STUDY AND EVALUATION SCHEME
FOR
ELECTRONICS & COMMUNICATION ENGINEERING

SEMESTER - VI

Code No.	Subject	Study Scheme Period/Week			Evaluation Scheme						Total Marks
					Internal Assessment		External Assessment Exam				
		L	T	P	Theory	Practical	Written Paper		Practical		
					Max Marks	Max. Marks	Max. Marks	Hrs.	Max. Marks	Hrs.	
1	Advanced Communication Systems	4	-	3	50	50	100	3	50	3	250
2	Television Engineering	4	-	3	50	50	100	3	50	3	250
3	Industrial Management & Entrepreneurship Development	4	-	-	50	-	100	3	-	-	150
4	Digital System Design	4	-	3	50	50	100	3	50	3	250
5	Elective - I	4	-	3	50	50	100	3	50	3	250
6	Major Project	-	-	4	-	100	-	-	100	3	200
**	SCA	-	-	4							
	TOTAL	20	-	20	250	300	500		300		1350

** Student centered activities will include: extension lectures, field visits, Soft Skills, seminars, debates, hobby clubs, library studies, awareness regarding ecology and environment, conservation of energy (Petroleum products, electricity etc), social service camps and other co-curricular activities including games. Advanced planning for each semester has got to be made.

ELECTIVE: 1. Advanced Microprocessor   2. Microprocessor Based System Design
           3. Programming in JAVA   4. Multi Media Application
           5. VLSI as per BTE corrigendum dt. 26/03/2012.

NOTE: - For awarding of Diploma all the papers of Diploma Examinations should be cleared within the course duration plus two years

In order to determine the division in which a candidate shall be placed at the end of the course, the following criteria shall be observed:-

(a)	Three year Diploma (I to VI Semester)		
	I year (I & II Semester)	-	20%
	II year (III & IV Semester)	-	40%
	III year (V & VI Semester)	-	40%

b)	Vocational Stream (III to VI Semester): (Direct II year admission)		
	II year (III & IV Semester)	-	40%
	III year (V & VI Semester)	-	60%

ADVANCED COMMUNICATION SYSTEMS

L T P
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DETAILED CONTENTS

1. Introduction of Basic block diagram of digital and data communication systems. Their comparison with analog communication system. Review of sampling theorm and PCM **(4 Hr)**

2. Coding **(8 Hr)**
    (i)   Introduction to various some loads like, Lempel, Shannon faro, ha ziv code etc.
    (ii) Code error detection and correction techniques – Redundancy, parity, block check character (BCC), Vertical Redundancy check (VRC), Longitudinal Redundancy, Check (LRC), Cyclic Redundancy check (CRC), Hamming code, Cycle codes, Linean block codes.

3. Digital Modulation Techniques: **(6 Hr)**
    (i)   To study the basic block diagram and principle of working of their modulator and demodulator of the following
          (a)   Amplitude shift keying (ASK): Interrupted continuous wave (ICW), two tone modulations.
          (b)   Frequency shift keying (FSK).
          (c)   Phase shift keying (PSK)
          (d)   Quadrature Amplitude modulation (QAM), DPSK, Quadrature PSK.

4. Characteristics/working of data transmission circuits; bandwidth requirements, data transmission speeds, noise, cross talk, echo suppressers, distortion, equalizers. **(4 Hr)**

5. UART, USART: **(2 Hr)**
    Their need and function in communication systems and study of their block diagram.

6. Modems: **(4 Hr)**
    Need and function of modems, Mode of modems operation (low speed, medium speed and high speed modems). Modem interconnection, Modem data transmission speed, Modem modulation method, Modem interfacing (RS 232 Interface, other interfaces).

7. Network and Control Considerations: **(8 Hr)**
    Protocols and their functions. Data communication network organisation, Basic idea of various modes of digital switching – circuit switching, message switching, packet switching.

    Basic concept of Integrated Services of Digital Network (ISDN)

    Digital Network (ISDN) its need in modern communication, brief idea of ISDN interfaces.

    Basic idea of local area Network (LAN), and its various topologies.

8. Telemetry: radio-telemetry, and its application. Block diagram of DTM and FDM telemetry system **(2 Hr)**

9. Electronic Exchange: Typical telephone network. Various switching offices (Regional Centre, District Centre, Toll Centre, Local Office) and their hierarchy.

(6 Hr)

Principles of space division switches. Basic block diagram of a digital exchange and its working. Combined space and time switching: Working principle of STS and TST switches.

Functions of the control system of an automatic exchange. Stored programme Control (SPC) processor and its application in electronic exchange and rural telephone exchange.

Introduction to PBX, PABX and EPABX. Function of PBX. PABX relation with central office. Modern PABX capabilities.

