

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

TEACHING AND EVALUATION SCHEME

DISCIPLINE: ELECTRONICS & TELECOMMUNICATION ENGINEERING

SEMESTER : VI

Subject Code	Subject	PERIODS			Evaluation Scheme						TOTAL
		L	T	P	SESSIONAL EXAM			END SEM EXAM	PRACTICAL EXAM	TERM WORK	
					TA	CT	TOTAL				
Theory											
BST -501 OR HMT 601	Environmental Studies OR Entrepreneurship and Management	5			10	20	30	70	-		100
ETT 601	Advanced Communication Engineering	4		-	10	20	30	70	-		100
ETT 602	Microcontroller, Embedded System & PLCs	4		-	10	20	30	70	-		100
ETT 603	Digital Signal Processing	4		-	10	20	30	70	-		100
ETT 604	ELECTIVE (any ONE) (i)Artificial Intelligence and Robotics (ii)Speech and Audio Processing (iii)Cloud Computing (iv)Image & Video Processing	4			10	20	30	70	-		100
Practical											
ETP 601	Advanced Communication Lab	-	-	4	-	-			25	25	50
ETP 602	Microcontroller & Embedded System Lab	-	-	4	-	-	-		25	25	50
ETP 603	Computer Hardware & Maintenance Lab	-	-	3	-	-	-		25	25	50
ETP 604	PLC & Network Lab	-	-	3	-	-	-		25	25	50
ETP 605	Electronics Project Work & Seminar. & Library Study	-	-	4					25	25	50
	TOTAL:	21		18	50	100	150	350	125	125	750

TOTAL PERIODS PER WEEK : 39

TOTAL SEMESTER MARKS: 750

Abbreviations: L-Lecture, T-Tutorial, P-Practical, TA- Teacher's Assignment, CT- Class test

Minimum Pass Mark in each Teaching Subject is 35% and in Practical subject is 50%

ENVIRONMENTAL STUDIES
(Common to all Branches of Engg.)
BST-501

Period/Week: 05

Total Marks: 100

Total Periods: 75

Theory End Exams: 70; CT (20) +IA (10)

Rationale:

Due to various aspects of human developments including the demand of different kinds of technological innovations, most people have been forgetting that, the Environment in which they are living is to be maintained under various living standards for the preservation of better health. The degradation of environment due to industrial growth is very much alarming due to environmental pollution beyond permissible limits in respect of air, water industrial waste, noise etc. Therefore, the subject of Environmental Studies to be learnt by every Engineering student in order to take care of the environmental aspect in each and every activity in the best possible manner.

OBJECTIVES:

After completion of study of environmental studies, the student will be able to:

1. Gather adequate knowledge of different pollutants, their sources and shall be aware of solid waste management systems and hazardous waste and their effects.
2. Develop awareness towards preservation of environment.

Unit 1: The Multidisciplinary nature of environmental studies (04 periods)

Definition, scope and importance, Need for public awareness.

Unit 2: Natural Resources (12 periods)

Renewable and non renewable resources:

a) Natural resources and associated problems.

- Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction mining, dams and their effects on forests and tribal people.
- Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems.
- Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources.
- Food Resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizers- pesticides problems, water logging, salinity, .
- Energy Resources: Growing energy need, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
- Land Resources: Land as a resource, land degradation, man induces land slides, soil erosion, and desertification.

b) Role of individual in conservation of natural resources.

c) Equitable use of resources for sustainable life styles.

Unit 3: Systems (12 periods)

- Concept of an eco system.
- Structure and function of an eco system.
- Producers, consumers, decomposers.
- Energy flow in the eco systems.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following eco system:

- Forest ecosystem:
- Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit 4: Biodiversity and it's Conservation (08 periods)

- Introduction-Definition: genetics, species and ecosystem diversity.
- Biogeographically classification of India.
- Value of biodiversity: consumptive use, productive use, social ethical, aesthetic and optin values.
- Biodiversity at global, national and local level.
- Threats to biodiversity: Habitats loss, poaching of wild life, man wildlife conflicts.

Unit 5: Environmental Pollution. (18 periods)

Definition Causes, 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.

Disaster management: Floods, earth quake, cyclone and landslides.

Unit 6: Social issues and the Environment (12 periods)

- Form unsustainable to sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, water shed management.
- Resettlement and rehabilitation of people; its problems nd concern.
- Environmental ethics: issue and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies.
- Air (prevention and control of pollution) Act.
- Water (prevention and control of pollution) Act.
- Public awareness.

Unit 7: Human population and the environment (09 periods)

- Population growth and variation among nations.
- Population explosion- family welfare program.
- Environment and human health.
- Human rights.
- Value education
- Role of information technology in environment and human health.

Recommended Books:

1. Textbook of Environmental studies, Erach Bharucha, #UGC
2. Fundamental concepts in Environmental Studies, D.D. Mishra, S.Chand & Co-Ltd,
3. Text book of Environmental Studies by K.Raghavan Nambiar, SCITECH Publication Pvt. Ltd.
4. Environmental Engineering by V.M.Domkundwar- Dhanpat Rai & Co.
5. Environmental Engineering & Safety by B.K.Mohapatra.

ENTREPRENEURSHIP & MANAGEMENT **(Code :HMT-601)**

Period/Week: 05
Total Periods: 75

Total Marks: 100
Theory End Exams: 70; CT (20) +IA (10)

(COMMON TO ALL BRANCHES OF ENGG EXCEPT CIVIL/ CSE/ IT)

OBJECTIVES:

On completion of the course, students will be able to :

1. Understand the concept of different forms of organization including MSME and various managerial functions.
2. Understand Entrepreneurship and choose it as a career option after study.
3. Learn about the basic financial accounting and cost control.
4. Know different areas of management relating to stores and purchase, finance, production, sales and marketing and human resources in an organization.
5. Learn about various reasons of industrial sickness and its remedial measures.
6. Have a comprehensive idea on important legislations relating to employment in Factory.

SYLLABUS

1. **Concept of Organization & Enterprise Management:** **12 periods**
 - 1.1. Meaning, features and components of Business
 - 1.2. Different forms of Business Organizations with features
 - 1.3. Meaning, definitions and importance of management
 - 1.4. Difference between Management & Administration
 - 1.5. Functions of management- Planning, Organizing, Staffing, Directing (including Motivation, Leadership & Communication), Coordinating and Controlling.
 - 1.6. Principles of Scientific Management.

2. **Entrepreneurship & Management of MSME:** **12 periods**
 - 2.1. Meaning & Need of Entrepreneurship
 - 2.2. Qualities of an Entrepreneur
 - 2.3. Relevance of Entrepreneurship of Socio-economic gain
(Generating national wealth, creating wage & self employment, developing MSME enterprises, Optimizing human and national resources, building enterprising personalities and society
 - 2.4. Micro, Small and Medium Enterprises. (investment limits of MSME)
 - 2.5. Project Report- PPR & DPR. (Preparation of a PPR)
 - 2.6. Incentives available to MSME as per the latest IPR
 - 2.7. Role of DIC, OSFC, OSIC, IDCO, SIDBI, IPICOL and Commercial Banks in the context of MSME.

