Elements of Microprocessor

T. E. I. S. (Semester - V)

Scheme of Instruction

Lectures:.3 Periods/Week

Practical: 2 Periods/Week

Schr:me of Examination

Paper: 100 f\1arks

Term~Work: 25 Marks

1: Introduction

Microprocessor definition, power of microprocessor, physical components - memory, I/O, and CPU, Software requirements, Microprocessor based system - Organization, machine language - terms and their definitions, Assembly language - ASCII codes, writing and executing program, Assembler, Introduction to High-Level l:anguages, and Classification of computers.

2: rv1icroprocessors

808sA, MC~_800, Zilqg-Z80 Microp~ocessor architecture and their comparison, 3: 8085 Architecture and Memory Interfacing

8085 Architecture, Signal Description, Demultiplexing the Address/Data Bus, Generation of Control Signals, Architecture and' operation, 8085 based microcomputer, machine cycles and bus timings.

Memory interfacing - minimum system .design,. timing diagram considerations, clock, reset and buffering circuits, testing and troubleshooting.

4: 808S Programming Techniques

8085 Programming Model, Instruction classification, Instruction and Data format, Process of writing assembly language program,

8085 Instruction set, timing diagram of 1 byte, 2 byte and 3 byte instructio!]s, Addressing modes,

Looping, Counting and Indexing, Counters and Timers, Code Conversion, BCD arithmetic and 16 - Bit data operation, Software development systems and Assemblers.

CO'1r:">rt of stack and subroutines, parameter passing techniques, re-entrant and recur .*le* subroutines.

5: Input/Output (I/O) Data Transfer Techniques

Basic interfacing concepts, Interfacing input and output devices with examples, memory mapped *1/0* and *IIO* mapped I/O, Testing and troubleshooting I/O i;1terface circuits, I/O data transfer classification, Programmed I/O, Interrupt driven program controlled.IjO, Hardware *1/0* (Direct Memory Access).

Serial *1/0* and data communication - basic concepts, 8085 serial I{O lines.

6: In.terrupts

Requirements, Single Level Interrupt, Multilevel interrupt, Vectored interrupt, 8085 interrupt structure and operation,

7: Programmable Interface Devices

(Features, Organization, Operating modes and their interfacing)

a) 8155 - Multipurpose Programmable Device

.c) 8253 - Programmable Interval Timer

,.~*A* 8237 - DrvlA Controller

~ 8259 - Interrupt Controller .'

f) 8251 - USART.£'

8: Microprocessor Applications

(Hardware configuration and their accompanying programs)

a) ADC/DAC

b) DC Motor Control

c) Position Control with Stepper Motor' d)

Temperature Control

e) Automatic Weighing

7) Interfacing of 8255 and related programs with 8085.

8) Inkrfacing of 8253 and related programs with 8085. 9)

Interfacing of 8259 and related programs with 8085.

10) Interfacing of 8251 and related programs with 8085.

11) Anyone application from chapter - 8.

Term-\l\Jork: Each student shall appear for at lest one written test during the term. Journal should consist of 8 experiments from the list given above, properly recorded and graded as well as assessed test paper. The Term-Work will carry 25 Marks. Distribution of Marks: 15 Marks for Journal and 10 Marks for Test.

Principles **of Communication Engineering**

T. E. I. S. (Semester - V)

Scheme of Instruction	Scheme of Examination
Lectures: 3 Periods/Week	Paper: 100 Marks
Practical: 2 Periods/Week	Term-WorK: 25 Marks

1: Introduction. to communication systems

Elements of a communication systemr time & frequency domain analysisr Noise in communication systems, Spectrum analysis (Fourier Transform), Introduction to radio wave propagation.

2: Amplitude modulation

Introduction, Time. and frequency domain analysisr power relations, ba:;ic requirements and description of various modulatorsr comparison of DSBr. SSB, VSBr spectrum modulqtor and detectors.

3: Angle modulation

Introduction, frequency modulationr phase modulationr spectrum of FMr effect of noise in FMr ~eneration of FMr detection of FM.

4: Tran~mi~-ers and Receivers

Introductionr transmitters - requirements, topologies, AM and FM transmitters, receiver.- topologies, characteristics, variations, measurements, transceivers, characteristics and block diagram of Broadcast Radio transmitters.

5: Basic Information Theory.

Information entropies of dis<;rete systems rate of transmission - redundanCYr_- efficiency and channel capacity.

6: Pulse and Digital Modulation.

Sampling theorem, low pass and band pass signals, elements of PAMr PPM, PCM, PW~1, FSK, psk and delta modulation, adaptive delta modulation.

7: 1\t1uW.'Jlexing Time and frequency division multiplexing.

8: Telemetry

Methods of data transmission, general telemetry system, types of telemeterying syste'm - land line telem.:::terying, RF telemeterying, Voltage telemderying system, Current telemeterying system; force balance telemet~rying, Impuise and position telemetering system, land line telemetry feedback systems, FM telemetry systems, PAM telemetry, and PO,., telemetry.

References:

1) Blake, "Electronic communication systems", 2nc: Edition, Thomson Learning, 1989.

