WITH EFFECT FROM THE ACADEMIC YEAR 2005-2006

SCHEME OF INSTRUCTION & EXAMINATION

B.E IV YEAR (REGULAR)

(ELECTRONICS & COMMUNICATION ENGINEERING)

SEMESTER - II

Sl. No.	Syllabus Ref.No	SUBJECT	Scheme of Instructions Periods per Week L/T	D/P	Scheme of Examination Dura-tion in Hrs	Maximum Marks Univ. Exam	Sessi-onals
		THEORY					
1.	EC 451	Radar & Satellite Communication Systems	**4**	**-**	**3**	**75**	**25**
2.		**Elective -II**	**4**	**-**	**3**	**75**	**25**
3.		**Elective – III**	**4**	**-**	**3**	**75**	**25**
4.	CE 405	Environmental Studies*	**4**	**-**	**3**	**75**	**25**
		PRACTICALS					
1.	CE 481	Seminar	**-**	**3**	**3**	**50**	**25**
2.	CE 482	Project	**-**	**6**	**Viva Voce**	**Gr****	**50**
		TOTAL	**16**	**9**	**-**	**350**	**200**

* Marks not included for award of degree, pass is essential
* *Excellent/ Very Good/ Good/Satisfactory/Unsatisfactory

Elective –II

EC 452 Web Programming & Java
EC 453 Neural Networks & Fuzzy Logic
EC 454 Electro Magnetic Interference & Electro Magnetic Compatibility
EC 455 Design of Fault Tolerant System
EC 466 Global Positioning System
LA 454 Intellectual Property Rights

Elective-III

EC 457 Data Structure using C++
EC 458 Embedded Systems
EC 459 Speech Processing
EC 460 Advanced Topics in Microwave Engineering
EC 461 Micro Electro Mechanical Systems

ME 457 Robotics

EC 451

RADAR AND SATELLITE COMMUNICATION

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

Dropper effect, CW radar, FM CW radar, multiple frequency FW radar. MTI radar, delay line canceller, ranger gated MTI radar, blind speeds, staggered PRF, limitations to the performance of MTI radar, non-coherent MTI radar.

Unit III

Tracking radar: Sequential lobing, conical scan, monopusle: amplitude comparison and phase comparison methods, Radar antennas. Radar displays. Duplexer.
Orbital aspects of Satellite Communication: Introduction to geo-synchronous and geo-stationary 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 systems, power supply system, space craft antennas, multiple access techniques, comparison of FDMA, TDMA, and 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 of specified C/N, satellite data communication protocols.

Suggested Reading

1. Merril. I. Skolnik, Introduction to radar systems, 2nd ed., MGH, 1981
2. Timothy Pratt and Charles Bostian, Satellite Communictions, John Wile, 1986
3. Toomay, Radar Principles of Radar, PHI, 2nd Ed., 2002
4. Dennis Roddy, Satellite Communications, 3rd ed., MGH, 2001
5. M. Richharia, Satellite Communcation Systems: Design principles,MacMillan, 2nd edition, 2003

EC 452

WEB PROGRAMMING AND JAVA

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

Unit I

HTML for Java Programmers: Introduction to Internet. HTML, HTML format, HTML tags, The applet tag, HTML Document Creation. Introduction to scripting languages VB Script and Java Script

Unit II

Features of Java, Java tools, Java applications, The Java language: Java key-words, primitive types, Literals, arrays, Operators, Control Operations: Selection, Iteration, Jumping, Java classes, Class Inheritance, Exception handling, working with Threads: Thread basics, Thread classes, Creating Threads, scheduling and Thread priorities, Daemons, Grouping threads, Thread states, Synchronization.

Unit III

Java Applets, Programming the user interface: Introduction and basic concepts, Abstract Window Toolkit(AWT), Drawing, Interactive Interface Elements, Organizing Interface with Layouts, Images, Windows, Frames, Dialog Box, File dialog Box, Working with Applications, Applet method of interest, Extending the AWT, Extending Components, Event Handling: AWT event handling, the Event Class, Java Input Events: KB events, mouse events.

Unit IV

Working with Databases: Introduction to SQL and Relational Databases, Using java with databases: Java and CGI calls, JDBC API, Server side database Access. IO streams, IO exceptions, Package Java.net: Datagram Packet, Datagram Socket, Inet Address, Server Socket, Socket, URL and URL Connection.

