DEPARTMENT OF ELECTRONICS
ST. JOSEPH'S COLLEGE (Autonomous), BANGALORE

Vth Semester Syllabus
Paper code: EL-5112 COMMUNICATION-1

UNIT I: Electromagnetic spectrum, propagation of EM waves (7hrs)

EM spectrum Terrestrial propagation of EM waves: Ground wave -Space wave (line of sight) propagation-Microwave propagation radio horizon Sky wave propagation, formation of ionosphere, importance, Propagation terms and definitions: Virtual height, Critical frequency, maximum usable frequency and skip distance Noise-definition: Types of noise –Internal and External Noise Signal to Noise ratio-definition and equation Noise figure definition and equation. Numerical problems

UNIT 2: Analogue Modulation Techniques (10 hrs)

Block diagram of general communication system-function of each block.
.Modulation - Need for Modulation,
Types of modulation-AM.FM &PM –definitions Amplitude modulation –wave form representation, Expression for instantaneous voltage–derivation, frequency spectrum. Modulation index, power relations-derivation of the expressions for total power radiated ,side band power and current calculations Modulation by several sine waves – the expression for total modulation index - Numerical problems on all the above expressions.
Generation of AM –Principle, requirements. Collector modulator –circuit ,working advantages Block diagram of AM transmitter ,function of different stages , Advantages of SSBSC, limitations of AM.
Frequency modulation-Definition and wave form representation. Definitions of the terms frequency derivation, carrier swing, modulation index, deviation ratio and percentage modulation.
Expression for instantaneous voltage –derivation, Frequency spectrum(qualitative mention only with general diagram). Bandwidth requirements. Generation of FM
Varactor diode modulator –circuit diagram and working ,FET reactance Modulator,
circuit diagram and working.
Block diagram of FM Transmitter –Function of different stages with AFC. Pre emphasis –need, circuit, working , Comparison of AM and FM.
Numerical problems

UNIT 3: Radio Receivers(08 hrs)

Demodulation –Need for demodulation, Types of Receiver –TRF and SHD.
Characteristics of RADIO Receiver –Definitions of sensitivity, Selectivity Fidelity ,Stability and Signal to Noise ratio.
AM Detectors, diode and transistor detectors, SHD AM Receiver-Principle, block diagram with AGC, function of different stages ,wave form ,Choice of IF, image frequency and rejection, de emphasis circuit-simple circuit diagrams (passive circuits and active circuits)and working.
FM receiver block diagram, FM detectors – slope detector, balanced slope detector-circuit ,principle of working, waveforms advantages.

UNIT 4: Transmission lines and Antennas (12 hrs)

Transmission line: definition examples-Two wire parallel line ,Coaxial line ,wave guides optical fibre cable, ideal transmission line(definition)Equivalent circuit of transmission line –diagrams for low frequency and for high frequency equivalent .Primary and secondary constants-L,R,C ,Z,Y – definitions Characteristic Impedance-definition $Z_0 = \sqrt{Z/Y}$ .For high frequencies $Z = \sqrt{L/C}$, Z of parallel wire line ,Z of coaxial line –no derivations Propagation constant-definition $Y = \alpha + j\beta = \sqrt{ZY}$ no derivation Reflection coefficient definition expression for K for a loaded line-derivation SWRdefinition in terms of I &V, expression for SWR for a loaded line ,derivation of relation between K&S, standing wave patterns for shorted and open lines. Numerical problems on all above equations

Antenna: radiation mechanism-Evolution of the dipole from open circuited transmission line , antenna equivalent circuits, elementary doublet, radiation pattern ,expression for radiation field-no derivation Resonant antenna-definition , radiation pattern and current distribution for $l = \lambda/2$, $2\lambda/2, 3\lambda/2$, grounded antenna Non resonant antenna-definition, radiation pattern for a long wire antenna-qualitative Antenna parameters-definitions and expressions for gain , directive gain, power gain, directivity ,beam width and band width Radiation resistance definition, derivation of expressions for total power radiated and radiation resistance considering expression of electric field intensity Expression for radiation efficiency –mention Numerical problems Yagi antenna-design of three element yagi antenna and applications, vertical antennas Numerical problems (dish/set top box/ routers)