3. **Financial Accounting & Cost Control:** **12 periods**
 - 3.1. Double- entry System of Book –keeping and types of accounts
 - 3.2. Journal, Ledger, Cash Book (different types), Trial balance
 - 3.3. Components of Final Accounts- Trading A/c, Profit & Loss A/c and Balance Sheet
 - 3.4. Elements of Cost and Preparation of Cost Sheet
 - 3.5. Break-even Analysis

4. **Financial Management:** **04 periods**
 4.1. Meaning & Importance
 4.2. Finance Functions
 4.3. Types of Capital- Fixed & Working Capital
 4.4. Components of Working Capital, Working Capital Cycle
5. **Stores & Purchase Management:** **05 periods**
 5.1. Inventory Control : Importance & Techniques
 5.2. Purchase management-Principles & Procedures
 5.3. Important Store Records (Bin Card, Stores Ledger & GRN)
6. **Production Management:** **04 periods**
 6.1. Production & Productivity
 6.2. Production , Planning & Control- (meaning & steps)
7. **Sales & Marketing Management:** **08 periods**
 7.1. Sales & Marketing Management- Meaning & Importance
 7.2. Selling Methods
 7.3. Product Policy- (Branding, Packaging, Labeling)
 7.4. Product-mix, Pricing methods and Sales Promotion including its techniques.
 7.5. Advertising & its media
8. **Human Resource management:** **06 periods**
 8.1. Need & Importance
 8.2. Recruitment & its sources
 8.3. Selection- Methods
 8.4. Training- Need, & Methods
 8.5. Need of Performance Appraisal
9. **Industrial Sickness:** **04 periods**
 9.1. Meaning & Symptoms of Sickness
 9.2. Causes of Industrial Sickness
 9.3. Remedial measures of Sickness
10. **Industrial Legislation:** **08 periods**
 10.1. Major Provisions of Factories Act relating to Health, Welfare, Safety, Accidents, Hours of Work, employment of Women
 10.2. Duties and Power of Factory Inspector
 10.3. Major Provisions of Employee's Compensation Act.

Books Recommended:

- | | |
|--|----------------|
| 1. Industrial Engineering & Management : | O.P.Khanna |
| 2. Entrepreneurship for Engineers : | B.Badhei |
| 3. Principles & Practice of Management : | L.M.Prasad |
| 4. Industrial Engineering & Management: | Banga & Sharma |
| 5. Mercantile Law: | N.D.Kapoor |
| 6. Industrial Engineering & production Management: | M.Mahajan |
| 7. Industrial Policy Resolution (latest) | |

ADVANCED COMMUNICATION ENGINEERING
SIXTH SEMESTER

Theory & Tutorial – 4P/W
Total Theory & Tutorial: 60P

Examination: 3Hr
Total Marks: 100
Theory: 70
TA :10 CT: 20

A: RATIONALE:

The Communication has a wide long history, of application in different technology. This subject deals with different advanced techniques of Communication Engineering. The Microwave Engineering, Radar and Navigation aids an example of Communication system. The Satellite, Mobile and Optical Fiber Communication has today permeated almost every field of modern society. This has been incorporated in this subject.

B: OBJECTIVES:

At the end of the course the students should be able to :

- Discuss the principles of RADAR system & types
- State the various uses of radar in field of navigation system and aircraft Landing system.
- Define & Describe Satellite Orbital patterns and categories(LEO,MEO& GEO)
- Describe Geostationary satellite, satellite earth station & Link Station.
- Explain the operation of direct broadcast system (DBS) & VSAT system.
- Compare the advantage and disadvantage of optical fiber metallic cables
- Describe how light wave propagate to optical fiber& .Know source & detector
- Define the modes of propagation and index profile of optical fiber
- Discuss the operation of Basic Telephone System & Electronic Telephone System.
- Describe the operation of a PBX.

C: COURSE CONTENTS&DISTRIBUTION OF PERIODS :**1. RADAR & NAVIGATION AIDS.****15**

- 1.1 State and explain the simple Radar system & its classification
- 1.2 Derive Radar range equation, types of radar and their application.
- 1.3 Explain the Performance factor of radar.
- 1.4 Describe the block diagram of pulsed radar system.
- 1.5 State the function of radar indication and moving target indicator.
- 1.6 Define Doppler effect&Describe the block diagram of C.W radar.
- 1.7 Explain the radar aids to navigator.
- 1.8 Explain aircraft landing system.
- 1.9 Explain the concept of Navigation Satellite System.(NAVSAT) & GPS System
- 1.10 Simple radar problems.

2. SATELLITE COMMUNICATION.**15**

- 2.1 Define & Describe Satellite Orbital patterns and elevation(LEO,MEO & GEO) categories
- 2.2 Describe the Concept of Geostationary Satellite , calculate its height, velocity & round trip time delay & their advantage & disadvantage over other system
- 2.3 State Satellite frequency allocation and frequency bands.
- 2.4 Describe General structure of satellite Link system (Uplink, Down link, Transponder, Crosslink)
- 2.5 Explain the operation of direct broadcast system (DBS)
- 2.6 Explain the operation of VSAT system.
- 2.7 Define multiple accessing & name various types.
- 2.8 Discuss the Time Division Multiple Accessing(TDMA) & Code Division Multiple Accessing (CDMA) & its advantages & dis-advantages.
- 1.9 Describe Satellite Application- Communication .Satellite, Digital Satellite Radio.
- 1.10 Explain GPS Receiver & Transmitter.

2. OPTICAL FIBER COMMUNICATION.**20**

- 3.1 Define optical communication.
- 3.2 Compare the advantage and disadvantage of optical fiber metallic cables
- 3.3 Define Electromagnetic Frequency and wave line spectrum
- 3.4 Need and advantages of optical fibers & principles of light transmission in a fiber using Ray Theory
- 3.5 Describe the optical fiber construction

- 3.6 Explain the following terms: Velocity of propagation, Critical angle, Acceptance angle & numerical aperture
- 3.7 Discuss the block diagram of an optical fiber communication system
- 3.8 Define the modes of propagation and index profile of optical fiber
- 3.9 Describe the three types optical fiber configuration: Single-mode step index, Multi-mode step index, Multi-mode Graded index
- 3.10 Attenuation in optical fibers – Absorption losses, scattering, losses, bending losses, core and cladding losses- Dispersion – material Dispersion, waveguide dispersion, Intermodal dispersion
- 3.11 Optical sources – LED- semiconductor
- 3.12 Define LASER ,its working Principles Block diagram using laser feedback control circuit
- 3.13 Explain Optical detectors – PIN and APD diodes & Block diagram using APD
Connectors and splices –Optical cables - Couplers
- 3.14 Applications of optical fibers – civil, Industry and Military application
- 3.15 Explain concept of Wave Length Division Multiplexing (WLDM) principles.

4. TELECOMMUNICATION SYSTEM

10

- 4.1 Discuss the operation of Electronic Telephone System. (Telephone Set)
- 4.2 Discuss the function of switching system.& Call procedures
- 4.3 Discuss the principle of space and time switching.
- 4.4 Discuss the numbering plan of telephone networks (National Schemes & International Numbering)
- 4.6 Describe the operation of a PBX & Digital EPABX.
- 4.7 Define units of Power Measurement.
- 4.8 Describe the operation of Internet Protocol Telephone.
- 4.9 Describe the principal of Internet Telephone

RECOMMENDED BOOKS:

A. TEXT BOOKS:

- 1. Optical Fiber comm. Principles and practice John M.Senior.
- 2. Microwave Engineering- M. Kulkarni – UMESH Pub
- 3. Telecommunication and the computer – James Martine
- 4. Advance Electronics Communication System-Wayne Tomasi

A. REFERENCE BOOKS:

- 1. Electronic communication system – G.Kennedy.
- 2. Principle of Electronics Telecommunication system – CoulsE.frenzel.
- 3. Satellite Comm.- RebertM.Gagriardi
- 4. Optical Fiber Communication Essentials by Greb Keiser-TMH
- 5. Rader& Microwave engineering- M.Kulkani
- 6. Optical Fibre communication system by SK Sarkar-Schand

MICRO CONTROLLOR, EMBEDDED SYSTEM & PLCs
SIXTH SEMESTER
(common to ETC/AEI)

Theory & Tutorial – 4 P/W
Total Theory & Tutorial: 60 P

Examination: 3Hr
Total Marks: 100
Theory: 70
TA :10 CT: 20

A: RATIONALE:

Computational tools & computing machines are always for technology implementation in field of automation for industries and domestic products. Hence micro controls, Embedded System & PLCs are integral part of Automation and semi-automation machine. Each day, our lives become more dependent on 'Embedded Systems', digital information technology that is embedded in our environment. This includes not only safety-critical applications such as automotive devices and controls, railways, aircraft, aerospace and medical devices, but also communications, 'mobile worlds' and 'e-worlds', the 'smart' home, clothes, factories etc. All of these have wide-ranging impacts on society, including security, privacy and modes of working and living. More than 98% of Processors applied today are in embedded systems, and are no longer visible to the customer as 'computers' in the ordinary sense. New processors and methods of processing, sensors, actuators, communications and infrastructures are 'enablers' for this very pervasive computing..

