear convolution.

MODULE III

Analysis of LTI systems - Impulse Response. Sampling of continuous time signals, sampling theorem for lowpass signals, aliasing. Fourier Transform on Discrete Time Signals : DTFT – Definition - Properties - Periodicity, Linearity, Time Reversal, Differentiation, Convolution Theorem.

MODULE IV

Laplace Transform: Definition - ROC - Properties - Linearity, Time Shifting, Frequency Shifting, Differentiation, Convolution - Inverse Laplace Transform. Z transform: Definition - ROC - Properties - Linearity, Time Shifting, Time Reversal, Multiplication by an Exponential Sequence, Differentiation, Convolution Theorem. Inverse Z Transform.

Text Books

1. Alan V. Oppenheim and Alan Willsky, Signals and Systems, PHI, **2/e**, 2009
2. Tarun Kumar Rawat, Signals and Systems, Oxford University Press, 2010.

References

1. Simon Haykin, Signals & Systems, John Wiley, 2/e, 2003.
2. Rodger E Ziemer, Signals & Systems - Continuous and Discrete, Pearson, 4/e, 2013.
3. B P. Lathi, Priciples of Signal Processing & Linear systems, Oxford University Press, 2010.
4. Hwei P.Hsu, Signals and Systems, McGraw Hill, 3/e, 2013.
5. M.J.Roberts, Signals and Systems, TMH, 3/e, 2003.
6. Anand Kumar, Signals and Systems, PHI, 3/e, 2013.

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.
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: 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

DC choppers: Principle of chopper operation and control strategies, Step-up and step-down choppers, Types of chopper circuits, Voltage-commutated chopper, Current-commutated chopper, Load-commutated chopper. Inverters: single-phase voltage source inverters, Modified McMurray half-bridge and full-bridge inverter, Pulse-width modulated inverters, Series and Parallel inverter.

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

1. P. C. Sen, Power Electronics, Tata McGraw Hill.
2. S.K. Dutta, Power Electronics and Control, PHI.
3. SN Biswas, Industrial Electronics, Dhanpat Rai & Sons, 2005.
4. C. W. Lander, Power Electronics, McGraw Hill.

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

Exception Handling Techniques: try, catch, throw, throws, finally. Applet Fundamentals: applet tag, applet life cycle, simple applet programs for drawing lines, rectangle & polygon.

Text Book

1. E. Balaguruswami, Programming with Java: A Primer, 4/e, TMH.
2. Patrick Naughton & Herbert Schildt, Java2: The Complete Reference, Osborne, Seventh Edition.

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, qualiy control, operational control techniques.

Text Books

1. P C Tripathi & P N Reddy, Principles of Management, TMH.
2. Rathi Narayan, Principles of Management, Eswar Press, Chennai.
3. M M Abraham, Business Management, Prakash Publications.

Reference

1. Stephan P Robbins & Mary Coulter, Management, Pearson Education.
2. L M Prasad, Principles & Practice of Management, Sultan Chand and Sons Publishers.
3. Chabbra, Principles of Management, Dhanpat Rai & Sons.
4. P Chitambaranathan, Principles of Marketing and Management, Scitech Publications.

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

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 LCD display.

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^2C, USB, CAN. Wireless and Mobile System Protocols – Bluetooth, ZigBee.

Text Books

1. Muhammad Ali Mazidi, The 8051 microcontroller and Embedded System, Pearson.
2. Rajkamal, Embedded Systems Architecture, Programming and Design, TMH.
3. Steve Heath, Embedded Systems Design, Second Edition, Newnes.
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
2. Kenneth Ayala, The 8051 Microcontroller, 3/e, Thomson Publishing, New Delhi.
3. Wayne Wolf, Computers as Components: Principles of Embedded Computing system design, Elsevier, 2005.

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

Wave propagation: EM spectrum, Wave Propagation: TE, TM and TEM waves, Waves in free space, Radiation mechanism, Attenuation and absorption, effects of the Environment, reflection of waves, Refraction, Interference of Electromagnetic waves, Propagation of waves, Ground (surface) waves, Electrical properties of Earth, Reflection of radio waves from the surface of Earth, Space wave propagation, Maximum usable frequency, Fading of space wave signals, Ionospheric layers & Ionospheric propagation.

MODULE II

Antenna Basics: Introduction-Definition, functions and properties of Antenna- Antenna Parameters(qualitative study only) : Isotropic Radiator, Antenna Impedance, Radiation resistance, Radiation Pattern, Radiation Power density & Intensity, Gain, Directive Gain & Power Gain, Directive Gain and Directivity, Antenna Efficiency, Effective Area/Aperture, Antenna Band-width and Beam Width, Beam Efficiency, Antenna Temperature, Antenna polarization , EIRP, Friis Transmission Formula.