UNIT 5: Television (8 hrs)

Introduction to TV-Basic principles of picture transmission. Simplified Block diagram of TV Transmitter-Function of each block Simplified Block diagram of TV Receiver. –Function of each block TV Systems &Standards-Mention about NTSC,PAL &SECAM. Comparison Between American And European systems Basic Principles of colour TV-Primary and Secondary colours, Compatibility Colour Combinations-chromo &Luminescence processing as per PAL system-luminance equation Simplified block diagram of PAL colour TV Receiver –Function of each block. Numerical problems,

cable TV ,CATV, LCD, TV, Plasma TV, HD TV, LED TV (qualitative study)

Picture transmission using HDMI protocol (qualitative studies)

PRACTICALS

1. Saw tooth wave generator using IC555
2. Voltage comtrolled oscillator.
3. Astable multivibrator using IC555
4. Scmitt trigger using IC555
5. Amplitude modulator and demodulator
6. First order active low pass filter and high pass filter
7. Band pass filter
8. Clipper and clamper circuits
9. Miller sweep circuit
10. Automatic gain control
11. Tuned amplifier

Books Recommended:

1.Electronic Communication ,Dennis Roddy &John Coolen –IVth edition-PHI, 2005

2.Electronic Communication systems, Kennedy &Davis IV the edition ,2005 TATA Mc GRAW Hill

3. Monochrome and colour television, R.R.Gulati, New Age international

4. Television Engineering- A.M. Dhake-Tata Mc Graw Hill

Reference Books:

1. Advanced Electronic Communication System,,Wayne Tomas I – , PHI,VI edition, 2005

2. Handbook of experiments in electronics and communication-Poorna Chandra Rao & Sasikala, VIKAS Publising house, 2004

3.Basic Electronics -A text lab manual,-PaulB.Zbar,Albert P.Malvinu &Michael A.Miller-Tata Mc GRAW Hill, 1997.

4. Electronic Communication systems ,Wayne Tomas –Vth edition –Pearson education, 2005

Paper code:EL5212: Micro processor and Interfacing

UNIT 1: Introduction to Microprocessors (4hrs)

Computer terminologies. Block diagram of a Computer: - Input, Output, CPU and memory. Evolution of Microprocessors and application. Microcomputer, microcontroller and embedded systems. Tri-state buffers. Memory size and word length. Microprocessor based system organization.

UNIT 2: 8086 Architecture (8hrs)

Pipelining, Architectural block diagram: - Execution unit, Bus interface unit, registers (General purpose, pointers, segment and index registers), data and address bus demultiplexing, flags, Generation of 20-bit Address, pin configuration, modes of operation: - minimum mode and maximum mode. Accessing odd and even memory bank, instruction cycle, fetch-execute cycles, timing diagrams - memory read, write, I/O write.

UNIT 3: Instruction and Programming of 8086 (18hrs)

Instruction format and template, Addressing modes:-Immediate, register and Memory addressing modes, Different group of instructions - data transfer, shift and rotate, arithmetic, logical, branch and machine control group. Stack, subroutine, Interrupts: - Types/classification of interrupts, Sources of 8086 interrupts, interrupt sequence and vector table.

some examples addition, subtraction, multiplication, division of two 8 bit numbers, one’s compliment, two’s compliment, to find the number of one’s in a given byte, addition and

subtraction of 16 bit numbers, Average of 10 numbers, Fibonacci series, count 00-99, program to generate ASCII equivalent values for decimal numbers 0 to 9, move string from one location to another, smallest and largest numbers, Delay program.

UNIT 4: Peripheral devices and their Interfacing (12hrs)

Memory mapped, I/O mapped I/O scheme, memory and I/O interfacing, interfacing devices and I/O devices, I/O Ports, Data transfer Techniques: - parallel and serial data transfer, Synchronous and asynchronous.

Programmable peripheral interface (PPI) (8255): Architecture operating mode, control group, control word.

Interfacing: key board, 7-segment display, stepper motor, and DAC.