2) Taub & Schilling, "Principles of communication engineering", 2nd Edition, McGrayv Hill, 1993.

3) Bruce Carls~n, "Communication systems", 2nd edition, McGraw Hil!, 1994.

4) Kennedy, "Electronic communications", McGraw Hill, 1985.

5) Haykin, Simon S., "Communication Systems~', .John Wiley, New York, 1978.

6) Lathi Ghagwandas Pannalal, "Signals, Systems and Communications", John Wiley, New York, 2000.

7) Dennis Roddy and John Coolen, "ElectroniC communica~ions", 3rd Edition, Prentice Hall of India (P) Ltd., New De!hi, 1986'.

8) A. . K. Sawhney, "Electrical and Electronic MeasureIT}ent and Instrumentation", Dhanpat Rai and Co., 1997.

9) Perry. A. Borden and W. J. Mayo -"Telemetering systems" Wells ReinhDld publishing corporation, Newyork,1959.

10) William Schweber, "Electronic Communication Systems", PHI, 4h edition, 2002.

Experiments :

1. To analyze the signals in frequency domain.
2. To analyze the AM generation and detection and calculate" the modulation index.
3. To analyze the SSB generation and detection.
4. To observe the FM generation and detection and measure frequency deviation and modulation index of FM.
5. To generate phase modulation and detection.
6. To analyze PAM generation and detection.
7. To analyze PWM generation and detection. To
8. analyze PPM generation and detection." To analyze PCM generation and detection.
9. To analyze delta modulation and demodulation.
10. To observe time division multiplexing.
11. To observe frequency division multiplexing. To
12. analyze FSK modulation.
13. To analyze PSK modula.tior).
14.

Term-Wor'k:

Each student shall appear for at least one writte'n test during" the. term. Journal should consist of any' 8 experiments properly recorgedand graded. Term-Work will carry 25 Marks. Distribution of Marks: 15 Mar~ for Journal and 10 Marks for Test.

SIGNALS AND SYSTEMS

T.E. I.S. (Semester - V)

Scheme of Instruction:		Examination
Lectures: 3 Periods.jWeek	Scheme:	P~per: 100 Marks
Tutorial: 1 Periods.jWeek		Term-work: 25 Marks

l.Introduction:

1.1 Basic signals in continuous time and discrete time domain, different measures for signals.

1.2 Classification of signals: Periodic/ aperiodic, Even/Odd Deterministic/Stochastic and Energy/Power signals.

1.1. Singular Functions: Ramp, step and Impulse functions, Axiomatic definition of impulse function, approx. to impulse function and the generalized impulse function.

1.2. Representation of a system as a mapping 'between input and output signals, System as a means of transformation of signals.

1.3. System representation in continuous and discrete time domain in terms of differential and difference equ9tion respectively. Normal form representation of signals.

104. Classification of-systems :Causal / Non-.g!usall time-varying, time-invariant, 'stable/ unstable, invertible / non- invertible and lumped/distributed parameter systems.

2. Fourier Analvsis of Continuous Time Siqnals:

2.1. Orthogonal functions: Definitions ,approximationsl coefficient calculation on the basis of minimum mean square error.

2.2. Fourier Series: Representation of Fourier- series in terms of sine *Icosine* ! exponential functions.

2.3. The complex Fourier spectrum.

204. Properties of Fourier serie$.

2.5. Convergence of Fourier Series.

2.6. Gibbs's phenomenon.

2.7. Fourier transform and its properties.

3. Continuous Time Systems :

3.1. Linear differential equations.

3.2. Representation of signals by a continuum of impulses, system impulse response and the convolution integral.

3.3. Evaluation and Interpretation of Convolution Integral.

3.4. Stability of system in time and frequency domain.

3.5. Transient and steady state response of linear systems.

3.6. Frequency "response of linear systems.

3.7 Response of systems to causal periodic inputs.

4. Z- Transform:

4.1 Definition, Convergence, properties anq inversion of Z-Transform. Concept of single and double sided Laplace Transform.

4.2 Analysis of discrete time system using Z-Transform.

4.3 Relationship between Laplace and Z-Transform, Fourier transforms. 5.

Random Siqnals :

5.1 Introduction, Discrete time iandom process.

5.2 Random variables, Stochastic processes, first and second order statistics, moment, correlation and covariance stationary process, ergodicity.

"References: .

1 Oppenheim, Wilsky and Nawab, "Signals and Systems", PHI/Pearson Education, 2nd e~ition, 2002. 2 S. P:Xavier, "Signals and Systems", 2nd Edition, S. Chand and Co., 1998." 3 Reddy and Prasad, "Signals Processing", TMH, Vol. II, 1994.

Taylor, "Principles of Signals and Systems", McGraw Hill, 1994.

4 Haykin, Simon S., "Signals and Systems", John Wiley, New York. 1978.

5 Lathi 8. P., "Signals, Systems and Communications". John Wiley, New York,

6 2000.

7 I. J. Nagrath, "Signals and Systems", 1st Edition. TMH. 2000.

8 S. Salivahanan, "Digital Signal Processing", 1st Edition, TMH. 2001.

9 Douglas K. Lindner, "Introduction to Signals and Systems", TMH, 1999.

10 Rodger E. Ziemer, William H. Tranter, "Signals & Systems - Continuous and Discrete", Pearson Education, 4th Edition, 2002.