MODULE III

Antenna Arrays: Introduction, Various forms of Antenna Arrays, Broad -side Array, End-fire Array, Arrays of point sources - field of two isotropic point sources - principle of pattern multiplication - linear arrays of n isotropic point sources. Grating lobes. Principle of Log periodic antenna array and Helical antenna.

MODULE IV

Basic antenna elements, Radiation mechanism of Antennas: Radiation from an oscillating electric dipole, Radiation from a half wave dipole. Traveling wave antennas. Principle and applications of V and rhombic antennas. Principles of Horn, Parabolic dish and rectangular Patch antennas.

Text book

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

References

1. John D. Krauss, Antennas for all Applications, 3/e, TMH.
2. Constantine A Balanis, Antenna Theory and Design, 2/e, Wiley Publications.
3. R.E Collin, Antennas & Radio Wave Propagation, McGraw Hill, 1985.
4. Thomas A. Milligan, Modern Antenna Design, IEEE PRESS, 2/e, Wiley Interscience.
5. V. Soundara Rajan, Antenna Theory and Wave Propagation, Scietech Publishers, 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. 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

Review of Discrete Time Signals and Systems : Elementary of Discrete Time Signals, Discrete sequences, Discrete Systems and their classifications and properties. Digital Signal Processing Systems: Block Diagram - Applications – Advantages – Limitations. Review of Z transform: definition, properties and inverse Z Transform.

MODULE II

Discrete Fourier Transform: Properties of DFT- Periodicity, Linearity, Time Reversal, Time Shift, Circular Convolution. Computation of DFT – Circular Convolution using DFT. 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

Filters: Comparison between Analog and Digital filters – comparison between FIR and IIR filters - IIR Filter Design by Impulse Invariance and Bilinear Transformation. 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.

Text Books

1. John G Proakis, Dimitris G Monolakis, Digital Signal Processing, PHI, 4/e, 2013
2. Rulph Chassaing, Digital Signal Processing and Applications, CRC Pres, 2012.

References

1. Sanjith K Mitra, Digital Signal Processing, 4/e, TMH, 2011.
2. Emmanuel Ifeachor & Barry Jervis, Digital Signal Processing, Pearson ,2/e, 2002.
3. Anand kumar, Digital Signal Processing, PHI, 2013.
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

Differential PCM, Delta Modulation – Block diagram of DM Transmitter and Receiver. Multiplexing Techniques: TDM, Block diagram, FDM – Block diagram. Digital Transmission: Introduction - ASK, FSK, PSK, BPSK, QPSK (Explanation with waveforms).

MODULE III

Signal space Analysis – Geometric representation of signals, analyzer and synthesizer, distance, norm, inner product and orthogonality, Gram Schmidt orthogonization procedure. Conversion of the continuous AWGN channel into a vector channel –Statistical Characterization of correlator outputs, Likelihood function – Coherent detection of signals in noise – Maximum likelihood Detection, correlation receiver – probability of error.

MODULE IV

Spread Spectrum modulation – Principle of spread spectrum modulation -Pseudo Noise Sequences -Generation of PN sequence- Concept of jamming - Avoidance of jamming- 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.

EX1544: PRINCIPLES OF MOBILE COMMUNICATION

MODULE I

Limitations of conventional mobile systems- limited service capability, poor service performance, inefficient frequency spectrum utilization- spectrum efficiency considerations. Introduction to wireless communication: Evolution of wireless communication- 1G, 2G,3G and beyond 3G. Radio Transmission techniques- Simplex, Half duplex, Full duplex, Frequency division duplexing , Time division duplexing techniques.

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

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

References

1. K. Feher, Wireless Digital Communications: Modulation and Spread Spectrum Applications, Prentice Hall, 1995.
2. J. G. Proakis, Digital Communications, 4/e, McGraw Hill, 2000.

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
3	Report	20
4	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, 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.

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, 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,

Fading, Doppler shift & Multipath: Small scale multipath propagation. Multiple Access Techniques for Wireless Communications Coding: FDMA, TDMA, CDMA. Capacity of Cellular Systems.

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

1. T. S. Rappaport, Wireless Communications: Principles and Practice, 2nd ed. Singapore: Pearson.
2. Kauch Pahalavan & Prahanet Krishnamoorthy, Principles of Wireless Networks, 2/e, Pearson.