Timer or Counter (8253): operation modes and programming

Programmable direct memory access controller (DMA) (8257), Priority interrupt controller (PIC) (8259) and Programmable Communication Interface (8251):Schematic and operation. (mention only)

UNIT 5: Memory devices (3 hrs)

Need for memory devices, computer memory devices, primary and secondary, real and virtual memory, volatile and non volatile, Memory write ability and storage permanence, Composing Memories, Types of semiconductor memories:- ROM, PROM, EPROM, EEPROM, Flash, RAM, SRAM, DRAM, PSRAM and NVRAM, Composing Memory, Memory Hierarchy, cache memory.

Reference Books:

"Microprocessor Architecture, Programming and Applications with the 8085"-Ramesh S. Gaonkar, Penram International Publishing (India).

"Fundamentals of Microprocessors and Microcomputers"- B. Ram, Dhanpet Rai Publishing.

"Advanced Microprocessors and Peripherals"- A.K. Ray, K.M. Bhurchandi. Tata Mc. Graw Hill.

"Microprocessors and Microcontrollers"- B.P. Singh. Galgotia publications.

"Microprocessor theory and applications"- M. Rafiquizzaman, PHI.

"The 8088 and 8086 Microprocessors Programming, interfacing, software, hardware and Applications" - Waltier A. Triebel and Avtar Singh. PHI.

"The Intel Microprocessors 8086/8088, 80186, 80386, 80486 Architecture, Programming and interfacing"- Barry B. Bray, PHI, New Delhi.

EL5P2 PRACICALS

List of experiments -8086 Programs:

Addition and subtraction of 8-bit numbers.

Addition and subtraction of 16-bit numbers.

1's and 2's complement of 8-bit and 16-bit numbers.

Ascending and descending order of 8-bit numbers.

Smallest and largest number in a data array.

To find the number of ones in a data.

To interchange the data present in two different memory locations.

To find the square of a number.

Interfacing DAC to 8086 through 8255

Interfacing stepper motor to 8086 through 8255

Interfacing ADC to 8086 through 8255

Interfacing 7 segment display to 8086 through 8255

VI SEMESTER

Paper code:EL-6112 (COMMUNICATION-2)

UNIT 1: Pulse and Digital communication systems (10hrs)

Introduction, characteristics of data transmission circuits-Shannon limit for information capacity Bandwidth requirements, data transmission speeds Sampling theorem, Pulse modulation types-PAM, PWM, PPM, brief description, waveforms, PCM-brief description and block diagram
Digital communication systems –Introduction to digital modulations. FSK, PSK and ASK-brief description, waveforms, Advantages and disadvantages of digital transmission. Applications. Noise, Cross talk, Echo suppressors, Distortion and equalizer, Modems-Classifications, modes of modem operation.

UNIT2: Satellite Communications (12 hrs)

Introduction and the need of a satellite, the launching of a satellite, the use of Kepler's Laws in satellite communication, satellite orbits, satellite system-block diagram of satellite sub systems (space segment), station keeping, attitude control, ground station (simplified block diagram of earth station), uplink, downlink, cross-link, Transponder (C-band multi channel), satellite band width, frequency reuse ,micro strip antenna systems Multiple access methods - TDMA, FDMA, and CDMA.GPS –services like SPS & PPS.

UNIT 3: Optical fibre Communications (12 hrs)

Introduction-need for optical fibre communication, Block diagram of OFC system, Core and clad concept, light propagation through optical fibre, Expressions for acceptance angle and numerical

aperture. Light sources-Requirements and examples. Construction and working of unguided LASER diode. Photo detector –PN photo diode PIN photo diode requirements and examples. Construction and working of Avalanche photo diode. Advantages and disadvantages of optical fibre communication, Losses in optical fiber cables. Advance applications of optical fibre communications.

UNIT 4: Radar (5 Hrs)

Introduction, principle, frequencies and power. Block diagram of Pulsed radar system. Elementary blockdiagram and function of each block. CW Doppler radar –working principle applications (block diagram)
RADAR range equation. Derivation of the expression and factors influencing maximum range. Applications of RADAR-classification under military, civilian and scientific

UNIT 5: Advanced Communication systems (06 hrs)

Concept of cellular mobile communication-cell and cell splitting, frequency response, Roaming and Hand off, Block diagram of cellular mobile communication system, Simplified block diagram of cellular phone Hand set, Advantages and disadvantages. Study of GSM & CDMA system: other wireless system: LAN, WiFi, Bluetooth Standards, WI-max (mention only), Brief description of Long Term Evolution.