UNIT V

Introduction to CGI, PERL, SERVELETS, RMI, SWINGS, CORBA, EJB,activeX

Suggested Reading:

1. Thomas A. Powell, HTML- The Complete Reference, TMH, 2002
2. Herbert Schildt, Java-The Complete Reference, TMH,
3. Robert Orfali and Donharkey, Client Server Programming with JAVA and CORBA, John Wiley, 2nd ed., 1998
4. Comer, Internet Book-everything you need to know about computer networking & How Internet Works, 3rd ed., PHI, 2002

EC 453

NEURAL NETWORKS AND FUZZY LOGYC

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

Unit I

Basic models of a neruon, Mc-culloch pits model, Percepron model, supervised and unserpervised learning. Basic learning laws, Single and multi-layer perceptrons, back propagation rule, Adaline, madalines and their appliatiosn.

Unit II

Assocaitive meories: Auto-assocaitive , Hetro-associative, Bi-directional assocaiative memories. Discrete and continuous Hopfield networks, energy function and memory capacity. BAM energy function and memory capacity.

Unit III

Recurrent neural networks and their applications: Components of competitive learning network. Basic learning rules and applications of competitive neural networks. Description of kohonen neural network. Basic conepts of adaptive resonance theory.

Unit IV

Fuzzy sets and Fuzy relations: Fuzzy set operation, properteris of fuzzy set,fuzzy tolerane and equivalene and equivalence realtions, value asignments.
Membership Functions: Features of the memebership function, standard forms and boundaries Fuzzification, membership value assignments; intution, inference and rank ordering, defuzzification methods

Unit V
Fuzzy rule Based systems: Natural language, Linguistic Hedges, Rule-based systems, Graphical techniques of Interference.
Fuzzy control systems: Examples of fuzy control system design such as: Aircraft landing system, blood pressure control during anesthesia.

Suggested Reading

1. Freeman J.A and Skapura D.M., Neural networks Algrotihm, Application and Programming Techniques, Addison Wesley, New York, 1991
2. Simaon Haykin, Neural Networks(A Comprehensive foundation), McMillian college Publ. Company, Newy York, 1994
3. John Yen, Reza Langari, Fuzzi Logic(Intelligenc, Control and information), Pearson Education, 2003
4. Dr. K. Sundareswaran, A Learner's Guide to Fuzzy Logic System, Jaico Publishing House, 2005
5. Timothy J. Ross, Fuzzy Logic with Engineering applications, MGH, 1995
6. Satish Kumar, Neural Networks(A Classroom approach), MGH, 2004

7. Limin Fu, Neural Networks in computer Intelligence, TMH, India, 2003

EC 454

EMI AND EMC

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

Unit I

Sources of EMI- Intersystems and Intra system, EMI predictions and modeling, cross talk, cable wiring and coupling, Shielding and Shielding materials, Grounding and bounding

Unit II

Transmitter models for EMI prediction:
Types of emissions: amplitude culling, Frequency culling, Detail prediction and performance prediction of various emissions.
Receiver models for EMI prediction:
Receivier EMI function, Receiver models for amplited culling, Frequency culling. Detail predictions andperformane prediction.

Unit-III

Antenna models for EMI prediction:
Antenna EMI prediction considerations, Antenna models for amplitude culling, frequency culling and detailed prediction.
Progapagation models for EMI prediction:
Proagation considerstion, proapagation models for amplitude culling, propagation models and detailed prediction.

Unit IV

EMI Measurements – Open area test side measurements, measurement precautions, radiated and condcuted interference measurements, control requirements and test methods.

Unit V

EMI filters characteristics of LPF, HPF, BPF, BEF, EMI standards – Military and Industrials standard, FCC regulations

Suggested Reading:

1. William Duff G., & Donald White R.J., Series on Electromagnetic Interference and Compatibility, Vol. V, EMI Prediction and Analysis technique, 1972
2. Dr.Prasad Kodali, V., Engineering Electromagnetic compatibility, S.Chand, 1996
3. Weston David A., Electromagnetic Compatibility, Principles and Applications, 1991
4. Kaiser B.E, Principles of Electromagnetic Compatibility-Artech House, 1987

EC 455

DESIGN OF FAULT TOLERANT SYSTEMS

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

Unit I

Basic conecepts of Reliability: Failures and faults, Reliability and failure rate, relation between reliability and mean time between failure, maintainability and availability, reliability of series and parallel systems. Modelling of faults. Test generation for combinational logic circuits-conventional methods, random testing, transtition count testing and signature analysis.

