WITH EFFECT FROM THE ACADEMIC YEAR 2013-14

SCHEME OF INSTRUCTION & EXAMINATION
B.E IV/IV (REGULAR)
ELECTRONICS & COMMUNICATION ENGINEERING

Semester-II

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| Total | 12 | 9 | - | 225 | 150 |

ELECTIVES

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EC 451

RADAR AND SATELLITE COMMUNICATION

**Instruction**
4 Periods per week

Duration of University Examination
3 Hours

University Examination
75 Marks

Sessional
25 Marks

UNIT-I
Introduction to radar, radar block diagram and operation, radar frequencies, Applications of radar, Prediction of range performance, minimum detectable signal, receiver noise, probability density function, SNR, Integration of radar pulses, radar cross-section of targets, PRF and range ambiguities, transmitter power, system losses.

UNIT-II
Doppler effect, CW radar, FM CW radar, multiple frequency CW radar. MTI radar, delay line canceller, range gated MTI radar, blind speeds, staggered PRF, limitations to the performance of MTI radar, non-coherent MTI radar.

UNIT-III
Orbital aspects of Satellite Communication: Introduction to geo-synchronous and geostationary satellites, Kepler’s laws, Locating the satellite with respect to the earth, sub-satellite point, look angles, mechanics of launching a synchronous satellite, Orbital effects, Indian scenario in communication satellites.

UNIT-IV
Satellite sub-systems: Attitude and Orbit control systems, Telemetry, Tracking and command control system, Power supply system, Space craft antennas, multiple access techniques, comparison of FDMA, TDMA, CDMA.

UNIT-V
Introduction to satellite link design, basic transmission theory, system noise temperature and G/T ratio, design of down link and uplink, design of satellite links for specified C/N, satellite data communication protocols.

**Suggested Reading**
EC481

SEMINAR

Instruction
Duration of University Examination: 3 Periods per week
University Examination: 3 Hours
Instruction: 50 Marks
Sessionals: 3 Periods / Week

Sessionals: 25 Marks

Oral presentation is an important aspect of engineering education. The objective of the seminar is to prepare the student for a systematic and independent study of the state of the art topics in a broad area of his / her specialisation.

Seminar topics may be chosen by the students with advice from the faculty members. Students are to be exposed to the following aspects of a seminar presentation.

- Literature survey
- Organization of the material
- Presentation of OHP slides / PC presentation
- Technical writing

Each student is required to:

1. Submit a one page synopsis before the seminar talk for display on the notice board.
2. Give a 20 minutes presentation through OHP, PC, slide projector, followed by a 10 minutes discussion.
3. Submit a report on the seminar topic with list of references and slides used.

Seminars are to be scheduled the 3rd week to the last week of the semester and any change in schedule should be discouraged.

For award of sessional marks students are to be judged by at least two faculty members on the basis of an oral and a written presentation as well as their involvement in the discussions.
EC 482

PROJECT

Instruction :  Periods / Week
Univ. Exam :  Viva-voce: Grade(@)
Sessionals :  50 Marks

Dealing with a real time problem should be the focus of under graduate project.

Faculty members should prepare project briefs (giving scope and references) well in advance, which should be made available to the students in the department. The project may be classified as hardware / software modeling / simulation. It may comprise any or all elements such as analysis, design and synthesis.

The department should appoint a project coordinator who will coordinate the following.

- Grouping of students (a maximum of 3 in group)
- Allotment of projects and project guides
- Project monitoring at regular intervals.

All project allotment are to be completed by the 4th week of IV-Year, I-Semester, so that the students get sufficient time for completion of the project.

All projects will be monitored at least twice in a semester through individual presentations.

Every student should maintain a project dairy, wherein he/she needs to record the progress of his/her work and get it signed at least once in a week by the guide(s). If working outside and college campus, both the external and internal guides should sign the same.

Sessional marks should be based on the grades / marks, awarded by a monitoring project committee of faculty members as well as the marks given by the guide.

Efforts be made the some of the projects are carried out in reputed industries / research organizations with the help of industry coordinators. Problems can also be invited from the industries to be worked out through undergraduate projects.

Common norms should be established for final documentation of the project report by the respective department on the following lines:

1. The project little should be task oriented for example “Analysis and Modeling of ………”

2. Objectives of the project should be identified clearly and each student of the project batch should fulfill at least one of the objectives identified. The chapters of the project report should reflect the objectives achieved.