Tutorials:

1. Diffe: ~;nce between continuous time and discrete time signals, classification: problems on the same.
2. Singular functions, Impulse function and its approximation, I/O systems. Difference equation formulati,)n.
3. Fourier series representation, properties, problems on Fourier series and Fourier Transform.
4. Problems on convolution, Frequency response of linear systems.
5. Relation between Fourier and Laplace, Solutions to differential equations. 6. Concept of Z-Transform (Single and Double Sided), analysis, relation between Laplace Transform and Z-Transform.
7. 'One complete theoretical assignment on Random Signals.

Term - Work: Each student shall appear for at least one written test during the term. journai should consist of 7 tutorials properly recorded and graded as well as assessed test paper. Term-work will carry 25 marks. Distribution of marks: 15 Marks for Journal and 10 Marks for Test.

Electronics **and Digital Instrumentation**

T. E. I. S. (Semester - V)

Scheme of instruction	Scheme of Examination
Lectures: 3 Periods/Week	Paper: 100 Marks
Practicals: 2 Periods/Week	Term-Work: 25 Marks.

1. Introduction to OP-AMP.
Ideal and practical Op-Amp, Op-Amp Applications-Differential Amplifier, Inverting, Non-Inverting, Adder, Subtractor, Differentiator, Integrator and Voltage Follower, ratiometric conversions, logarithmic compressions and signal conditioning.

--2. Error analysis and standa.rds (brief introd.~ction): Types of errors,.. Statistical analysis of error~_p~?ba.~ility of eyrs, Limiting errors, standards of measurements - classification - Primary; Secondary and working standards, standards for - mass, length, time, frequency, voltage, current, resistance, induct~nce, capacitance.

3. Input/Output devices {brief'introductiQn):Digital I/<\devices
punched card, paper tape, bar codes, line ,printer, ink jet pr!!]teI, digital tape re~ording, Method of Digital recording, floppy disk, Displays ':":.b~D, UCD, L!:9..,seven segment display driver, Alpha numeric display, B~/raPh display. Brief comparison with analog displays & recorders.

4. Digital counters and timers: Circuitry of logic elements (DTL, TTL FAMILIES), Interfaces and LOGIC converters, Basic internal counter circuitry, modes of operation aCt rms, digital time and frequency. Ratiometric samplin~ plug in units and spedal" functions, Accuracy.

5. Converters: ADC, DAC, various types.

6. Digital Instruments: Automation in voltmeter (ranging, zeroing, polarity i,ndication), DMf'.1 (digital multimeter) circuit (block diagram), Accuracy & guarding of DVM, significance of '/2 & 3f4 digits.

Ī; Signal Sources and Analyzers: Sine wave Ger.erator, Square wave generator, P:.:lse generator, Fundon generator, Wave analyzer, Ha,mor:1.: distortion 2iE!yzer, H~:erodyne \'.3ve an:=lyzer, 5;Jectrum analyzer, frequency r~ponse 2f.aiyzer, Lo:k-i~_ar.plifier. - -

-- 8. Cathode Ray Oscilloscope: Bl:ck Dia;ram, Delay line, Horizont:c; Deflection S';:::em, Vertical Defle::ion sy~em, Ty;;es of CRO'S -sinf~e beam, doc: :: beam, c;gital storc;e and samplin;, brief comparison between CRCs, block c'agram ,i~ featu2s like re:l, refresl, samplin.~ ratE~ and spec~fiC2::on. A;Jp1;:ation in :""1strurr~ntation :md me2surement oscilloscope. virtuE..

9. Sources of Noise and Preventive Maintenance: Srie7 Descript:m7 to\~ards So:...::-.:es of no~~e and ~h:::;i redu:tion .teC1n~qUeS, ;nreventiv:: maintenanc:: 2nd trJuc.eshootm; of ele:crontc e:;ulpmen::s.

References:

Jf. A. J. Bouwens, "'Digitai In£rument:cjon", 1,'tZjH- 1985.

2. T.S. Rathore, 'Digital mecsurement Techn~ues", N=rosa 1996.

3. Oliver and Cage, "Electronic Measurement *2nd* InstrJmentatiJn", MGH-1975. 4. A. D. Helfrick ard W. D. O:!oper, "Nodern Eectronic Instrumentation and Measurement Techniques", PHI- 1995

$ c. S. Rangan, G. R. Sarm2, V.s. Mani, \\Inst1Jmen~on Devk:es and Systems",. 2nd Ecition, TMH- 1983

YH.S. Kalsi, "Electmnic InshJmentafon", T!";rl- 1991.