PRACTICALS (25 marks)

1. Pulse width Modulation and PPM using IC555
2. Pulse Amplitude Modulation
3. FSK modulation
4. ASK modulation
5. Audio cross over network
6. Frequency multiplier using transistors
7. Numerical aperture of a given fiber
8. Losses in fiber

Individual Electronics Projects (25 marks)

Books Recommended

1. Electronic Communication, Dennis Roddy &John Coolen –IV edition-PHI, 2002

2. Electronic Communication systems, Kennedy &Davis IV the edition _TATA McGraw Hill, 2005

3. Advanced Electronic Communication System, Wayne Tomasi, PHI, VI Edition, 2005.

Reference Books:

1. Electronic Communication systems, Wayne Tomasi–Pearson education, Vth edition 2005

2. Basic Electronics, A text lab manual,-PaulB.Zbar, Albert P.Malvino &Michael A.Miller-Tata Mc GRAW Hill, 1997.

3. Electronic devices and circuit theory, Robert Boylestad and Louis Nashelsky, PHI, 6th Edition, 2002

4. Satellite communication-Agarwal-Khanna publishers, New Delhi, 2000

5. Communication Electronics, Frenzel, TMH, 3rd Edition, 1999

6. Understanding Radar Systems. Simon Kingsley, Shaun Quegan, SciTech Publishing

7. Handbook of experiments in electronics and communication-Poorna Chandra Rao &Sasikala, VIKAS Publishing House, 2004

Paper code:EL-6212: Microcontrollers and Embedded systems.

UNIT1: Introduction to microcontrollers (3hrs)

General block diagram, types of architecture: - Harvard, Princeton, RISC, CISC, Difference between microprocessors and microcontrollers.

UNIT2: PIC Microcontrollers (PIC16F877A) (10 hrs)

Introduction, PIN diagram, and architectural block diagram, ALU, stack, IO Ports, Memory Organization, Addressing modes,special Function Registers: - W-register, PSW, CPU registers, configuration word and peripheral registers. , PIC resets, and PIC oscillators, WDT and PIC instruction set.

UNIT3: IN-built Peripheral Features of PIC16F877A (12hrs)

I/O ports programming, interrupts with a programming example, timers and watch dog timer, programming the ADC.

UNIT4: Interfacing PIC (5hrs)

Interfacing- push buttons, LED, relays, 7-segmant, stepper motor, Keypad, LCD controller and DAC to generate: - Square wave, Ramp and Step.

UNIT 5: Introduction to Embedded systems (15 hrs)

Introduction: - optimizing the Design constraints, processor technology, Custom Single-Purpose processor design, RT-Level Custom Single-Purpose processor design, optimizing Custom Single-Purpose processors. General purpose processors:-Basic Architecture, operation of general purpose processors, Programmer's view, Development Environment. ASIPs: - Microcontrollers and DSP chips. Standard Peripherals: Timers, PWMs Application, UART, A/D Converters, Interfacing- Introduction, Basic Terminology, Interfacing: - I/O Addressing, Interrupt and DMA, and bus Arbitration.

Reference Books:

"8051 Micro controller" - by Kenneth J.Ayala

"An Embedded Software Primer"-David E. Simon

"Embedded System hardware and software design "- Frank Wahid

"Microcontroller and Programming and Applications"- Mazidi M.A and Mazidi J.G.

"Programming in ANSI 'C' " - E Balaguruswamy, TMH, New Delhi.

"Let Us C"- Yashavanth Kanitkar.

EL 6P2 PRACTICALS

8051 Micro controller Lab:

1. Write an ALP to perform addition and Subtraction
2. Write an ALP to perform Multiplication and Division
3. Write an ALP to find the 2's compliment of a no.
4. Write an ALP to access each bit of a given byte.
5. Write an ALP to find if the given no. is a palindrome.
6. Write an ALP to find the LCM of two numbers.
7. Write an ALP to find GCD of 2 nos.

Delay Program

8. Interfacing DAC
9. Interfacing ADC
10. Interfacing Traffic Control
11. Interfacing 7- segment display
12. Interfacing a mux and demux.