B: OBJECTIVS:

At the end of the course the students should be able to :

- i. Gate Idea of Embedded System & Different Technology.
- ii. Know the application of Embedded System.
- iii. Know the various peripherals.
- iv. Concept in PLC & its Programming.

C: COURSE CONTENTS&DISTRIBUTION OF PERIODS :

- | | | |
|-----------|--|-----------|
| 1. | Introduction to Embedded Systems | 10 |
| 1.1 | Embedded Systems Overview
-What are they?
-A shortlist of embedded systems
-Some common characteristics of embedded systems
-An embedded system example – A Digital Camera | |
| 1.2 | Embedded Systems Technologies
-Technology – Definition
-Technology for Embedded Systems
-Processor Technology
-IC Technology
-Design Technology | |
| 1.3 | Processor Technology
-General Purpose Processors – Software,
Basic Architecture of Single Purpose Processors – Hardware | |
| 1.4 | Application – Specific Processors
-Microcontrollers
-Digital Signal Processors(DSP) | |
| 1.5 | IC Technology
- Full Custom / VLSI
- Semi Custom ASIC (Gate Array & Standard Cell)
- PLD (Programmable Logic Device) | |
| 2. | MICROCONTROLLER 8051 Architecture | 10 |
| | 2.1 Difference between microcontroller & general purpose Microprocessor. | |
| | 2.2 Explain the Block diagram of the Architectural of 8051. | |
| | 2.3. Explain the PIN Diagram features of the 8051 . | |
| | 2.4 Explain the 8051 Programming Model. | |
| | 2.5 Explain 8051 register banks and stack | |
| | 2.6 Explain the Port Structure & Operation, Timer/Counters, serial Interface& External Memory. | |

3.	8051 Addressing Modes & Instruction Set	07
3.1	Explain different addressing modes of 8051.	
3.2	Explain the different types of Instruction sets of 8051.	
	<ul style="list-style-type: none"> • Data Transfer • Arithmetic Operations • Logical Operations • Boolean Variable Manipulation • Program Branching etc. 	
4.	MICRO CONTROLLER 8051 Assembly Language Programming Tools.	11
4.1	Programs using Jump, Loop and Call Instructions <ul style="list-style-type: none"> ▪ Loop and Jump Instructions, ▪ Call Instructions ▪ Time Delay Generation and Calculation 	
4.2	I/O Port Programming I/O Programming, Bit manipulation	
4.3	Arithmetic Programs <ul style="list-style-type: none"> ▪ Unsigned Addition and Subtraction ▪ Unsigned Multiplication and Division ▪ Signed number concept and Arithmetic operations 	
4.4	Logic Programs <ul style="list-style-type: none"> ▪ Programs using Logic and Compare Instructions ▪ Programs using Rotate and Swap Instructions ▪ BCD and ASCII Application Programs 	
4.5	Programming using single-bit Instruction <ul style="list-style-type: none"> • Single-bit Instruction Programming • Programs using Single-bit Operations with CY • Use Instructions which reads the status of input pin and reads internal latch of the output port 	
4.6	Simple Programs <ul style="list-style-type: none"> • The addition of 8bit numbers located in two memory addresses • Write a subroutine that can be used to produced a time delay and which can be set to any value • Create a Square wave of different duty cycle • Simple 8051 programming in C 	
4.7	Counter / Timer Programming <ul style="list-style-type: none"> • Programming 8051 Timers • Counter Programming • Programming timer 0 & 1 in 8051C 	
5.	Peripherals	07
5.1	Explain Watchdog Timers, LCD Controllers,	
5.2	Explain Analog-to-Digital converters	
5.3	Explain Real- Time Clocks	
5.4	Explain DS 12887 RTC chip & its interfacing	
5.5	Motor Control: Relay and optoisolator, Stepper motor interfacing, DC MOTOR Interfacing	
6..	Programmable Logic Controllers(PLCs)	15
6.1	Draw the block diagram showing the major components of PLC and state each function of each block.	
6.2	Explain the basic operation of PLC	
6.3	Describe briefly PLC programming	
6.4	Explain address of inputs, outputs and internal of a PLC	
6.5	State the difference between a programmable controller and a computer	
6.6	Explain how a PLC memory is organized	
6.7	Explain program scan of a PLC	
6.8	Explain internal instruction of PLC	
6.9	Program EXAMINE instruction&Program a ladder Rung diagram	
6.10	Program PLC timer	

- 6.11 Program PLC as a counter
- 6.12 Understand control instructions of PLC
- 6.13 Understand Data management instruction of PLC
- 6.14 Understand Compute Instruction of PLC
- 6.15 Explain sequences in a program of a PLC
- 6.16 Explain how I/O interface handles numerical data in PLC
- 6.17 Draw the solid state logic control circuit for the following problems and explain Motor control circuit to provide sequence control to Motor 1 and Motor 2

BOOKS:

A: TEXT BOOK:

- 1. 8051 Microcontroller an Embedded Systems by Mazidi, Mazidi, McKinlay-Paerson
- 2. Embedded System by Frank Vahid & Tony Givargis.
- 3. Programmable logic Controllers by Frank D. Petruzela -TMH
- 4. Microcontrollers by Ajaya Deshmukh, TMH.

B: REFERENCE BOOKS:

- 1. Programme logic controller –Dr.M.Mitra & Dr.S.Sengupta
- 2. 8051 Microcontroller by V Udayashankara & MS Mallikarjunaswamy -TMH
- 3. 8051 Microcontroller & Embedded System by Sampath K. Venkash
- 4. Microprocessor & Microcontroller by R Theagarajan - SCITECH

DIGITAL SIGNAL PROCESSING
SIXTH SEMESTER
(Common to ETC/AEI)

Theory & Tutorial – 4P/W
Total Theory & Tutorial:60P

Examination: 3Hr
Total Marks: 100
Theory: 70
TA :10CT: 20

A: RATIONALE:

DSP, or Digital Signal Processing, as the term suggests, is the processing of discrete-time signals by digital means. A signal in this context can mean a number of different things. Historically the origins of signal processing are in electrical engineering, and a signal here means an electrical signal carried by a wire or telephone line, or perhaps by a radio wave. More generally, however, a signal is a stream of information representing anything from stock prices to data from a remote-sensing satellite. A digital signal consists of a stream of numbers, usually (but not necessarily) in binary form. The processing of a digital signal is done by performing numerical calculations. Digital signal processing is a technology driven field which dates its growth where Computers and Digital Circuitry became fast enough to process large amount of data efficiently.

B: OBJECTIVES:

On completion of the study the students will be able to:

- To provide background and fundamental materials in discrete time system, digital signal processing technique, design procedures of digital filters and discrete Fourier transform.
- Understand signal system & signal processing.
- Differentiate continuous time & discrete time signals.
- Explain the concepts of frequency in continuous time, discrete time signals and harmonically related complex exponential.
- Classify the signals like multi-channel, multidimensional, continuous time vs. discrete time signals and continuous valued vs. discrete valued signals.
- Convert analog signal to digital & vice-versa.
- State and explain sampling theorem. & quantization of continuous-amplitude signals, sinusoidal signals., Analyze digital signal & system verses discrete time signals & systems.
- Explain discrete time signals & classify discrete-time signals.
- Describe discrete time systems with block diagrams, classification & interconnections.
- Analyze linear invariant systems using different techniques.
- Describe discrete time system using different equations.
- Apply Z-transform on LTI systems.
- Know discrete Fourier transform, its properties & state its application.
- Study of Fast Fourier Transform algorithms & Digital Filters.