8. Technical r'.1aJ!~G~s for ViitJal CRG:

9. Technical r'.1aJ!~G~s for ViitJal CRG:

10. Roy Choudh2:j, "Linear ii"itegratec circuit5'{, Wiley ::astern- :991.

Experiments:

1. to 4 : Study of various recorders - X-V, strip chart, potentiometric.. magnetic types.
5. ADC CIRCUIT.
6. DAC CIRCUIT.
7. Signal generators ------ sine, square, triangular, pulse types.
8. Phase meter c with discrete components)
9. Study of Wave analyzer and harmonic distortion analyzer for measurement of total distortion of signal.
10. Study of DSO.
11. Applications of CRO for frequency, time period, rms of AC waves, phase measurements, etc.
12. Op-Amp applications
    Ca) Inverting and Non-Inverting (b)
    Differentiator and integrator and (c)
    Adder & subtractor

Term Work: Each student shall appear for at least one written test during the term. Journal should consist of at"least 8 - experiments duly graded and recorded as well as assessed test paper. Term shaH carry 25- marks. Distribution of marks: 15 Marks- for journal and 10 markS-ror Test.

UNIVERSITY OF MUMBAI THIRD YEAR ENGINEERlNG
SYLLABUS [SEMESTER V] PlU:SEi'\TATION AND
COMMUNICATION TECHNIQUES

LECTURES : 2 I'EH.lODS / WImK

ORAL : 25

TFfORIALS : 2 PElHOD~ WEEK

TERM WORK MARKS: 25

SYLLABUS

COMMUNICATION IN A BUSINESS ORGANISATION

int~rnal tUp\\~II~, Downward. Horizontal, Grapevine, Problems, Solutions) Exten,;I! Communication. Slr:1legies lor conducting successful business meetings, documenta! .: (notic~, agenda. minutes) of meetings, Introduction to modern communication techniq;:.:s (for ~.g. e-mail, internet, vid'eo conferencing ete), Legal" & ethical issues in communication (intellectual property rights, patents) 6 - 7 Lectures

ADVANCED TECHNICAL WRITING 9 - 10 Lectures

1. REPORT - WRITING AND PRESENTATION: Definition and importance of reports. Qualities of Reports, language and style in reports, type of reports, formats (letter, memo, project - reports), methods of compiling data. A computer-aided presentation of a project report based on technical, survey-based, reference b~ed or campus related topic. Topics to be assigned to a group of 8-10 students: The written report should not exceed 20 printed pages.
2. TEC!L"{ICAL PAPER-WRITING
3. WRITING PROPOSALS

INTERPERSONAL SIGLLS

Introduction to emotional intelligence, Motivation, Negotiation and conflict-resolution, Assertiveness, Leadership, Tenn-building, Decisi-on-making, Time-management 9-10 lectures

INTERVIE\V TECHNIQUES

Preparing for job interviews, verbal and non-v~rbal communication du.ring intcrvh;w~;. Observation sessions and role-play techniques may be used to demonstrate inlervi~w strategies. 1 - 2 lectures

GROUP DISCUSSION

Dynamics of Group Behavior, Techniques for effective participation. 1 - 2 lcctui.cs

ASSIGNMENTS:

\V ri lten
:2 assignments on Communication topics 3
assignments on Report writing
3 assignments on Interpersonal Skills
1 class test

Oral
Practical sessions on Group-discussion / Interview Skills / Project Presentation / Power point Presentation.

BREAK UP OF TERM WORK MARKS (External Exam)

Assignment	15 marks
Test	I 0 marks
Total	25 marks

BREAK .UP OF ORAL EXAMINATION (Internal Exam)

Project Report Presentation	20 marks
Group Discussion	5 marks
Total	25 marks

BOOKS' RECOMMENDED

A. For classropm teaching
(i) Fred Luthans, 'Organizational Behavior' McOraw Hill International Edition
(ii) Lesiker and Petit 'Report writing For Business' McGraw Hill International Edition (Hi) Huckin and Olsen' 'Technical Writing and Professional Communication' -.McGraw Hill International Edition '..
(iv) Wallace and Masters 'Personal Development for Life and Work'(workbook) Thomson Learning
(v) Herta Murphy 'Effective Business Communication' Hearta Murphy Herburtwhildebraudt - McGraw Hill

B. For Additional Reading
(i) Lewicki, Saunders, Minton 'Essential of Negotiation' McGraw ijill International Edition (ii) Hartman Lemay 'Presentation Success' Thomson learning.
(iii) Kitty 0 Locker & Kaczmark - 'Business Communication Building Critical Skills' McGraw Hill
(iv) Vikas Gupta.: Comdex Computer Course Kit, lOG Books Pvt. Ltd.
(v) I-{eller & Handle: The Essential Manager's Manual - Dorleen Kindercey
(vi) The Sunday Times 'Creating Success Series'
I. Develop your Assertiveness.
2. Make every Minute. Count
3. Successful Presentation Skills
4. How to motivate people
5. Team building

Process Instrumentation System

T.E. I.S. (Seme~ter - **V...!1**

~-,cl1eme of Instruction

L~c~ures: 3 Periods/Week

pcacticais: 2 Periods/week

Scheme of Examination

Paper: 100 Marks

Term work 25 1\1arks

Oral: 25 Marks

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1.: Development of mathematical model of a process :. 5) (r-

Need Of Mathematical Modeling. Energy and mass balance equations for some of the process viz. C5TR, 5TH, Mixing process, Fluid Flow system, liquid level system, Modeling difficulties, modeling considerations for controi purposes.