3. Contents of the report should include the following
   a. Title page
   b. Certificate
   c. Acknowledgements
   d. Abstract (limited to one/two paragraphs, page no.1 should start from this)
e. Contents (Ch. No.          Title of the chapter/section Page No.)
f. List figures (Fig. No. caption of the figure Page No.)
g. List of Tables (Table. No. Caption of the table Page No.)
h. List of Symbols (ex. C: Velocity of light $3 \times 10^8$ m/s )
i. Chapter I should be introduction (limited 4-5 Pages) This should contain sections as objectives of the project, technical approach, literature survey, the importance of the project and organization of the report.
j. Chapter II, Last two chapters should be on results with discussions and conclusions.
k. References in IEEE format which should be duly referred in the report.
l. Appendices
   The algorithm related to the software developed should be thoroughly discussed.
m. Index.

4. The project reports should be hard bound.

The project work if found inadequate and gets an Unsatisfactory grade, the candidate should repeat the project work with a new problem or improve the quality of work and report it again.

The project report should be evaluated and one of the following grades may be awarded at the external examination.

@: Excellent / Very Good / Good / Satisfactory / Unsatisfactory.
EC 461
REAL TIME OPERATING SYSTEMS
(ELECTIVE –II)

Instruction 4 Periods per week
Duration of University Examination 3 Hours
University Examination 75 Marks
Sessional 25 Marks

Unit – I: Introduction to OS and RTOS
Architecture of OS (Monolithic, Microkernel, Layered, Exo-kernel and Hybrid kernel structures), Operating system objectives and functions, Virtual Computers, Interaction of O. S. & hardware architecture, Evolution of operating systems, Batch, multi programming, Multitasking, Multiuser, parallel, distributed & real –time O.S.

Unit – II: Process Management of OS/RTOS
Uniprocessor Scheduling: Types of scheduling, scheduling algorithms: FCFS, SJF, Priority, Round Robin, UNIX Multi-level feedback queue scheduling, Thread Scheduling, Multiprocessor Scheduling concept, Real Time Scheduling concepts.

Unit – III: Process Synchronization

Unit – IV: Memory & I/O Management:
Memory Management requirements, Memory partitioning: Fixed, dynamic, partitioning, Buddy System Memory allocation Strategies (First Fit, Best Fit, Worst Fit, Next Fit), Fragmentation, Swapping, Segmentation, Paging, Virtual Memory, Demand paging, Page Replacement Policies (FIFO, LRU, Optimal, clock), Thrashing, Working Set Model. I/O Management and Disk Scheduling: I/O Devices, Organization of I/O functions, Operating System Design issues, I/O Buffering, Disk Scheduling (FCFS, SCAN, C-SCAN, SSTF), Disk Caches.

Unit – V: RTOS APPLICATION DOMAINS

Suggested Reading:
EC 462

CODING THEORY AND TECHNIQUES
(ELECTIVE –II)

Instruction 4 Periods per week
Duration of University Examination 3 Hours
University Examination 75 Marks
Sessional 25 Marks

Unit-I: Introduction

Coding for Reliable Digital Transmission and Storage, Types of codes, Modulation and Coding, Maximum Likelyhood Decoding, Types of errors, Source coding: Shannon-Fano coding, Huffman codes, Run-Length Encoding, Lampel-Ziv codes.

Unit II: Block codes

Important Linear Block Codes, Repetition codes, Hamming codes, a class of single error-correcting and double-error correcting codes, Reed-Muller codes, the (24,12) Golay code, Product codes, Interleaved codes.

Unit III: Convolutional codes

Encoding, Structural properties, State diagram, Code tree diagram, Maximum-Likelihood decoding, Soft decision and hard decision decoding, the Viterbi algorithm.

Unit IV: Low Density Parity Check codes

Introduction, Galleger’s method of construction, Regular and Irregular LDPC codes, other methods of constructing LDPC codes, Tanner graphs, Decoding of LDPC codes.

Unit V: BCH and RS codes

Groups, Fields, Binary arithmetic, Construction of Galois Fields GF(2ⁿ), Basic properties of Galois Fields, Introduction to BCH and RS codes.

Suggested Reading:

EC 463

Design of Fault Tolerant Systems
(ELECTIVE –II)

Instruction 4 Periods/Week
Duration of University Exam 3 hours
Exam Marks. 75 Marks
Sessionals 25 marks

UNIT - I
Basic concepts of Reliability: Failures and faults, Reliability and failure rate, Relation between reliability & mean time between failure, Maintainability & Availability, reliability of series and parallel systems. Modeling of faults. Test generation for combinational logic circuits: conventional methods (path sensitisation, Boolean difference), Random testing, transition count testing and signature analysis.