C: COURSE CONTENTS & DISTRIBUTION OF PERIODS:**1. INTRODUCTION.****11**

- 1.1 Discuss Signals, Systems & Signal processing.
 - 1.1.1 Explain basic element of a digital signal processing system.
 - 1.1.2 Compare the advantages of digital signal processing over analog signal processing.
- 1.2 Classify signals
 - 1.2.1 Multi channel & Multi dimensional signals.
 - 1.2.2 Continuous time verses Discrete -time Signal.
 - 1.2.3 Continuous valued verses Discrete -valued signals.
- 1.3 Discuss the concept of frequency in continuous time & discrete time signals.
 - 1.3.1 Continuous-time sinusoidal signals.
 - 1.3.2 Discrete-time sinusoidal signals.
 - 1.3.3 Harmonically related complex exponential.
- 1.4 Discuss Analog to Digital & Digital to Analog conversion & explain the following.
 - 1.4.1 Sampling of Analog signal,
 - 1.4.2 The sampling theorem.
 - 1.4.3 Quantization of continuous amplitude signals,
 - 1.4.4 Coding of quantized sample.

- 1.4.5 Digital to analog conversion.
- 1.4.6 Analysis of digital systems signals vs. discrete time signals systems.
- 2. DISCRETE TIME SIGNALS & SYSTEMS. 15**
- 2.1 State and explain discrete time signals.
 - 2.1.1 Discuss some elementary discrete time signals.
 - 2.1.2 Classify discrete time signal.
 - 2.1.3 Discuss simple manipulation of discrete time signal.
- 2.2 Discuss discrete time system.
 - 2.2.1 Describe input-output of system.
 - 2.2.2 Draw block diagram of discrete- time systems
 - 2.2.3 Classify discrete time system.
 - 2.2.4 Discuss inter connection of discrete -time system.
- 2.3 Discuss discrete time time-invariant system.
 - 2.3.1 Discuss different technique for the analysis of linear system.
 - 2.3.2 Discuss the resolution of a discrete time signal in to impulse.
 - 2.3.3 Discuss the response of LTI system to arbitrary I/Ps using convolution theorem.
 - 2.3.4 Explain the properties of Convolution & interconnection of LTI system.
 - 2.3.5 Study systems with finite duration and infinite duration impulse response.
- 2.4 Discuss discrete time system described by difference equation.
 - 2.4.1 Explain recursive & non-recursive discrete time system.
 - 2.4.2 Determine the impulse response of linear time invariant recursive system.
- 3 THE Z-TRANSFORM & ITS APPLICATION TO THE ANALYSIS OF LTI SYSTEM. 12**
- 3.1 Discuss Z-transform & its application to LTI system.
 - 3.1.1 State & explain direct Z-transform.
 - 3.1.2 State & explain inverse Z-transform.
- 3.2 Discuss various properties of Z-transform.
- 3.3 Discuss rational Z-transform.
 - 3.3.1 Explain poles & zeros.
 - 3.3.2 Determine pole location time domain behavior for casual signals.
 - 3.3.3 Describe the system function of a linear time invariant system.
- 3.4 Discuss inverse Z-transform.
 - 3.4.1 Determine inverse Z-transform by partial fraction expansion.
- 4 DISCUSS FOURIER TRANSFORM: ITS APPLICATIONS PROPERTIES. 12**
- 4.1 Discuss discrete Fourier transform.
- 4.2 Determine frequency domain sampling and reconstruction of discrete time signals.
- 4.3 State & Explain Discrete Time Fourier transformation(DTFT)
- 4.4 State & explain Discrete Fourier transformation (DFT).
- 4.5 Compute DFT as a linear transformation.
- 4.6 Relate DFT to other transforms.
- 4.7 Discuss the property of the DFT.
- 4.8 Explain multiplication of two DFT & circular convolution.
- 5 FAST FOURIER TRANSFORM ALGORITHM & DIGITAL FILTERS. 10**
- 5.1 Compute DFT & FFT algorithm.
- 5.2 Explain direct computation of DFT.
- 5.3 Discuss the radix-2 algorithm. (Small Problems)
- 5.4 Introduction to digital filters.(FIR Filters)
- 5.5 Introduction to DSP architecture, familarsation of different types of processor.

BOOKS:

TEXT BOOKS:

1. Digital signal processing principles algorithms & applications by J.G.Proakis& Dimities G. Manolakis, Peason.
2. Digital Signal Processing by Ramesh Babu.

REFERENCE BOOKS:

1. Digital signal processing By A.V.Oppenleim&W.Schafer.
2. Digital Signal Processing by S Salivahanan, AVallavaraj, C Gnanapriya Tata McGraw Hill.
3. DigitaisationbyB.Somanath Nair, PHI.

ARTIFICIAL INTELLIGENCE & ROBOTICS
SIXTH SEMESTER(Elective)

Theory & Tutorial – 4P/W
Total Theory & Tutorial:60 P

Examination: 3Hr
Total Marks: 100
Theory: 70
TA:10 CT: 20

A: RATIONALE:

Artificial intelligence (AI) is the intelligence exhibited by machines or software, and the branch of computer science that develops machines and software with human-like intelligence. Major AI researchers and textbooks define the field as "the study and design of intelligent agents", where an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success. John McCarthy, who coined the term in 1955, defines it as "the science and engineering of making intelligent machines". **Robotics** is the branch of technology that deals with the design, construction, operation, and application of robots, well as computer systems for their control, sensory feedback, and information processing. These technologies deal with automated machines that can take the place of humans in dangerous environments or manufacturing processes, or resemble humans in appearance, behavior, and/or cognition. Many of today's robots are inspired by nature contributing to the field of bio-inspired robotics and will play an important role in industrial sector now a days.

B: OBJECTIVES:

On completion of the study the students will be able to:

- Know Basic configuration of Robotics & its working.
- Know Robot Control & Motion Analysis
- Know about programming.

C: TOPIC WISE DISTRIBUTION OF PERIODS:**1. Artificial Intelligence****18**

- 1.1 Definition of AI ,Scope of AI -Games, theorem proving, natural language processing, Vision and speech processing, robotics, expert systems,
- 1.2 AI techniques- search knowledge, abstraction.
- 1.3 Problem solving - State space search; Production systems, search space control: depth-first, breadth-first search, heuristic search - Hill climbing, best-first search, branch and bound.
- 1.4 Problem Reduction, Constraint Satisfaction End, Means-End Analysis
- 1.5 Knowledge Representation- Predicate Logic: Unification, modus ponens, resolution, Dependency directed backtracking. Rule based Systems : Forward reasoning: conflict resolution, backward reasoning: use of no backtrack.
- 1.6 Structured Knowledge Representation: Semantic Nets: slots, exceptions and default frames, conceptual dependency, scripts.
- 1.7 Handling uncertainty and learning- Non-Monotonic Reasoning, Probabilistic reasoning, use of certainty factors, fuzzy logic.
- 1.8 Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets.