2: Process dynamics:

Dynamic elements in control loops. Dead time processes. Dy~amic behaviors of first order, second order and higher order systems. Interacting and non-interacting systems.

3: Controller principles:

Process characteristics. Control system par9meters. Discontinuous, continuous and composite modes of control actions (P, PI, PD & PID).

4: Analog and 'digital c~ntrollers:

General features. Electronic--controllers, pneumatic controllers and hydra~lic con~rollers. Design considerations.

5: Process loop tuning:

Open loop transient response method. Ziegler-Nichols metho<;J. Frequency response method.

6: Different control Paradigms:

Introduction to feedback, feedforvlJard and inferent!a! controls. Multivariable *controll* cascade controll split range control, ratio control, selective controi and their appiications.

7: Discrete -state-process-control :

Discrete state process control, characteristics of the system, discrete state variables, p specifications & event sequence description, ladder diagram - ladder diagram elements examples, Programmable controller - Relay sequencers, programmable logic controller, architecture, operation and programming, Types of PlC.

8: Batch and Continuous process control:

Batch mode, Batching nomenclature{ Batch formulation, System selection factors, Batc versus Continuous Process Control, Computers in Process Control.

References:

1. George Stephenopoulos, "Chemical process control", PHI-1999. 2. Curtis Johnson, "Process control instrumentation technology", 2002.
3. Kirk and Rimboi, "Instrumentation", D. B. Taraporewala sons and co. Pvt. ltd. - 199'6
4. Peter Harriott, "Process control", Tata McGraw Hill, 1995
5. Norman A. Anderson, "Instrumentation for Process Measurement and Control"(3rd Edition; ISA(1997.
6. M. Gopal, "Control System - Principles & Design"(2nd Edition TMH(2002.,
7. Douglas M. Cpnsidine("Process/IndustrIal instruments and' control handb~ok"; 4th' Eci~ McGraw-Hili International Edition(1~74.
8. Bela G. Liptak, "Process Control Instrum~nt Engineers Handbook"(3rd Edition(Chilton B: company, 1970.
9. Gary Dunning, "Introduction to Programmable logic Controller" Thomsan learning(edition{ 2001.
10. M. Chidambaram, "Computer Control of processes"(Narosa(2002.
11. B.Wayne Bequette,"Process Control~' PHI 2003

Experiments :

1. f\1tJthem. ~JCal fvlodeling of CSTR and STH Systems and Simulate this ~sing simul~t;oi1 software.

2. 3. Application of *P,* PI and pro for Typical process.----
Application of ON-OFF Control action.

~. App!;cation o! Cascade control ~ Jr process.

5. Ratio Control System. ~

6. To design and check the performance of Electronic PID controller. 7.

To study the pneumatic controllers.

8. To study Hydraulic controller.

9. Supervisory and Direct Digital Control system.

10. Tuning of PID controller. ~

11. Ladder Programming for simple process.

Term-Work:

Each candidate shall submit a journal in which he has recorded a laboratory work of at least eight experiments he has performed in the laboratoryr given to him by his concerned teacher (duly graded). Graded answer books for the test along with graded journal shall be considered as term work and allotted maximum of 25 marks by the examiners.

Linear Integrated Circuits and Applications

T. E. 1. S. (Semester - VI)

Scheme of Instruction

Lectures: 3 Periods/Week

Practical: 3 Periods/Week

Scheme of Examination

Paper: 100 Marks

Term-Work: 25 Marks

Oral: 25 Marks

Practical: 25 Marks.

1: Introduction: Fabrication process for monolithic Ie's, Process of fabrication for BJT's, diodes, Capacitors, Resisters & MOS-FETs in brief. 2: Analog IC's :

Ideal & practical op-amp, Differential Amplifier-a.c. & d.c. analysis, improving voltage gain using active load etc, current sources, unbalanced op-amp frequency response & stabilizing unbalanced operation, circuit diagram of lC741 & working in detail a.c. & d.c. characteristics, specifications measurement of op-amp parameters.

3: Linear applications of op-amp

Effect of source impedance, bias current, offset voltage, frequency response of all the applications as - Voltage follower, inverting & non-inverting, Adder, Subtractor, Instrumentation Amplifier, V to I & I to V converter with floating load & grounded load,. Howland current source, 3 mode integrator, differentiator & compensated differentiator, gyrator [simulation of inductance].

4: Non-linear applications of op-amp

Preci~ion rectifier half wave, full wave, abs?lute value circuits, clipping, clamping.. circuits! practical clamping circuits, sample & hold circuits (performance parameters),peak detectors ,log amplifiers ,temperature compensated log amplifier ,antilog amp., multiplier ,divider ,comparator ~ threshold detector ,zero crossing detector, window detector ,Schmitt trigger, free running multivibrator, Wien-bridge oscillator, Phase shift oscillator.

5:~Vr'!tage & Power Regulator:

Fun,-cional Block Diagram of Series & Shunt regulator, break down protection, thermal shutdown, 78xx series, negative *79xx* series, adjustable IC regulator 723 & its applications, pulse width modulator voltage regulator, TL 494/ SG1524.