10. Operation of CELLULAR mobile telephone system. Concept of cells and frequency reuse. Special features of cellular mobile telephone. Introduction of GSM CDMA, their advantages & disadvantages. Basic idea of spread spectrum, 2g & 3G Technology. **(2 Hr)**

11. Facsimile (FAX) **(2 Hr)**

Basic idea of FAX system and its applications. Principle of operation and block diagram of modern FAX system. Important features of modern FAX machines.

LIST OF PRACTICALS

1. Transmission of humming code on a serial link and its reconverson at the receiving end.
2. Observe wave forms at input and output of ASK, FSK, PSK and QAM modulators.
3. To transmit parallel data on a serial link using USART.
4. Transmission of data using MODEM.
5. Observe wave forms at input and output of a TDM and FDM circuit.
6. To study the construction and working of a telephone handset.
7. To study the construction and working of a FAX machine.
8. To study the construction and working of an EPABX.
9. To study the working of a LAN system.
10. To study the working of GSM cellular mobile system.
11. To study the working of CDMA cellular mobile system.

NOTE: Visits to the sites of all types of telephone exchanges (including mobile and rural exchanges), FAX and Carrier telephony should be made with a view to understand their working. A comprehensive report must be prepared by all the students on these visits, especially indicating the dates and locations of their visits.

TELEVISION ENGINEERING

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RATIONALE:

The objective of teaching this subject to the students is to give them an in-depth knowledge of various aspects of black and white and colour TV. This is to develop in them the capability to assemble TVs and also to systematically diagnose its faults and rectify the same.

DETAILED CONTENTS

1.   **(20 Hr)**
(i)   Fundamentals of TV Communication
   (a)   Elements of TV communication system
   (b)   Scanning, its need for picture transmission
   (c)   Need for synchronizing and blanking pulses
   (d)   Progressive scanning, Interlaced scanning, its need, persistence of vision, frame field and line frequencies, bandwidth requirement for picture transmission, concept of picture resolution and its dependence on the bandwidth.
   (e)   Composite video signal (CVS), blocker than black level, CVS at the end of even and odd fields, equalizing pulses and their need.
   (f)   Construction and working of monochrome picture tube, comparison of magnetic and electrostatic deflection of beam.
   (g)   Construction and working of vidicon and plumbicon camera tubes, typical voltages at different electrodes, block diagram of monochrome TV camera and the transmitter chain.
   (h)   Block diagram of a TV receiver, function of each block and waveforms at the input and output of each block.
   (i)   Frequency range of various VHF, UHF bands and channels used in India, major specifications of CCIR-B system.

   (ii) System adopted in India – channel bandwidth and transmitted RF spectrum. (8 Hr)
   (a)   Concepts of positive and negative modulation, VSB transmission, trap frequencies and aspect ratio.
   (b)   Typical circuits of scanning and EHT stages of TV receiver and explanation of their working principles, function of keyed AGC.
   (c)   Function and location of brightness, contrast, V-hold, H- hold and centering control.
   (d)   Identification of faulty stage by analyzing the symptoms and basic idea of a few important faults and their remedies.

2.   Color TV Communication   **(12 Hr)**
   (i)   Relative sensitivity of eye to different spectral colours (visibility curve)
   (ii)   Primary colours, tristimulus values, trichromatic coefficients, concepts of additive and subtractive mixing of colours, concepts of luminance, hue and saturation, representation of colour in colour triangle, non-spectral colours.
   (iii) Compatibility of colour system with the monochrome TV system, block diagram of colour TV camera, basic colour TV systems – NTSC, SECAM and PAL, their advantages and disadvantages.
   (iv)   Construction and working principles of Trinitron and PIL types of color picture tubes, concepts of convergence and purity.
   (v)   Need for luminance signal and band sharing by color signals, sub-carrier frequency, colour difference signal, its need, synchronous quadratic modulation and representation of colour by a vector, burst signal, its need, chrominance signals.
   (vi)   Block diagram of PAL TV receiver and explanation of its working.

3.   Elements of Cable TV   **(2 Hr)**

- Introduction, signal reception, signal processing and signal distribution, Conditional Access System (CAS), Concepts and block diagram.

4. **Video CD player**   **(3 Hr)**
   - Introduction, CD structure, VCD encoding, block diagram of a VCD player and its explanation.

5. **Latest Trends in TV Technology**   **(3 Hr)**
   - Concepts of Plasma TV, LCD, LED TV, Comparison between Plasma and LCD and introduction to DTH and basic principle of transmission & reception of DTH (Set Top Box). Concepts of High Definition TV (HDTV).