2. Introduction to Robotics**05**

- 2.1 What is and What is not a Robot
- 2.2 Progressive Advancement in Robots
 - 2.2.1 First Generation
 - 2.2.2 Second Generation
 - 2.2.3 Third Generation
 - 2.2.4 Fourth Generation
- 2.3 Robot Anatomy
 - 2.3.1 Links
 - 2.3.2 Joints and joints Notation Scheme
 - 2.3.3 Degrees Of Freedom (DOF)
 - 2.3.4 Required DOF in a Manipulator
 - 2.3.5 Arm Configuration

2.3.6	Wrist Configuration	
2.3.7	The End- Effector	
2.4	Sensors and Vision	
3.	Coordinate Frames, Mapping, and Transforms	05
3.1	Coordinate Frames	
3.1.1	Mapping	
3.1.2	Mapping between Rotated Frames	
3.1.3	Mapping between Translated Frames	
3.1.4	Mapping between Rotated and Translated Frames.	
3.2	Fundamental Rotation	
3.2.1	Principal Axe Rotation	
3.2.2	Fixed Angel Representation	
3.2.3	Euler Angle Representations	
3.2.4	Equivalent Angle Axis Representation	
4.	Symbolic Modelling of Robots-Direct Kinematic Model (2D/3D)	05
4.1	Mechanical Structure and Notations	
4.2	Description of Links and Joints	
4.3	Kinematic Modelling of the Manipulator	
5.	The Inverse Kinematics	04
5.1	Manipulation Workspace	
5.2	Solvability of Inverse Kinematic Model	
5.2.1	Existence of Solutions	
5.2.2	Multiple Solutions	
6.	Trajectory Planning	06
6.1	definitions and planning Tasks & terminology	
6.2	Steps in Trajectory planning	
6.3	Joint Space Techniques	
6.3.1	Use of a p-Degree Polynomial as Interpolation Function	
6.3.2	Cubic Polynomial Trajectories	
6.3.3	Linear Function with Parabolic Blends	
7.	Control of Manipulators	08
7.1	Open-and Close Loop Control	
7.2	The Manipulator Control Schemes	
7.3	Linear Control Schemes	
7.4	Characteristics of Second-Order Linear Systems	
7.5	Linear Second-Order SISOModel of a Manipulator Joint	
7.6	Joint Actuators	
7.6.1	Model of a DC Motor	
7.7	Partitioned PD Control Scheme	
7.8	PID Control Scheme	
7.9	Computed Torque Control	
7.10	Force Control of Robotic Manipulators	
8.	Robotic Sensor and Vision	06
8.1	The Meaning of Sensing	
8.1.1	The Human Sensing	
8.1.2	The Problem of Robot Sensing	
8.2	Sensors in Robots	
8.2.1	Status Sensors	
8.2.2	Environment Sensors	
8.2.3	Quality Control Sensors	
8.2.4	Safety Sensors	
8.2.5	Work cell Control Sensors	
8.2.6	Classification of Robotic Sensors	
8.3	Kinds of Sensors Used in Robotics	
8.3.1	Acoustic Sensors	
8.3.2	Optic Sensors	
8.3.3	Pneumatic Sensors	
8.3.4	Force /Torque Sensors	

9. Robot Application

- 9.1 Material Transfer Applications
- 9.2 Arc Welding
- 9.3 The Assembly Task
- 9.4 The Compliance
- 9.5 Providing Compliance
- 9.6 Sensor Based Inspection

BOOKS:

A .TEXT BOOKS:

1. E. Rich and K. Knight, "Artificial intelligence", TMH,
- 2..Robotics& Control By R. K. Mithal& I.J. Nagrath-TMH

B .REFERENCE BOOKS:

1. Introduction Robotics byS.K.Saha-TMH
2. N.J. Nilsson, "Principles of AI", Narosa Publ. House,
3. Robin R Murphy, Introduction to AI Robotics PHI Publication,
4. D.W. Patterson, "Introduction to AI and Expert Systems", PHI,

IMAGE & VIDEO PROCESSING
SIXTH SEMESTER(Elective)

Theory & Tutorial – 4P/W
Total Theory & Tutorial:60 P

Examination: 3Hr
Total Marks: 100
Theory: 70
TA:10 CT: 20

A: RATIONALE:

Digital Image Processing is used for image processing system in day to life. The transforms, enhancement, restoration, segmentation & reorganization of images are used for analysis of different images. The data compression technique is also essential for Digital image processing system. This subject helps for remote sensing and digital satellite communications and other fields of electronic and information technology.

B: OBJECTIVES:

On completion of the study the students will be able to:

1. Understand data compression and various techniques.
2. Define Gray level transformation of images.
3. Know techniques of image enhancement, image compression, image segmentation etc.
4. Know elements of image processing system.
5. Know applications of digital image processing.
6. Define object recognition.
7. Understand binary image processing.

C: TOPIC WISE DISTRIBUTION OF PERIODS:**1: Digital Image Fundamentals**

- | | | |
|-----|---|---|
| 1.1 | What is Digital Image Processing & Components of a General Purpose Image processing Systems | 8 |
| 1.2 | Elements of visual perception, | |
| 1.3 | Image sensing and acquisition, | |
| 1.4 | Image sampling and quantization, | |
| 1.5 | Basic relationships between pixels –neighborhood, adjacency, connectivity, distance measures. | |

2: Image Enhancements and Filtering

- | | | |
|-----|--|----------|
| | | 9 |
| 2.1 | Basic Gray level transformations, | |
| 2.2 | histogram equalization and specifications(Processing) | |
| 2.3 | pixel-domain -smoothing filters & sharpening filters | |
| 2.4 | first and second derivative of Image sharpening | |
| 2.5 | Aliasing in Image and 1-D, the 2-D and its inverse | |
| 2.6 | Basics of Filtering in frequency domain | |
| 2.7 | Image Smoothing – Ideal low-pass and high-pass filters | |

3: Color Image Processing

- | | | |
|-----|---|----------|
| | | 8 |
| 3.1 | Color fundamentals | |
| 3.2 | Color models – RGB, YUV, HSI; | |
| 3.3 | Color transformations- Formulation, color complements, color slicing, tone and color corrections; | |
| 3.4 | Color image smoothing and sharpening; | |
| 3.5 | Color Segmentation. | |

4: Image Segmentation

- | | | |
|-----|--|----------|
| | | 8 |
| 4.1 | Detection of discontinuities, | |
| 4.2 | Edge linking and boundary detection, | |
| 4.3 | Thresholding- global and adaptive, | |
| 4.4 | Define Segmentation & explain region-based segmentation. | |

5: Wavelets and Multi-resolution image processing

- | | | |
|-----|---|----------|
| | | 9 |
| 6.1 | Uncertainty principles of Fourier Transform, | |
| 6.2 | Time-frequency localization, | |
| 6.3 | Continuous wavelet transforms, | |
| 6.4 | Wavelet bases and multi-resolution analysis, | |
| 6.5 | Wavelets and Subband filter banks, wavelet packets. | |

6: Image Compression-Redundancy

8

- 1.1 Inter-pixel and psycho-visual;
- 1.2 Lossless compression – predictive, entropy;
- 1.3 Lossy compression-predictive and transform coding;
- 1.4 Discrete Cosine Transform;
- 1.5 Still image compression standards – JPEG and JPEG-2000.

7: Fundamentals of Video Coding-

9

- 7.1 Inter-frame redundancy,
- 7.2 motion estimation techniques – full-search, fast search strategies, forward and backward motion prediction,
- 7.3 frame classification – I, P and B; Video sequence hierarchy – Group of pictures, frames, slices, macro-blocks and blocks;
- 7.4 Elements of a video encoder and decoder;
- 7.5 Video coding standards – MPEG and H.26X.

8: Video Segmentation

7

- 8.1 Temporal segmentation
- 8.2 shot boundary detection, hard-cuts and soft-cuts;
- 8.3 Spatial segmentation – motion-based;
- 8.4 Video object detection and tracking.

BOOKS:

TEXT BOOKS:

1. “Digital Image Processing”, by R.C.Gonzalez and R.E. Woods, Second Edition, Pearson Edu
2. “Fundamentals of Digital Image Processing”, by Anil Kumar Jain. Prentice Hall of India.
3. “Video Processing” by Murat Tekalp

REFERANCE BOOKS:

1. Jayaraman, S Esakkirajan, T. Veerakumar .; Digital Image Processing TMH

CLOUD COMPUTING
SIXTH SEMESTER(Elective)

Theory & Tutorial – 4P/W
Total Theory & Tutorial:60 P

Examination: 3Hr
Total Marks: 100
Theory: 70
TA:10 CT: 20

A: RATIONALE:

Cloud computing comes into focus only when you think about what IT always needs: a way to increase capacity or add capabilities on the fly without investing in new infrastructure, training new personnel, or licensing new software. Cloud computing encompasses any subscription-based or pay-per-use service that, in real time over the Internet, extends IT's existing capabilities. Cloud computing is at an early stage, with a motley crew of providers large and small delivering a slew of cloud-based services, from full-blown applications to storage services to spam filtering. Yes, utility-style infrastructure providers are part of the mix, but so are SaaS (software as a service) providers such as Salesforce.com. Today, for the most part, IT must plug into cloud-based services individually, but cloud computing aggregators and integrators are already emerging.