Unit II

Fault Tolerant Design-I: Basic concepts – static, dynamic, hybrid and self purging redundancy, sift-out modular redundancy(SMR), triple modular redundancy, 5MR reconfiguration, use of error correcting codes.

Unit III

Fault Tolerant Design –II: Time redundancy, softwar redundancy , fail-soft-operation, examples of practical fault tolerant systems, Introduction to fault tolerant.Design of VLSI chips.

Unit IV

Self checking circutis, Design of totally self checking checkers. Checkers using M-out of n 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 tecnhique, level OR-AND-OR design, use of control and syndrome –testable design.
Testable design of sequential circuits: The sequential part technique, Level-sensitive scan design(LSSD) and random access scan technique, built in test: built in test of VLSI chips, design for autonomous self test, design in test ability in logic boards

Suggested Reading:

1. Parag K Lala, Fault Tolerant and Fault Testable Hardware Design, PHI, 1985
2. Parag K Lala, Digital System Design using PLDs, PHI, 1990
3. N.N. Biswas, Logic Design Theory, PHI 1990

4. Konad Chakraborthy & Pinaki Mazumdar, Fault tolerant and Relaibility Techniques for high-density random-access momeores reason, PHI, 2002

EC 456

GLOBAL POSITIONING SYSTEM

Instruction	4 Periods/week
Duration of Exam	3 Hours
University Exam	75 marks
Sessionals	25 marks

UNIT- I

GPS fundamentals: GPS Constellation,Principle of operation, GPS Orbits, Orbital Mechanics and satellite postion determination, Time references, Geometric Dilution of Precision: GDOP,VDOP,PDOP.

UNIT II

Coordinate Systems: Geometry of ellipsoid, geodetic reference system, Geoid,Ellipsoid,Global and Regional datum, WGS-84,IGS, ECI, ECEF.

Various error sources in GPS: Satellite and receiver clock errors, Ephemeris error, Atmospheric errors, Receiver measurement noise and UERE.

UNIT III

GPS measurements: GPS signal structure, C/A and P-codes,Code and carrier phase measurements, position estimation and pseudo range measurements, Spooling and anti spooling, GPS navigation and observation data formats. GPS Applications.

UNIT IV

GPS Augmentation Systems: Code based and carrier based DGPS Techniques,DGPS errors, Wide area augmentation system-architecture, GAGAN, Local area augmentation system concept.

UNIT V

GPS Modernization and other satellite navigation systems: Future GPS satellites, New signals and their benefits, Hardware and Software improvements, GPS integration- GPS/GIS, GPS/INS, GPS/pseudolite, GPS/cellular, GLOMASS,Galileo System.

Suggested Reading

1. Pratap Misra and PerEnge, Global Positioning System Signals, Measurments, and performance, Ganga-Jamuna Press, Masssachusetts, 2001.
2. B.Hofmann-Wellenhof, H.Lichtenegger, and J.Collings, GPS Theory and Practice, Springer Wien, 2000.

3. Ahmed El-Rabbany, Introduction to GPS, Artech House, 2002.

4. Satheesh Gopi, Global ositioning System : Principles and application, TMH, 2005.

5. Bradford W.Parkinson and James J. Spilker, Global Positioning System : Theory and Applications, Volume II, American institute of Aeronautics and Astronautics,Inc., Washigton, 1996.

6. Elliot D. Kaplan, Understanding GPS Princples and Applications, Artech House,1996.

7. A. Leick, GPS Satellite Surveying, John Wiley, 1990.

EC 457

DATA STRUCTURES USING C++

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

UNIT – I

Data Representation: Introduction, linear lists. Formula basic representation, Indirect addressing, simulating pointers, comparison and applications, Arrays, matrices, special and sparse matrices.