List of practicals

1. To identify the receiver components, and locate different stages on the chassis of a Black & White TV receiver.
2. To identify the receiver components, and locate different stages on the chassis of a PAL colour TV receiver.
3. To operate various controls and adjustments on a B/W TV receiver, and observe their effect (Contrast Brightness, volume, tone, fine tune, hold, height, width, H and V linearity, AGC, raster centering corner and pin-cushion correction etc.).
4. To operate various controls and adjustment on a PAL TV receiver and observe their effect (colour control, AFT, ACC, grey scale tracking).
5. To note DC voltages and the wave forms at various points in a B/W TV receiver.
6. To note DC voltages and the wave forms at various points in a PAL colour TV receiver.
7. (i)   To observe the effect of brightness control on the grid-to-cathode bias of the B/W picture tube and note the cut off bias for a typical picture tube.
   (ii) To observe the effect of contrast control on the luminance signal at the cathode of the B/W picture tube.
8. To use a colour pattern generator and subjectively evaluate the raster reproduction.
9. To install and study satellite TV receiver system including dish antenna and the receiver.
10. To study typical faults in different sections of a B/W TV receiver.
11. To study typical faults in different sections of a PAL TV receiver.

INDUSTRIAL MANAGEMENT & ENTREPRENEURSHIP DEVELOPMENT

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RATIONALE

The knowledge of this subject is required for all engineering technicians, but it becomes more important for those who intend to choose industry for their career. This course is managements, role of worker, foreman and engineer, industrial safety, marketing, entrepreneurship, inventory control and industrial legislation.

DETAILED CONTENTS

1. **Introduction** (4 Hr)
   Pattern of economics i.e. socialistic economy, capitalistic economy and mixed economy. Industrial Growth in India.

2. **Business Organisations** (4 Hr)
   Salient features of sale proprietary, partnership private and public limited companies, cooperative societies and public sector.

   Role of public and private sectors in growth of economy and their social obligations towards society; monopoly and price restriction.

3. **Entrepreneurship** (4 Hr)
   Entrepreneurial qualities, selection of product, estimation of capital expenditure resources of capital financial agencies, procedural formalities for registrations of firm. Exposure to sales tax registration import export procedures and project report preparation.

4. **Financial Management** (4 Hr)
   Brief idea of money banking, international trade, foreign exchange, various taxes such as property, wealth company income, excise duty, sales tax, finance forecasting. Types of accounts and account books, trial balance, final accounts and statements.

5. **Personnel Management** (6 Hr)
   Duties and responsibilities of personnel department, manpower planning, sources of employment, recruitment selection, various methods of testing, training and development of workers and supervisors. Promotions, retirement, retrenchment. Industrial relations, discipline, industrial fatigue, leadership, attitudes and human behaviour, morale maintenance, motivation systems, payment of wages, personnel records.

6. **Technician** (2 Hr)
   Role of engineer and technician in the industry and in society: duties and responsibilities of a technician (foreman) towards management, workers and work.

7. **Industrial Safety and House Keeping** (4 Hr)

Magnitude and cost of accidents, causes of accidents, job safety analysis, safety planning and its implementation safety education instructions and visual aids, obligatory provisions, first aid, investigation of accidents, fire fighting, BIS standards, security watch and ward.

8. **Marketing** (4 Hr)

Importance of marketing, theory of demand and supply forecasting demand and supply, product pricing, branding and packaging, sales promotions, advertising and publicity, warranty, after sales service, product improvement and development, salesmanship, tenders and contracts, installations and commissioning, feedback invoicing and trade documents.

9. **Industrial Legislation** (4 Hr)

Important provisions of the following acts: Factory Act, ESI, GPF, Bonus, Trade Union, Industrial Dispute, Shop, Minimum Wages, Compensation, Apprenticeship, Payment of Wages aCt and Commercial Establishment Act.

DIGITAL SYSTEM DESIGN

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1. **Memories**   **(4 Hr)**
   (i) Basic RAM cell, NXM bit RAM, Expansion of word length and capacity, static and dynamic RAM, basic idea of ROM, PROM, EPROM, EEPROM.