B: OBJECTIVES :

On completion of the study the students will be able to:

- Difference between distributed computing & cloud computing.
- Concept of Cloud Computing Technology.
- Know how to work with Cloud.
- Know about applications of Cloud Services.
- Understanding Cloud Computing Beyond the Desktop
- Using Cloud Services
- Controlling It All with Web-Based Desktops
- Outside the Cloud: Other Ways to Collaborate Online

C: COURSE CONTENT & DISTRIBUTION OF PERIODS

1: Introduction-	8
1.1 Define cloud computing	
1.2 Shift from distributed computing to cloud computing-Introduction	
1.3 Principles and characteristics of cloud computing	
1.4 Developing Cloud Services-IaaS, PaaS, SaaS; service oriented computing and cloud environment	
2: Cloud Computing Technology	12
2.1 Client systems, Networks, server systems and security from services perspectives;	
2.2 Accessing the cloud with platforms and applications;	
2.3 cloud storage	
3: Working with Cloud	10
1.1 Infrastructure as a Service	
1.2 Conceptual model and working Platform as a Service	
1.3 Conceptual model and functionalities. Software as a Service	
1.4 Conceptual model and working. Trends in Service provisioning with clouds	
4: Using Cloud Services	15
1.1 Cloud collaborative applications and services –	
1.2 case studies with calendars, schedulers and event management; and Task Management	
1.3 Cloud applications in project management.	
1.4 Collaborating on Word Processing, Spreadsheets, & Databases	
1.5 Storing and Sharing Files and Other Online Content	
1.6 Sharing Digital Photographs.	
5: Case studies-	15
1.1 Microsoft Azure, Google App Engine and Open source clouds- Controlling It All with Web-Based Desktops	
1.2 Open-Nebula and Eucalyptus	
1.3 Collaborating via Web-Based Communication Tools	

- 1.4 Collaborating via Blogs and Wikis
- 1.5 Collaborating via Social Networks and Groupware

BOOKS:

Text Books:

1. Anthony T.Velte, Toby J.Velte and Robert E, Cloud Computing – A Practical Approach, TMH
2. Michael Miller, Cloud Computing – Web based Applications, Pearson Publishing, 2011

Reference Books:

1. Resources from Internet /WWW.

SPEECH AND AUDIO PROCESSING
SIXTH SEMESTER(Elective)

Theory & Tutorial – 4P/W
Total Theory & Tutorial:60 P

Examination: 3Hr
Total Marks: 100
Theory: 70
TA:10 CT: 20

A: RATIONALE:

This course will give students a foundation in current audio and recognition technologies. One objective is to build up a familiarity with the perceptually-salient aspects of the audio signal, and how they can be extracted and manipulated through signal processing. A second related but separate objective is to obtain a thorough understanding of the statistical pattern recognition technology at the core of contemporary speech and audio recognition systems. Thirdly, the course aims to deepen each student's familiarity with the practical application of signal processing in general, through the study of specific instances, and through the experience of the term project.

B: OBJECTIVES :

On completion of the study the students will be able to:

- Concept of Speech production, Human Auditory System & speech coding techniques.
- Study of Speech Signal Processing.
- Know about Linear Prediction of Speech.
- Concept of Speech Quantization & Scalar Quantization of LPC.
- Study of Code Excited Linear Prediction.
- Know about Speech Coding Standards..

C: COURSE CONTENT & DISTRIBUTION OF PERIODS:

1: Introduction	8
1.1 Speech production and modeling	
1.2 Human Auditory System	
1.3 General structure of speech coders	
1.4 Classification of speech coding techniques – Parametric, waveform and hybrid ;	
1.5 Requirements of speech codecs – quality, coding delays, robustness.	
2: Speech Signal Processing	8
4.1 Pitch-period estimation,	
4.2 All-pole and all-zero filters, convolution;	
4.3 Power spectral density,	
4.4 Periodogram, autoregressive model,	
4.5 autocorrelation estimation.	
3: Linear Prediction of Speech	8
1.1 Basic concepts of linear prediction;	
1.2 Linear Prediction Analysis of non-stationary signals – prediction gain,	
1.3 Examples; Levinson-Durbin algorithm;	
1.4 Long term and short-term linear prediction models;	
1.5 Moving average prediction.	
4: Speech Quantization	8
1.1 Scalar quantization – uniform quantizer, optimum quantizer, Logarithmic quantizer, adaptive quantizer, differential quantizer; Vector quantization	
1.2 Distortion measures,	
1.3 Codebook design, codebook types.	
5: Scalar Quantization of LPC	8
1.1 Spectral distortion measures,	
1.2 Quantization based on reflection coefficient and log area ratio,	
1.3 bit allocation; Line spectral frequency	
1.4 LPC to LSF conversions,	
1.5 Quantization based on LSF.	
6: Linear Prediction Coding	6
1.1 LPC model of speech production;	
1.2 Structures of LPC encoders and decoders;	

1.3	Voicing detection; Limitations of the LPC model.	
7: Code Excited Linear Prediction		10
7.1	CELP speech production model;	
7.2	Analysis-by-synthesis;	
7.3	Generic CELP encoders and decoders;	
7.4	Excitation codebook search –	
7.5	state-savemethod, zero-input zero-state method;	
7.6	CELP based on adaptive codebook, AdaptiveCodebook search;	
7.7	Low Delay CELP and algebraic CELP.	
8: Speech Coding Standards		4
8.1	An overview of ITU-T G.726, G.728 and G.729standards	

Text/Reference Books:

1. "Digital Speech" by A.M.Kondoz, Second Edition (Wiley Students Edition),
2. "Speech Coding Algorithms: Foundation and Evolution of Standardized Coders", W.C. Chu, WileyInter science,

ADVANCE COMMUNICATION LAB.

Practical : 4 P/W
Total Practical: 60 P

Examination: 4Hr
Practical Exam:25
Term Work:25

A: RATIONALE:

In this Lab. The student will know the operation & application of RADER trainer, Satellite Trainer, Optical Fiber kit Trainer & EPABX Trainer for various communication Technology including mobile communications.

B: OBJECTIVES:

On completion of this Lab the students will be able to:

- Setup & Know the Optical Fiber Link including analog & digital.
- Measure the losses of Optical Fiber.
- Know EPABX /Satellite/ISDN trainer

C: COURSE CONTENT:

1. Setting up a fiber optic analog & digital link including source & detector.
2. Study of losses in Optical Fiber:
 - a. Measurement of propagation loss.
 - b. Measurement of bending loss.
 - c. Measurement of connector loss.
 - d. How connector loss is affected by fiber and quality.
3. Measurement of Numerical aperture.
4. Setting of AM, FM, PWM, Modulator & Demodulator using optical fiber kit.
5. Study the following experiments using EPABX Trainer Kit.
 - a) To study extension to extension call pickup, direct onward dialing, autocal back, auto attendant, dynamic looking, last extension redial, conference call , call forward, simultaneous ringing, pulsing on trunk, follow me tone and DTMF dialing, Messages on hold, extension baring, trunk baring, caller id for extension to extension & trunk lines, individual memory, global memory, call waiting call conference
 - b) Study of speech circuit using IC and its interface to line, pulse/tone dialing
 - c) Study to subscriber ringing generation circuit and interface to the line.
 - d) Study of telephone instrument trainer with caller id facility
6. Study of satellite communication Trainer Kit:
 - a. To setup active & passive satellite communication link.
 - b. To study up linking and downlinking of satellite signals.
 - c. To analyze the analog baseband (Voice & Video) Signals in satellite link.
 - d. To study the digital baseband signals in a satellite link.
 - e. To setup an analog FM/FDM satellite link.
7. Study of Rader Trainer Kit.
 - a. Study of Doppler shift in Radar.
 - b. Speed detection & multiple reflections from object.
 - c. To find out the Time period and frequency of a moving pendulum for different heights.
 - d. To measure the size of moving objects using Radar.
 - e. To measure the distance traveled by moving a object.
8. Study of mobile communication Trainer Kit.
9. Study of ISDN Trainer Kit.
 - a. Basic Rate ISDN exchange with Protocol with Protocol Analyzer.
 - b. ISDN Telephone sets.
 - c. ISDN Terminal Adaptors. D) Analog Telephone sets.
10. Visit to Telephone Exchange / Mobile Network / earth station / Rader Station.