UNIT – II

Stacks Definitions, operations and applications, array and link representation of stacks.
Queues: Definitions and operations. Array and linked representation queues applications.

UNIT –III

Trees: Definitions and properties, representation of binary tree operations. Binary tree traversal, Binary Search trees.

UNIT – IV

Sorting: Merge sort, quick sort, selection sort, heap sort, compexity analysis, sequential search, binary search.

UNIT – V

Graphs: Definitions and representation of graphs. Graph search method, applications of Binary trees.

Suggested Reading:

1. S. Sahani, Data Structures, Algorithms and applications in C++ , Mc Graw Hill, 1998.
2. Mark Allen Weiss, Data Structures & Algorithms in C++, PHI, 2002
3. Tannenbaum, Data Structures in C++, PHI, 2002

EC459

SPEECH PROCESSING

Instruction	4 Periods per Week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	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, ceptral decoder, linear predictive decoder, vector quantizer coder.

UNIT – V

Problems in automatic speech recognition, dynamic warping, hidden markow model, speaker identification / verification.

Suggest Reading:

1. Rabiner and Schafer, Digital Processing of Speech Signals, PHI, 1978.
2. Owners FJ, Signal Processing of Speech, Macmillan, 2000.
3. Papamchalis, Practical Approach to Speech Coding, PHI, 1987.
4. Daniel Jurefskey & James H Martin, Speech and Language Processing, Pearson Education, 2003.

EC 460

ADVANCED TOPICS IN MICROWAVE ENGINEERING

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

Sessional 25 Marks

UNIT – I
Impendence matching with reactive elements: single stub, double stub and triple stub, waveguid reactive elements, quarter wave transformers, theory of small reflections, approximate theory of multisection quarter, wave transformers, binomial and chebyshev transformers, tapered transimmision lines.

UNIT – II
Introduction to strip line and micro strip lines, field configuration, characteristic impendence, losses in lines, quality factor, coupled line directional couplers, even and odd mode analysis of four port networks, branch line couplers.

UNIT – III
Microwave integrated circuits, materials, fibrication, hybrid microwave integrated circuits, lumped inductor, capacitor and resistor, advantages and difficulties with MICs.

UNIT – IV
Avalanche transit time devices, read diode, IMPATT didoe, TRAPTT diode, BARITT diode, parametric amplifiers, applications.

UNIT – V
Microwave measurements, detection of microwaves, power measurement, bolometer methods, impendence measurement using slotted line, network analyser, measurement of scattering parameters, frequency and wavelength. Low, high VSWR measurement, measurement of lumped elements.

Suggested Reading:
1. Robert E Collins, Foundation of Microwave Engineering, 2nd ed. MGH, 1992.
2. Samuel Y. Liao, Microwave Devices and circuits, PHI, 2003.
3. Gupta KC & Sinha A, Microwave Integrated Circuits, New Age 1983.

EC 461

MEMS
(Micro Electro Mechanical Systems)

Elective –III
Instruction 3 Periods per week
Duration of Examination : 3 Hours
University of Examination : 50 Marks
Sessional : 25 Marks

UNIT-I

Introduction to Electromechanical switches and their application in elecronics –Pure mechanical switehes ,Magnetic switiches and reed relays Thermo mechanical switches and relays –Bimetallic switches ..Shape memory alloy based switches ,Electro statics force based switches and MEMS.

UNIT-II
Engineering Mechanics & Electro Statics

Review of the mechanical concepts –stress ,strain ,shear force ,Bending moment ,Deflection ,Differential equation describing the deflection under concertrated force,distributed force ,Deflection cures for cantilevers (single and fixed),fixed beams(both ends fixed).Brief description of bending of square and circular plates. Qualitative description of vibrational characteristics of the above structures, Mechanical behavior of thin films.

UNIT III

Electro static excitation,Electric field, flux and flux density, coulombic force due to applied voltage between two plates, Capacitance between two plates, Fringe fields, Laplace's equation and fringe field estimations. Analysis of parallel plate system one fiexed and the other held by a spring, under applied constant voltage- Variation of displacement with applied Voltage-Variation of capacitance and applied voltage- Critical or pull in voltage-Analysis of Cantilevers. And fixed beams under constant voltage excitation , constant charge exciatation, Qualitative analysis of transient behavior of MEM structures.