~6: 555 timer:

Astable mutivibrator, monostable multivibrator (one application of each)

7: PLL IC and applications: Functional block diagram and applications of Phase Lock Loop Ics LM 4046 and LM 565.

\/"*B-:*- Active filters

Low pass, high pass, band pass, band reject, 1st and 2nd order filters (Butterworth and Chebyschev), state variable filters.

9. Miscellaneous ICs like temp. sensing ICs - LM34, LM35, LM335, AD590, Instrumentation Amplifier Ies - AD521 and AD522, Function Generator 1C8038 and IC566.

References:

1) Coughlin & Driscoll, "Op-amp & linear ICs", 6th edition, PHI, 2002.

2) Sergio Franco, "Design with op-amp analog ICs", McGraw-Hili, 1988

3) Ramakant Gayakwad, "Op-amp & linear ICs", PHI/Pearson Education: 4th edition, 2002.

4) Roy Choudhary, "Linear'integrated circuits", Wiley Eastern, 1991,

5) Lineqr IC Data book: National Semiconductor, 1989.

6) SCR Manual: General Electric.

7) Greame, Tobey and Huelsman, "Operational Amplifier", 1981.

8) Burr - Brown General Catalog, Tucson, Ariz: Burr-Brown, 1979.

~tel - Intersil Data Acquisition Component Handbook, Mansfield, fvlass: Datel - Intersil, Inc., 1980.

10) D. E. Pippenger' and E. J. Tobaben, "Linear and Interface Circuits Applications", 2nd Edition, McGraw Hill Book Company, 1988.

11) Linear Application Data Book: National Semiconductor, 1986.

12) Voltage Regulator Handbook: National Semiconductor, 1980.

13) Op-Amp Data book: National Semiconductor.

Experiments:

1. Measurement of op-amp parameters.

2. 2. Linear application of op-amp (any 4)

V to I with floating load and with grounded load, I to V converter, frequency response of differentiator and integrator, comparator, adder & subtractor, Instrumentation Amplifier, gyrator.

3. Non-Linear application of op-amp

Precision rectifier, clipping, clamping, logarithmic amplifier, antilog amplifier, Schmitt trigger, free running multivibrator, Wien bridge oscillator (any 3)

4. Any two of the following

555 astable multivibrator

Low pass Butterworth filter

High pass Chebyschev filter

5. Low & High Voltage Regulator using ,IC 723 ',"

6. Voltage Regulator using PWM IC 1524 or 494.

Term-Work: Each student shall appear for at least one written- test during the term. Journal should consist of a atleast 8 experiments properly recorded and graded. Term-Work will carry 25 Marks. Distribution of Marks: 15 Marks for Journal and 10 Marks for Test.

Advanced Microprocessors

T. E. I. s. (Semester - VI)

Scheme of Instruction

Lectures: 4 Periods/Week

Practical: 3 Periods/Week

Scheme of Examination

Paper: 100 Marks.

Term-Work: 25 Marks.

Oral: 25 Marks.

1: Introduction

Evaluation of microprocessor, single-chip microprocomputers/microcontrollers, embedded microcontrollers, RISe and elSe processors, overview of microcomputer systems - hardware and software principles.

2: Microprocessor Architecture

8086/8088 - Architecture, signal description, memory organization, genera" bus operation, *IiO* addressing capability, clock, reset and buffering circuits, minimum mode and maximum mode system and timing, comparison between 8086 and 8088 microprocessors. 8087 architecture, interfacing of 8086 and 8087.

3: 8086 Programming Techniques

Machine Level Programming - Machine language Instruction formats, Addressing modes, coding, assembler directives and operators, programming with assemblers - TASM, MASM, etc.,

Modular Programming - Stack structure, Procedure and their related programs, Interrupt and Inte'rrupt Service Routines (ISR), interrupt cycle, Non-Maskable/Maskable. Interrupt and programming, MACROS, timing and delays.

String Manipulation - String instructions, REP Prefix, Text'Editor, Number format conversions.

Input/Output (I/O) Programming. - Fundamentals of I/O considerations, programmed I/O, Interrupt I/O, Block transfer and DMA.

4: Introduction to 80386

Introduction to 80386 microprocessors and their applications, Software model of 80386DX microprocessor, memory address space and data organization, data type, segment registers and memory segmentation, instruction pointer, general purpose registers, flag registers, generating a real - mode memory address, stack, addressing modes,

Protected mode. - registers model, memory management and address translation, system control instruction set,

Multitasking and Protecting, Virtual 8086 mode

5: 8 – Bit Microcontrollers

MCS – Sl Family - Architectural and operational features, Instruction set, CPU timing and machine cycles, Interrupt structure and priorities, Timer/Counters, serial interface, connection to external memory, power saving modes,

Assembiy language programming process, mechanics of programming, programming tools and techniques of 8051. Comparative study of various MCS 51 family.

6: Peripheral Intelface Devices

a) RAM and EPROM Interface with 8086/8051

b) 8255 with 8086/8051 (Interfacing Circuit and related Programs)

c) 8259 interface with 8086 (Interfacing Circuit and related Programs)

d) 8257 interface with 8086. (Interfacing Circuit and related Programs)

e) ADC/DAC interface with 8086/8051 (Interfacing Circuit and related Programs) f) Stepper Motor interface with 8086/8051(Interfacing Circuit and related

Programs)

g) Anyone MCS - 51 Microcontroller - Real Time Operation

References:

1) Douglas V. Hall, "Microprocessor Interfacing & Programming", TMH, 1991.