MICROCONTROLLER & EMBEDDED SYSTEM LAB
SIXTH SEMESTER
(Common to ETC/AEI)

Practical :4 P/W
Total Practical: 60 P

Examination: 4Hr
Practical Exam:25
Term Work:25

A: RATIONALE:

An embedded system lab is a computer system with a dedicated function within a larger mechanical or electrical system, often with real-time computing constraints. It is *embedded* as part of a complete device often including hardware and mechanical parts. By contrast, a general-purpose computer, such as a personal computer (PC), is designed to be flexible and to meet a wide range of end-user needs. Embedded systems control many devices in common use today. Modern embedded systems are often based on microcontrollers (i.e CPUs with integrated memory and/or peripheral interfaces)^[4] but ordinary microprocessors (using external chips for memory and peripheral interface circuits) are also still common, especially in more complex systems. In either case, the processor(s) used may be types ranging from rather general purpose to very specialised in certain class of computations, or even custom designed for the application at hand. A common standard class of dedicated processors is the digital signal processor (DSP).

B: OBJECTIVS:

On completion of this Lab the students will be able to:

- Study Microcontroller trainer
- PLC trainer
- Embedded systems

C: LIST OF PRACTICALS:**A: MICROCONTROLLER:**

1. Draw the Architecture Diagram of 8051 Microcontroller
2. Write a Simple Assembly Programs for
 - a. Addition b. Subtraction b. Multiplication d. Division e. Ascending order
 - f. descending g. Loop up
3. Write a Program for
 - a. Bit Digital Output-LED Interface
 - b. 8 Bit Digital Inputs (Switch Interface)
4. Write a Programs for(Any one)
 - a. 4 x 4 Matrix Keypad Interface
 - b. Buzzer Interface
 - c. Relay Interface
5. Write a Program for character based LCD Interface.
6. Write a Program for Analog to Digital Conversion (On chip ADC& DAC)
7. Interfacing With Temperature Sensor.
8. Write a program Stepper Motor Interface
9. Write a program to Generate Delay Subroutine
10. 805 Timer & Counter programming –Generate Square wave

B: EMBEDDED SYSTEM: HANDS ON EXERCISE .

11. To Study and Implement Multitasking. Write a Simple Program with Two Separate LED Blinking Tasks.
12. Interface a Stepper motor and control the speed of rotation by implementing RTOS delay functions.
13. Interface bugger sound
14. Interface Traffic light Systems
15. Interface RTOS chips & conduct few experiments

Equipment Required

1. Microcontroller 8051 trainer kit & interfacing
2. Embed kit (arm processor and its operating system)

COMPUTER HARDWARE & MAINTENANCE LAB
SIXTH SEMESTER
(Common to ETC/AEI)

Practical : 3 P/W
Total Practical: 45 P

Examination: 4Hr
Practical Exam:25
Term Work:25

A: RATIONALE:

Computer hardware lab is the collection of physical elements that constitutes a computer system. Computer hardware refers to the physical parts or components of a computer such as the monitor, mouse, keyboard, computer data storage, hard drive disk (HDD), system unit (graphic cards, sound cards, memory, motherboard and chips), etc. all of which are physical objects that can be touched.^[1] In contrast, software is instructions that can be stored and run by hardware. Software is any set of machine-readable instructions that directs a computer's processor to perform specific operations. A combination of hardware and software forms a usable computing system.

B: OBJECTIVES:

On completion of this Lab the students will be able to:

- Computer hardware refers to the physical parts or components of a computer such as the monitor, mouse, keyboard, computer data storage, hard drive disk (HDD), system unit (graphic cards, sound cards, memory, motherboard and chips).
- Installation of Software & antivirus

C: LIST OF PRACTICALS:

1. Switches, Indicators and connectors of PC: Identification of front panel indicators and switches in a computer system of table top/tower case model and also identification of rear side connectors.
2. PC system layout: Draw a Computer system layout and Mark the positions of SMPS, Mother Board, FDD, HDD, and CD-Drive / DVD-Drive add on cards in table top/tower models systems.
3. Mother Board Layout: Draw the layout of Pentium IV or Pentium Dual core or Pentium Core2 DUO mother board and mark Processor, chip set ICs. RAM, Cache, Xtal, cooling fan, I/O slots and I/O ports and various jumper settings.
4. CMOS Setup Program:
 1. Changing the Standard settings.
 2. Changing advanced settings (BIOS and Chipset features)
5. Installation of CD drive:
 1. Install and configure an CDD in a computer system.
 2. CDD drive diagnostics/servicing.
6. USB pen drives and I-pods.
 1. Connect and enable a pen drive or I-pod to HDD.
 2. Format the pen drive or I-pod.
 3. Copy files and folders from pen drive I-pod to HDD.
 4. Copy files and folders from HDD to pen drive or I-pod.
7. HDD Installation:
 1. Install the given HDD.
 2. Configuration in CMOS-Setup program
 3. Partition the HDD using fdisk./CAT/other
 4. Format the Partitions.
8. Printer Installation & Troubleshooting:
 1. Installing and checking a Dot-Matrix Printer.
 2. Installing and checking an Ink jet / Laser Printer.
 3. Possible problems and troubleshooting.
9. Modem Installation:
 1. Install and configure a Modem in a windows PC.
 2. Check the working condition of modem with pc.
10. DVD Multi-recorder drive installation:
 1. Install a DVD Multi-recorder drive in a PC.
 2. Configure using device driver.
 3. Check the read / write operation using a CD / DVD.
11. Installation of Scanner:
 1. Connect the given scanner with a PC.

2. Configure the scanner with driver.
3. Check the scanner by scanning a page / a portion in a page.
12. Familiarize: Scandisk, recent Anti-virus software and recent PC Diagnostic software.
13. Assembling a PC: Assemble a Pentium Dual Core/ Pentium Core2 Duo System with necessary peripherals and check the working condition of the PC.
14. Install and Configure Windows NT2003 operating system in a PC.
15. Construct Network by connecting one or two computer with a Windows NT2003 Server.
16. Install and Configure operating system (LINUX /Window XP/Window 2010etc)in a PC.
17. Construct Network by connecting one or two computer with a LINUX Server.
18. Configure the network by connecting one or two computer with a LINUX Server.
19. Add / Remove devices using Hardware Wizard Add and Manage User Profile, Set permission to the users both in Windows NT 2003 / LINUX.