UNIT IV

MEM switches, Cantilevers, Fixed beam, Plate and diaphragm switches. Plunger switches, sea-saw switches-Normally open switches(NOS) Normally closed switches, Triode switches-multi contact switches,conductive switches-Capactive switches-Switch Gates RF MEMS ,MEMORY Element. MEM Capacitor, Variable Capacitor-Coumb Capacitor.
UNIT V

MEM Technology, properties of MEM materials , Materials normally used Silicion, Sio_2 Metals & Polymers. Processing technologies: Micro Machining and etching, Surface machining (Deposition and etching techniques) Liga-Linthography (X-Ray) Electro forming (deposition) and moulding. Process flow, Packaging, Limitations of MEM Devices- Sticking , Life,Speed,contact life. Present status-integrability with Ics.

Suggested Reading

1. Gabriel.M>Reviez, RF MEMS Theory,Design and technology, John Wiley, 2003.
2. Tai-Ran HSU MEMS & MICRO Systems, Design and Manufacture, TMH, 2nd ed., 2003
3. Thimo Shenko, Strength of Materials, CBS Publishers, 2000.
4. Servey E. Lyshebski, MEMS & NEMS System, CRC Press, 2002.

ME 457

ROBOTICS
(ELECTIVE-III)

Instruction :	3 Periods per week
Duration of Examination :	3 Hours
University of Examination :	50 Marks
Sessional :	25 Marks

UNIT-I

Robots:History and evolution of robots,Laws of robotics ,Basic configuration ,degree of freedom ,work envelope ,motion contriol methods .Application in industry –material handling ,loading & unloading processing ,welding & painting appilication ,assembly and inspection, Robot specification requirements.

UNIT-II

Rotation matrix ,Homogenous transortmation matrix ,Denavit –Hartenberg cinvention .Euler angles ,RPY representation.Direct and inverse kinematics for industrial rtobotics for postion and orientation Redundancy.

UNIT-III

Manipulator Jacobian Joint –End effectors velocity –direct and inverse velocity analysis ,Trajectory planning ,interpolation cubic polynomial linear segments with parabolic blending ,static force and moment transformation ,solvability ,stiffness ,singularities.

UNIT-IV

Robort dynamics :Lagrangian formulation ,link Inertia tensor and manipulator Inertia tensor ,Netwon –Euler formulation for RR & RP Manipulation ,control; Individual Joint ,computed torque.

UNIT-V

End effectors.Postion and velocity measurement .Sensor : Proximity and range ,tactile ,force and torque .Drivers for robots:Electrical ,hydraulic and pneumatic.Robort vision :Introduction to techniques ,image acquisition and processing .Introduction to robort programming languages like AL and AML.

Suggested Reading:

1. Spong and vidyasager ,Robort Dynamics and control ,John Wiley ans Sons ,1990.
2. R.K Mittal and I.J Nagrath ,Robotics and contro,l,TMH,2003.
3. Groover,Indutrial Robotics ,MGH.
4. Asada and Slotine ,Robort Analysis and Intelligence,Wiley Intersciences ,1986.
5. Fu.K.S Gon Zalez R.C., R.C Lee C.S.G ., Robotics ,Control Sensing Vision and Intelligence,MGH ,Int.Etd.,1987.

CE 405

ENVIRONMENTAL STUDIES

Instruction : 3 Periods per week
Duration of Examination : 3 Hours

University of Examination : 50 Marks
Sessional : 25 Marks

UNIT-I

Environmental studies Defination ,scope and importance ,need for public awareness.
Natural resource :Water resources ,use and over utilization of surface and ground water ,floods ,drought ,conflicts over water ,dams-benefits and problems.Effect of modern agriculture, fertilizer ,pesticides problem ,water logging salinity.
Energy resources ;growing energy needs ,renewable and non-renewable energy source.Land resources ;land as a resources,land degradation,soil erosion and destructification.

UNIT-II

Ecosystems:Concept of an ecosystem,structure and function of an eco system ,producers ,consumers and decomposers,energy flow in ecosystem ,food chains,ecological pyramids ,aquatic ecosystem (ponds,streams,lakes,rivers,oceans,estuaries).