UNIT – II
Fault Tolerant Design-I: Basic concepts, static, (NMR, use of error correcting codes), dynamic, hybrid and self purging redundancy, Siftout Modular Redundancy (SMR), triple modular redundancy, 5MR reconfiguration.

UNIT – III
Fault Tolerant Design-II: Time redundancy, software redundancy, fail-soft operation, examples of practical fault tolerant systems, introduction to fault tolerant design of VLSI chips.

UNIT - IV
Self checking circuits: Design of totally self checking checkers, checkers using m-out of a codes, Berger codes and low cost residue code, self-checking sequential machines, partially self-checking circuits. Fail safe Design: Strongly fault secure circuits, fail-safe design of sequential circuits using partition theory and Berger codes, totally self checking PLA design.

UNIT - V
Design for testable combination logic circuits: Basic concepts of testability, controllability and observability. The Read-Muller expansion technique, level OR-AND-OR design, use of control and syndrome-testing design. Built-in-test, built-in-test of VLSI chips, design for autonomous self-test, design in testability into logic boards.

Suggested Reading:
EC 464

SPEECH PROCESSING
(ELECTIVE –II)

Instruction
Duration of University Examination
University Examination
Sessional

4 Periods per week
3 Hours
75 Marks
25 Marks

UNIT – I
Mechanism of speech production, source filter model of speech production, speech sounds .
Differential PCM. Adaptive delta modulation, Adaptive differential PCM (ADPCM).
Short time spectral analysis, cepstral analysis, Auto correlation function, Linear predictive
analysis, pitch synchronous analysis.

UNIT - II
Short –time Energy function, zero crossing rate, End point detection, vector quantization.
Format Tracking; Pitch extraction.

UNIT – III
Format synthesizer; Linear predictive synthesizer, phone use synthesis, Introduction to
Text-to-speech and Articulator speech synthesis.

UNIT IV
Sub-band coding, Transforms coding, channel decoder, Formant decoder, cepstral decoder,
linear predictive decoder, vector quantizer coder.

UNIT V
Problems in Automatic speech recognition, Dynamic warping, Hidden Markow models,
speaker Identification / verification.

Suggested Reading
EC 465

WIRELESS SENSOR NETWORKS
(ELECTIVE –II)

Instruction 4 Periods per week
Duration of University Examination 3 Hours
University Examination 75 Marks
Sessional 25 Marks

UNIT – I: OVERVIEW OF WIRELESS SENSOR NETWORKS
Challenges for Wireless Sensor Networks-Characteristics requirements-required mechanisms, Difference between mobile ad-hoc and sensor networks, Applications of sensor networks- Enabling Technologies for Wireless Sensor Networks

UNIT II ARCHITECTURES:

UNIT III NETWORKING SENSORS

UNIT IV INFRASTRUCTURE ESTABLISHMENT
Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

UNIT V SENSOR NETWORK PLATFORMS AND TOOLS

Suggested Reading:
ME 411

ENTREPRENEURSHIP
(ELECTIVE –II)

Instruction 4 Periods per week
Duration of University Examination 3 Hours
University Examination 75 Marks
Sessional 25 Marks

UNIT – I

UNIT – II
Identification and characteristics of entrepreneurs. Emergence of First generation entrepreneurs, environmental influence and women entrepreneurs. Conception and evaluation of ideas and their sources. Choice of Technology - Collaborative interaction for Technology development.

UNIT – III
Project formulation, Analysis of market demand, Financial and Profitability and analysis and Technical analysis. Project financing in India.

UNIT – IV
Project Management during construction phase, project organization, project planning and control using CPM, PERT techniques, Human aspects of project management. Assessment of tax burden.

UNIT – V

Time Management: Various approaches of time management, their strengths and weaknesses. The urgency addiction and time management matrix.

Suggested Reading
EC 471

NANO TECHNOLOGY
(ELECTIVE –III)

Instruction 4 Periods per Week
Duration of University Examination 3 Hours
University Examination 75 Marks
Sessional 25 Marks

Unit –I


Unit –II

TEM, Infraed and Raman spectroscopy. Phptoemission and X-RAY spectroscopy, Electron microscopy, SPMs, AFMs, Elecrostatic force Microscope, Magnetic force microscope.

Unit –III

Biological analogies of Nano and Micro-electromechanical systems (NMEMS)- Applications Fabrication of MEMS-assembling and packaging - applications of NMEMS.

Unit- VI

Mathematical models and design of NMEMS-architecture-electro magnetic and its applications for Nano and Micro-electromechanical motion devices Molecular and Nano structure dynamics-molecular wires and molecular circuits.