1. N.B. DIAGONIS SOFTWARE WILL BE USE FOR MAINTAINANCE OF COMPUTER
2. Higher configuration are preferred

EQUIPMENT REQUIRED

Sl.No.	Name of the Equipments	Range	Required Nos.
1	Pentium /higher configuration		5
2	Pentium Dual Core/higher configuration		2
3	iPod		4
4	USB Pen Drive		4
5	Printer Inkject / Laser		2
6	DVD RW		5
7	Scanner		1
8	Windows server 2003		1
9	Linux		1
10	DIAGONIS SOFTWARE		1

PLC & NETWORK LAB
SIXTH SEMESTER
(Common to ETC/AEI)

Practical : 3 P/W
Total Practical: 45 P

Examination: 4Hr
Practical Exam:25
Term Work:25

A: RATIONALE:

The PLC lab contains multiple workstations equipped with computers, PLC units and other interfacing devices to train students how to program and upload ladder logic code. Students program ladder logic code using the RS Logix software, which provides a graphical interface representing conditional computer programming functions such as if/else statements. The lab is based primarily on the Allen Bradley family of Programmable Logic Controllers, which are widely used in factories and other settings. In this Lab. The student will know the operation & application of PLC trainer,

B: OBJECTIVES:

On completion of this Lab the students will be able to:

- Setup & Know the PLC Trainer.
-
-

C: LIST OF PRACTICALS:**PLC Programming:****(35 periods)**

1. Introduction/Familiarization PLC Trainer & its Installation with PC
 - Learn the basics and hardware components of PLC
 - Understand configuration of PLC system
 - Study various building blocks of PLC
 - Determine the No. of digital I/O & Analog I/O
2. Write and implement a simple ladder logic program using digital inputs and outputs for PLC
3. Write the implement a simple ladder logic program using timer with branching and subroutines with PLC
 - To develop an application using On-Delay timer
 - To Develop an application using OFF Delay Timer
 - To Develop an application using UP/DOWN counter
4. Write the implement a simple ladder logic program using counter with branching and subroutines with PLC
5. Write program on MOVE, Control statement, Math Function ,data manipulation technique on PLC
6. Write and implement a simple ladder logic program for interfacing a lift control with PLC
7. Write and implement a simple ladder logic program for interfacing a conveyor control with PLC.
8. Communication between PLC and PC
 - a Single motor on / off control
 - b Interlock control of two motors
9. Project: perform project as above for PLC programming on DC Motor/Traffic light Controller/Any Automation Industrial Ideas implementation
10. To develop an application using Relays & Latches
11. To study of PID controller instruction for a pilot plant **(Optional)**

.NETWORKING PROGRAMMING:**(10 periods)**

1. Familiarize with computer networking Line diagrams.
2. Installation of network card & Connecting systems in a network switch.
3. Connecting systems in peer-to-peer network & Installing of internal modem and connecting to Internet.
4. Installing wireless node, Installing multiple network cards
5. Installing switch (Hub) & Preparing the UTP cable for cross and direct connections using crimping tool.
6. Installing and configuring E-mail client Microsoft Outlook Express.
7. Installing and configuring proxy server using Winproxy or Wingate.
8. Configuring Browser for Internet access using Proxy server & Installing windows 2000 or higher server as domain controller.

Equipment Required:

PLC (manual Fanuc / Alan Bradly /Siment

ELECTRONIC PROJECT WORK&SEMINAR
SIXTH SEMESTER

Practical : 4 P/W
Total Practical: 60 P

Examination: 4Hr
Practical Exam:25
Term Work:25

A: RATIONALE:

The Project work is intended to integrate the knowledge, skills and attitudes developed after completion of subjects for developing competency in a particular specialized job. In this activity the role of teachers is a facilitator or co-ordinator. The student will select a topic, perform design work, place the indents and get the raw materials either from the department or from the local market and implement the design. The leadership quality, coordination of job and maintaining a good communal harmony is important factor of activity. It is the process, which is to be evaluated along with students knowledge and their dedication. The success of the project is no doubt the goal but the group activity will also be critically evaluated.

B: OBJECTIVS:

On completion of the Project Work the students will able to:

1. Select a suitable project work.
2. Design the job.
3. Prepare job schedule.
4. Select and Indent the materials.
5. Procure material.
6. Exhibit co-opertative attitude towards the peer group.
7. Develop leadership.
8. Develop cost awareness.
9. Develop attitude for proper utilization of time.
10. Develop marketing strategies.
11. Develop quality consciousness.

C: COURSE CONTENT:

1. The students should be divided into group of 4 or 5 students. Each faculty should guide one group & he should that act as project guide. The students should select the projects of advanced topic of their own choice (Hardware /Software) in consultation with project guide.
2. The sessional records should be maintained and evaluated by a team of faculty members and the final marks awarded by the team.
3. In the end examination, a team of External Examiners and Internal examiner will evaluate students.
4. Suggested Project activity.

D: The Project Work:

i)The Project Work-I is to enable the student to take up investigative study in thebroad field of Electronics & Communication Engineering, either fully theoretical/practical orinvolving both theoretical and practical work to be assigned by the Department on anindividual basis or two/three students in a group, under the guidance of a Supervisor. This is expected to provide a good initiation for the student(s) in R&D work. The assignment to normally include:

- Survey and study of published literature on the assigned topic;
- Working out a preliminary Approach to the Problem relating to the assigned topic;
- Conducting preliminary Analysis/Modeling/Simulation/Experiment/Design/Feasibility;
- Preparing a Written Report on the Study conducted for presentation to theDepartment;
- Final Seminar, as oral Presentation before a Departmental Committee

ii)TheProject Work II & Dissertation is to enable the student to extend further the investigative study taken up under EC P1, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Departmental one or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The assignment to normally include:

- In depth study of the topic assigned in the light of the Report prepared under EC P1;

- Review and finalization of the Approach to the Problem relating to the assigned topic;
 - Preparing an Action Plan for conducting the investigation, including team work;
 - Detailed Analysis/Modeling/Simulation/Design/Problem Solving/Experiment as needed; □ Final development of product/process, testing, results, conclusions and future directions;
 - Preparing a paper for Conference presentation/Publication in Journals, if possible;
 - Preparing a Dissertation in the standard format for being evaluated by the Department
1. A practical project needs to be taken . The steps involved in the project work are:
 - a. Identification of the project.
 - b. Problem definition.
 - c. Gathering information / Data needed for the project.
 - d. Selection of best solution.
 - e. Selection and collection of suitable material.
 - f. Planning and fabrication.
 - g. Detailed Design.
 - h. Testing.
 - i. Preparing a detailed project report.
 2. **The Project report (Dissertation) should have the following features.**
 - a. Introduction.
 - b. Name and feature of the project
 - c. Block diagram of the project.
 - d. Circuit diagram and its brief description
 - e. Flow chart
 - f. Components layout.
 - g. Printed circuit pattern or layout diagram of the circuit.
 - h. Front panel and cabinet drawing.
 - i. Components list
 - j. Cost estimation of the project
 - k. Power Supply.
 - l. Testing points and waveforms if any
 - m. Operation and maintenance & design procedure
 - n. Suggestion for improvement if any
 - o. Operation and maintenance procedure.
 - p. Electrical safety information
 - q. Electrical safety information
 - r. Conclusion
 - s. Scope for feature
 3. **The internal and final evaluation marks** have to be awarded on the basis of the above features along with viva-voce at the end.
 4. **Evaluation based on:**
 - a. Work done during Semester for Project.
 - b. Testing & Working of Project.
 - c. PPP Seminar Presentation.
 5. Students may be advised to do the project in the following related areas.

A: Minor project (at least any two projects)

Develop a power supply related project.

- (a) Develop a simple IC based project.
- (b) Develop a simple Audio power project.
- (c) Develop an RF related project.
- (d) Develop a simple Electronics Chime / Sound generation Circuit.
Develop any protective Circuit.
- (e) Develop any Telephone System /Communication system related project
- (f) Preparation of PCB.

N.B.: The Minor project must be course related.

B: Major project (at least any one projects)

- a. The project based on following topics
 - Microcontroller Based

- Power Electronics & Industrial Control based.
- Communication / Mobile / Satellite based.
- Robotics Based.
- Mechatronics Based
- Embedded System Based
- Industrial Application Based

N.B : Any other Project may also be carried out in consultation with the Project guide as per suitability. Each project report must contain the technical data of live components i.e. Transistor. ICs etc and pin diagrams of the such devices, PCB layout diagram & component layout diagram etc.

- Use pisspice /Electronics work branch for initial work and simulation purpose.
- Use METLAB for project work and simulation purpose.