UNIT-III

Biodiversity :Genetic species and ecosystem diversity ,biogeographical classification of India.value of biodiversity ,threats to biodiversity,endangered and endemic species of India,conservation of biodiversity.

UNIT-IV

Environmental pollution :causes and control measures of air pollution ,water pollution ,soil pollution ,noise pollution,thermal pollution and solid waste management. Enviroment protection act:Air ,water,forest & wild life acts ,issues involved in enforcement of environmental legislation.

UNIT V

Social issues and the environment: Water conservation ,watershed management and environmental ethics.Climate change;global warming,acid rain,Ozone layer depletion,Environmental protection act ,population explosion.

Suggested Reading:

1.De A.K Environmental Chemistry ,Wiley Eastern Ltd.,1989.
2. Odum E .P.Fundamentals of Ecology ,W.B.Saunders Co.,USA ,1975.
3. RaoM.N and Datta A.K ., Waste weater treatment ,Oxford & IBH publishning Co.,1987.
4. Miller T.G Jr.Environmental Sciences ,Words Worth Publishing Co.,1984

EC 481

MICRO CONTROLLER LAB

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

Sessional : 25 Marks

Note:

1. This lab course will make use of
   a) 8051 family of microcontroller,
   b) C/C++ and Assembly language along with any suitable monitor program (PAULMON available at http://www.pjrc.com/tech/8051) and RTOS such as MC/O5 free software of any commercial one.

2.

a) Preliminary explanation of the features and use of the tools must be made in 2/3 Theory periods with a small had out provided.

b) To make the free software tools be copied on to CD by each student for their extensive use.

1.List of Experiments:

1.

a) Introduction to the embedded programming environment – various sensors actuators ,test and measuring equipment ,multi channel Digital storage scope ,logical analyzer ,DVM ,data loggers used.

c) A small embedded system demostrration be provided at the beginning .

2. Switch input detection program using C aand Assembly language with and without the use of 8255(PPI)

3. Gernal purpose digital input/output module that covers switches ,lamp and terminals using C.

4. Program to control a motor(Synchronous/stepper)

5.Bidirectional control of motors (Synchronous /stepper).

6.Using A/D and D/A convertors to interface with sensors and motors etc.

7 & 8. Experiment involving sensors such as temperature sensors ,touch sensors ,Range IR proximity sensors ,Ultra –sonic sensors,IR path following sensors ,Sound sensors

9-11. C program based exercise with clock ,real time clock ,interrupts,timer ,Warchdog timers.

12.Mini project:

such as:

i) Exercise using C and Assembly language (Preferably using RTOS such as MC/O5) such as ::task management ,multithreading ,semaphores ,scheduling ,priority based scheduling ,assigning priority inversion, avoiding deadlock ,dynamic memory allocation, recursive functions and memory allocation .

ii) Design of an mobile robot: The robot may have the following features .Two power wheels to move to move around infrared and ultrasonic sensors to detect obstacles ahead ,intelligences such as NOT bumping into walls ,communication link to receive commands from the user ,power system containing battery etc.

EC482

SEMINAR

Instruction : 3 Periods per week
Sessional : 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 specialization.
Seminar topics may be chosen by the students with advice from the faculty members .Students are to 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 to the last week of the semester and any change in schedule 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 written presentation as well as their involvement in the discussions.

EC483

PROJECT`

Instruction : 6 Periods per week
University Examination : Viva –Voice:Grade
Sessional : 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 reference) well in Advanced ,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 any or all elements such as analysis, design ands synthesis.
The department should appoint a project coordinate who will coordinate the following.

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

All project allotment are to completed by the 4th week of IV –Year,I –Semester ,so that the student 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 project are carried out in reputes industries /research organization with the help of industry coordinators. Problem 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 line:

1. The project little should be task oriented for example "Analysis and Modeling of ….."
2. Objectives of the project should be identical 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 (Limits to one /two paragraphs ,page no1 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' 10 8 m/s)
    i. Chapter I should be introduced (I Limited 4-5 pages) .This should contain section 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 result with discussion and conclusions.
    k. Reference 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 report 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 evaluates and one of the following grades may be awarded at the external examination .

Excellent/Very Good /Good /Satisfactory /Unsatisfactory

Curricula and Syllabi for the B.E. Programmes as approved by the University