2. **A/D and D/A Converters**   **(4 Hr)**
   (i) General principles of A/D and D/A conversion and brief idea of their applications.
   (ii) A/D Converter : Binary Ladder
   (iii) D/A Converter : Simultaneous method, counter type and continuous counter, successive approximation types of ADCs, integrating type (single slope and dual slope)

3. **Combinational Circuits**   **(8 Hr)**
   (i) Boolean algebra and minimization techniques
      (a) Review of logic variables, Boolean expression, and minimization of Boolean expression using K-map method (up to 5 variables) Tabular method of function minimization
   (ii) Combinational circuit design
      (b) Components of combinational circuits
      (c) Design procedures and implementation using gates (SSI approach) e.g., half and, full adder, half and full sub tractors, multiplexer, de-multiplexer /decoder (MSI approach)ROM / PLA (LSI approach)

4. **Sequential Circuits**   **(12 Hr)**
   (i) Essential Components of a Sequential Circuit Synchronous and asynchronous sequential circuits Classification of sequential circuits (Mealy and Moore Machines)
   (ii) Sequential Circuit Design Sequential logic circuit, review of RS,D,JK (including Master/slave JK) and T flip-flops. Their truth tables, characteristic tables, characteristic equation, exciation tables, conversion of one Flip Flop to another.
   (iii) Design of clocked sequential circuits: Generation of primitive state table/diagram, minimization of states, state assignment, choice of memory element. Design of counters

4. Synchronization of asynchronous inputs spikes in output and their removal. Design approach to asynchronous circuits, definition of cycles, races and hazards.   **(4 Hr)**

LIST OF PRACTICALS

1. Design and implement a code converter for Binary to Grey code conversion using decoder.
2. Design and implement full adder and full subtractor using multiplexer.
3. Program an EPROM using EPROM Programmer.
4. Using PROM / PLA design and implement a combinational circuit.
5. Design and implement a Modulo 5 synchronous counter using JK flip-flops.
6. From a given problem statement, design and test a typical sequential circuit.
7. Design a 4 bit sequence generator using JK Flip Flops.
8. To Construct & test 4/8 bit D/A converter using IC.
9. To Construct & test 4/8 bit A/D converter using IC.
10. Design a BCD adder and implement using combinational logic.
11. Design 4 bit up/down counter using T-Flip Flops.

ADVANCED MICROPROCESSOR

L T P
4 - 3

RATIONALE:

The complex systems requires high throughput that at times is not met with 8 bit microprocessors systems. So 16 bit microprocessor based systems become more suitable and economical. They provide better facilities to personal computers and other industrial systems. Presently 16/32 bit processor and 8/16 bit microcontrollers are widely used in personal computers and other industrial systems.

DETAILED CONTENTS

1. 16 bit microprocessors: (8 Hr)
    (i)   Introduction to 16 bit microprocessors.
    (ii)   8086 microprocessor: Internal architecture, internal registers, logical address, physical address generation, maximum and minimum modes, clock generator (8284), design of minimum system, comparison between 8086 and 8088.

2. Programming 8086: addressing modes, instruction format, instruction templates and hand assembly, instruction set, data transfer, arithmetic bit manipulation, string instruction, instruction, program transfer and processor control instructions.   (8 Hr)

3. Assembler and assembler directives, programming exercises based on the instruction set and use of assembler.   (8 Hr)

4. Memory and I/O interface: memory interface block diagram, I/O interface (direct and indirect).   (4 Hr)

5. Interrupt interface of 8086: types of interrupts interrupt masking, software interrupts. (4 Hr)

6. Introduction to microcontroller: main features, detailed architecture and applications of 8051 family of microcontrollers.   (4 Hr)

7. **Advanced processors features**
    i)   Pipelining
    ii)   Cache memory
    iii)   Vector processing

CASE STUDY : Pentium IV processor Block Diagram, Register Organisation Address generation, Memory and I/O interfacing.

List of Practicals

1. Write a program to perform multi-byte addition.
2. Write a program to add 10 sixteen bit integers and store the result (choose suitable memory location)
3. Write a program to multiply two sixteen bit signed integers and store the result.
4. Write a program to devide a 16 bit signed number by another 16 bit signed number and store the result (use sign extension to convert 16 bit data to 32 bit data)
5. Write a program to sort data in ascending / descending order (use bubble sort technique)
6. Write a modular program to compute the following expression
    $$y = ax^3 + bx^3 + cx$$

The main program should call one subroutine that compute x^2 and another subroutine that compute x^3 choose appropriate values for a,b,and c.

7. Write program that transfer a string from one memory area to another memory area. Use ASCII code to represent string characters. Assume strings end with NULL character.

8. Write a program that converts gray code to binary code (use XLAT instruction)

9. Write a program to determine the numbers of 1's in a 16 bit data stored in a particular memory location.

10. Write a program to convert a string of 20 characters from lower case to upper case. (string may contain blank space and digits)

MAJOR PROJECTS

This is treated as practical class.

The students will assemble and test a major electronic working useful project; model in the lab classes under the supervision of concerned teacher/lecturer. For example projects related to the following may be taken up:

1. Digital based projects
2. Micro-processor based projects
3. Software projects related to electronics field
4. Communication based projects
5. Any other project related; to electronic; industry

Evaluation will be based on the presentation of project developed including Viva. The marks are 100 each internal and external examinations.