2) YI !-cheng Liu and Glenn A. Gibson, "Microcomputer Systems: The 8086/8088 r :mHy Architecture, Programming and Design", 2nd Edition, Prentice Hal: of India Pvt., Ltd., New Delhi, 2002.

3) Kenneth Ayala, "The 8086 Microprocessor Programming and Interfacing the PC", Penram Internatj~"'nal, 1995.

4) Myke Predko, "Programming ADd Customizing The 8051 Microcontroller", Tata McGraw-Hili Publishing Company Ltd., New Delhi, 1999.

5) Walter A. Triebel, "The 80386DX Microprocessor: Hardware, Software and Interfacing", Prentice Hall Inc., 1998.

6) Barry B. Brey, "The Intel Microprocessors: 8086/8088, 80186, 80286, 80386, 80486", 6th Edition, PHI (P) Ltd. / P.earson Education, 2002.

7) A. K. Ray, K. M. Bhurchandi, "Advanced Microprocessors and Peripherals: Architecture, Programming, and Interfacing", Tata McGraw Hill, 2000.

8) [illegible] 2001.

9) John Uffenbeck, "8086/8088 Interfacing Programming & Design", PHI / Pearson Education, 2002.

10) Microcontroller Handbook by Intel

11) Michael Slater, "Microprocessor - Based Design", PHI, 2001.

12) M. .Rafiquzzaman, "Microprocessor - Theory-and Application", PHI, 2002.

Experiments:

1) Coding of various instructions and writing small programs of 8086.
2) By using Assemblers like TASM, MASM write assembly language program of 8086. (study of different control loops and segments) .
3) Modular Programming of 8086 - Stack/Procedure - Interrupt and ISR
4) Assembly language programming of MCS - 8051 Microcontroller.
5) Interfacing Devices and related programs - 8255, 8259, 8257, ADC, DAC and stepper motor with 8086 and 8051.

Assignments:

1) Study of Instruction set of 8086

2) Study of Instruction set of 8051

3) Study of Instruct!on set of 80386DX

Term-Work: Each student shall appear for at least one written test during the term. Journal should consist of 5 - Experiments and 3 - Assignments properly recorded and graded as well as assessed test paper. The term-work will carry

weightage of 25 Marks. Distribution of marks: 15 Marks for Journal and 10 Marks for Test..

Oral: Examination will be based on Elements of Microprocessor (Semester - V) and Advanced Microprocessor.

Control System Engineeri"ng

T.E.I.S. (Semester - VI)

Scheme of Instruction

Lectures: 4 Periods/Week
Practical: 2 periods/week

Scheme of Examination

Paper: 100 Marks Term-

Work: 25 Marks
Oral: 25 Marks.

1: Introduction

Analysis of the basic approaches to compensation, cascade compensation, feedback compensation, Effect of measuring elements on system performance, block diagram of automatic control system. Derivative and integrai error compensation.

/ 2(**Compensator Design 4sing Root Locus.**

Improving steady-state error and transient response by cascade compensation! integral, derivative compensation, Lag, "Lead, Lag-Lead compensation, Notch Filter, Feedback Compensation, physical realization of compensation.

3: Compensator Design using Frequency Response.

/ Steady-state error characteristics of Type 0,1, and 2 systems, lime delay, transient respon~~- through gain adjustment, lag, Lead, Lag-Lead compensation.

4: PID Compensator Design.

"~ Tuning rules for PID. contro1ler, Ziegler-Nichols rules, Designing PID controller using Root-Locus technique.

~State - **Space Analysis of Control System.**

Concept of state-space, and state model for Linear Systems - 5150 and MIMO systems, Linearization, state model for Linear continuous time system - State Space representation using phase variables, Phase variable formulation for transfer function with poles and zeros, state space representation \ Ising canonical variables, derivation of transfer function from state model. Diagonalizaion, ~ige.n'y~!ues and e~genv~ctors, Solution of State equations

properties of state transition matrix, compu~tion- of state transition matrix using Laplace Transformation, Cayley - Hamilton theorem.

6: Controller and Observer Design using State-Space.

Concept of controllability and observability, definitions, phase variable form, properties, effect of pole-zero cancellation in transfer function, pole placement by state feedback.

Controller design. - for phase v.ariable form, by matching.- coefficients, by transformation.

Observer pesign - for observer canonical form, by observJ1btlity matrix, by transformation, by matching coefficients.

Reference:

1) K. Ogata, "Modern Control Engineering", Prentice Hall of India, 4th edition, 20Q2.

2) Norman S. Nise, "Control Systems Engineering", John Wiley and Sons; Inc. 2000.

3) M. Gopal, "Control Systems Principl;s and Des.ig.n", TMH, New Delhi, 2nd edition, 2002.

4) Z. Gajic, M. Lelic, "Modern Control Systems. Engineering", Prentice Hall International, 1996.