Unit –V

Carbon nanotubes and nano devices-structural design of nano and MEM actuators and sensors configurations and structural design of motion nano-and micro-structures. Introduction to Intelligent control of Nano and Microelectronical Systems.

Suggestion Reading:
1. G.Timp, “Nanotechnology,” Bell Labs, Murray Hill , NJ, USA.
GLOBAL POSITIONING SYSTEM
(ELECTIVE –III)

Instruction 4 Periods per Week
Duration of University Examination 3 Hours
University Examination 75 Marks
Sessional 25 Marks

Unit –I
GPS Fundamentals: GPS Constellation, Principle of operation, GPS Orbits, Orbits mechanics and satellite position determination, time references.
Geometric dilution of precision : GDOP, VDOP, PDOP.

Unit –II
Coordinate Systems: Geometry of ellipsoid, geodetic reference system. Geoids, Ellipsoid and Regional datum, WGS-84, IGS ECI, ECEF.
Various error sources in GPS: Satellite and Receiver clock errors, ephemeris error, atmospheric errors, the receiver measurement noise and UERE.

Unit –III
GPS measurement: GPS signal structure, C/A and P-code and carrier phase measurement, position estimation with pseudo range measurement, Spoofing and antiSpoofing, GPS navigation, observation data formats.

Unit- VI
GPS Augmentation systems: Principle of DGPS, Types of DGPS: LADPS, WADGPS. Satellite Based Augmentation system (SBAS) : WAAS, GAGAN.
Ground Based Augmentation System (GBAS): LAAS.

Unit –V
New Satellite Navigation system; GLONASS, Galileo System.

Suggestion Reading:

EC 473

NEURAL NETWORKS AND FUZZY LOGIC
( Elective - III)

Instruction  
Duration of University Examination  
University Examination  
Sessional  

4 Periods per Week  
3 Hours  
75 Marks  
25 Marks

UNIT – I
Evolution of neural networks; Artificial Neural Network: Basic model, Classification, Feed forward and Recurrent topologies, Activation functions; Learning algorithms: Supervised, Un-supervised and Reinforcement; Fundamentals of connectionist modeling: McCulloach – Pits model, Perceptron, Adaline, Madaline.

UNIT – II

UNIT – III

UNIT – IV

UNIT – V
Basic structure and operation of Fuzzy logic control systems; Design methodology and stability analysis of fuzzy control systems; Applications of Fuzzy controllers. Applications of fuzzy theory.

Suggested Reading:
WITH EFFECT FROM THE ACADEMIC YEAR 2013-14

EC 474 SPECTRAL ESTIMATION TECHNIQUES (ELECTIVE –III)

Instruction 4 Periods per Week
Duration of University Examination 3 Hours
University Examination 75 Marks
Sessional 25 Marks

UNIT I

UNIT II
Forward and Backward linear prediction-Forward and Backward linear prediction, Relationship of an AR process to linear prediction, Solution of linear equations- The Levinson- Durbin algorithm, Wiener Filters- Wiener filters for Filtering and Prediction, FIR Wiener filter, Orthogonality Principle in linear Mean square Estimation, IIR Weiner Filter, Noncausal Weiner filter.

UNIT III
Non-parametric methods – Bartlett’s, Welch’s and Blackman-Tukey methods, Performance Characteristics of Nonparametric Power Spectrum Estimators, Computational requirements and performance characteristics.

UNIT IV

UNIT V

Suggested Reading:
LA 454

INTELLECTUAL PROPERTY RIGHTS
(ELECTIVE –III)

Instruction 4 Periods per Week
Duration of University Examination 3 Hours
University Examination 75 Marks
Sessional 25 Marks

UNIT – I

UNIT – II
Patents: Meaning of Patent, Commercial significance, obtaining of patent, patentable subject, matter-rights and obligations of patentee, specification, Registration of patents, Compulsory licensing and licenses of rights, Revocation.

UNIT – III

UNIT – IV
Trade marks: Meaning of trademark, purpose of protecting trademarks Registered trademark, procedure – passing off. Assignment and licensing of trademarks, Infringement of trademarks.

UNIT – V
Copy Right: Nature, scope of copyright, subject matter of copyright, right conferred by copyright, publication. Broadcasting, telecasting, computer programme, database right. Assignment, transmission of copyright, Infringement of copyright.

Suggested Reading
WITH EFFECT FROM THE ACADEMIC YEAR 2013-14

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**DISASTER MANAGEMENT**  
*(ELECTIVE –III)*

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