References

1. Wayne Tomasi, Electronic Communication, Pearson Education.
2. Jochen Schiller Mobile Communications, 7/e, Pearson Education, 2003.
3. William Cy Lee, Mobile and Personal Communication, Mc Graw Hill.
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

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

Text books

1. A.K. Sawhney, Electrical & Electronic Measurement & Instrumentation, Dhanpat Rai & Sons.
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 occulograph 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.
2. J. J. Carr and J. M. Brown, Introduction to Biomedical Equipment Technology, 4/e, Pearson, 2001.
3. Arumugam,M, Biomedical Instrumentation, Anuradha Agencies, Chennai, 2009.

References

1. J.G. Webster, Medical Instrumentation Application and Design, 3/e, John Wiley & Sons, 1998.
2. R. S. Khandpur, Handbook of Biomedical Instrumentation, 2nd ed., TMH.
3. Aggrawal, Modern Diagnostics, National Book Trust, India, 2001.

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

Introduction nanoelectronics, Impacts, Limitations of conventional microelectronics. Introduction to methods of fabrication of nanonaterials- 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. 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

References

1. K Goser, P Glosekotter, J. Dienstuhl, Nanoelectronics and Nanosystems, Springer, 2004.
2. Supriyo Dutta, Quantum Transport- Atom to transistor, Cambridge University Press, 2005.
4. Chattopadhyay,Banerjee, Introduction to Nanoscience & Technology, PHI, 2009.
5. Diwanand and Bharadwaj, Nanoelectronics, Pentagon Press, 2006.
6. W.R. Fahrner, Nanotechnology and Nanoelectronics, Springer, 2005.

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

Network Architecture: Layering and Protocols, OSI Layering, TCP/IP Layering. Transport layer: Multiplexing and demultiplexing. Connectionless transport UDP and connection oriented transport TCP. Reliable Transmission, Stop and wait protocol, Sliding window protocols.

MODULE II

Principles of congestion Control and TCP Congestion Control. Physical layer: Cables for Networking Coaxial cables, UTP, Fiber Optic cables. Network Layer: Network as graph.

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

MODULE III

Broadcast and Multicast routing.Address Resolution Protocols (ARP), IP version 4, Sub netting, IP Version6. Data link Layer: Error detection and correction techniques: parity checks and cyclic redundancy check. Link layer addressing: MAC addresses, Address resolution protocol. Ethernet: Frame structure, CSMA/CD, Ethernet technologies.

MODULE IV

Network Security Issues, Multilevel Security models. Authentication Protocols. Firewalls and Packet filtering. Types of Attacks. Security in Layers - Application Layer: SSH, Transport Layer: SSL. Network Layer: IP Security (IPSec).

Text Books

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

References

1. S.Keshav, An Engineering Approach to Computer Networking, Pearson Education, 2005.
2. John R Vacca, Cabling Hand book, Pearson.
3. Glen Kramer, Ethernet Passive Optical Networks, Mc.Graw Hill, Professional, 2005.
4. Charlie Kaufman et al., Network Security Private Communication In A Public World, **2/e**, Pearson.

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

TWT – constructional features- operation (mathematical analysis not required) – performance characteristics- applications. Magnetrons- cavity magnetron-operation (mathematical analysis not required)- performance characteristics- applications. Gunn diode-operation-performance characteristics-applications.

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.
2. Anoop singh & Seema Verma, Fundamentals of Microwave Engineering: Principles, Waveguides, Microwave Amplifiers and Applications, PHI.

References

1. David M Pozar, Microwave Engineering, 3/e, Wiley India
2. Reinhold Ludwig & Gene Bogdanov, RF circuit design: Theory and Applications, 2/e, Prentice Hall.
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

Digital Convergences: Human interaction, opportunities, empowering individuals and society, success stories, Digital divide and E-Governance Introduction- state as organization, New information technologies for Governance. Networking the civil society-Economics of development.

MODULE II

Digital Divide- Society Knowledge matrix, Digital knowledge divides, local knowledge communities. E-Governance- Definition, Models, Opportunities- Healthcare, Teaching, Learning, Social Security net, Government identity number. Cyber Crime Laws and Forensics Cyber Crime: Unauthorized computer access, data theft, data modification, data manipulation, threatening e-mails, ransom notes, credit card frauds, telecommunication frauds, software piracy, copy right violation etc.

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

Human Rights: Human Rights- meaning, origin, development of human rights in international base, Universal declaration of human rights. Implementation of human rights under Indian constitutions, women and human rights, children and human rights, Instruments for the protection of human rights and Rights protected – Human Rights commission and their powers.

Text Books

1. Andy Cevell, Digital convergence, Firewall Media, New Delhi.
2. Ashok Dohare, Manual for Investigation of Computer Related Crimes.
3. Kiran Bedi, Parminder Jeet Singh & Sandeep Srivastava, Government@net: New Government Opportunities, Sage Publication, 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.

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
3	Report	20
4	Viva voce	15

Students shall submit the duly certified report.