5) Richard C. Dorf, Robert H. Bishop, "Modern Control Systems", Addition-Wesley, 1999.

6) 1. J. Nagrath and M. Gopal, "Control System Engineering", 3rd Edition, New Age International (P) Ltd., Publishers -.2QOO.

7) B. c. Kuo, FaridGdna Golnaraghi, "Automatic Control Systems", PHI, 7th edition, 2003.

8) Jacqueline .Wilkie, Michael Johnson, Reza Kalebl, "Control Engineering - an Intr()ductory Course", Paigrave, 2002.

9) M. N. Bandopadhay, "Control Engineering - Theory & Practice", PHI, 2003.

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Exper;rnentsl **Assignments:**

Stude .1ts shall perform at least 4 experiments and 6 assignments. Out of these 6 assignments 4 assignments must be based on design of compensator using Root Locus and Bode Plot techniques. (2 - each). And 2 assignments based on,design of Observer and Controller using State-Spac~ techniques. (1 - each). Some of the experiments and some or all assignments must be done by using simulation software MATH CAD/MATLAB or similar one.

Term-Work: Each student s~all appear for at least one written test during the term. Journal should consist of at least 4 experiments and 6 assignments as mentioned above, properly checked and graded as well as assessed test paper. The term-work will carry 2~ Marks. Distribution of marks: 15 Marks for Journal and 10 Marks for Test.

Computer Communication Network

T. E. I. S. (Semester - VI)

Scheme of Instruction

Lectures: 3 Periods/Week

Practical: 2 Periods/Week

Scheme of Examination

Paper: 100 Marks.

Term-Work: 25 Marks.

Oral: 25 Marks.

1: Network Hardware and Software.

Local area network, Metropolitan area netwQrk, Wid~ area network, Wireless networks, Internetwork, Protocol Hierarchies, design issues for the Layers, Interfaces and services, connection - oriented and connectionless services, services primitives, relationship of services to protocols.

2: Network Models.

The OSI reference model, TCP lIP reference model, comparison of 051 and TCP/IP models, Internet and its main applications, SMDS, X.25 network, Frame relay, Broadband ISDN and ATM and it reference model, Perspective on ATM.

3: Physical layer.

Theoretical basis for data communication, -:r.r.ansmission media, Wireless transmission, Modems, Serial interface - RS 232, RS 485,-R5 - 422, Switch.es and Routers.

4: Data link layer.

a) Classification of communication protocols.

b) Data link design issues, error-correcting codes, error-detecting codes, elementary data link protocols, sliding window pro~ocols, protocol specification and verification, examples of data 'link protocols (HDLC and SOLC detailed study).

5: Medium Access Sublayers.

The channel allocation problems, Multiple access protocols, IEEE standard 802 for LANs, Bridges, High speed LANs, Satellite network.

6: Network layer.

Network design issues, Routing algorithms, Congestion control algorithms, Internetworking. 7. Network Applications.

Introduction to Email, FrP and Telnet. Introduction to '/lWW (world wide web) and virtual private network.

References:

1) Andrew S. Tanenbaum, "Computer Networks", 4th Edition, PHI/Pearson Education, 2002.

2) Behrouz A. Forouzan, "Data Communications and Networking", 2nd update Edition, Tata McGraw Hill Publishing Company, New Delhi, 2000.

3) Douglas E. Comer, "Computer Networks and Internets", 2nd Edition, Pearson Education Asia, 5th Indian reprint, 2001.

4). Uyless Black, "Computer Networks - Protocols, Standards and Interfacesll, 2nd Edition, Prentice Hall of-Inqia (P) Ltd., New Delhi, 1996.

5) William Stallings, "Data And Computer Communic:ations", 5th Edition, Prentice Hall of India (P) Ltd., 1998.

6) John wiley Fitzgerald & Dennis,. ~\Business' Data Communication and Networking", 6th edition, 199.8.

7) Kennieth C. Mansfield'-Jr., James L. Antonakos, "An Introduction to Computer Networking", PHI, 2002.

8) James F. Kurose, Keith W. Ross, "Computer Networking", Pearson .Education, 2003.

ExperimentS:

1) Study and use of **LAN** Commands.

2) To set.up server and its nodes.

3) PC-to-PC communication - File transfer.

4) To study Error correcting and detecting codes - Hamming, Hoffman codes. 5) Cyclic Redundancy Check.

6) Implementati.on of Routing Algorithm - simulation.

7) Implementation of Telnet Facility using C/C++ Languages.

8) Configuration of TCP/IP on Windows NT server.

Term-Work: Each student shall appear for at least one written Test during the term. Journal should consist of at least 6-experiments from the list given above, properly recorded and graded as weii as assessed test paper. The term-work will carry 25 Marks. Distribution of Marks: 15 Marks for Journal and 10 Marks for Test.

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T.E.(ELECTRICALIELECTRONICSIINSTRUMENT A TIONI
BIOMEDICAL/ELECTRONICS & TELECOlVIMUNICA TION)

SEM.VI

Sub: INDUSTRTAL ECONOMICS AND MANAGEI\1ENT

Lecture: 3hrs per \\'eek 100 Marks(3hrs)

1. Nature and significance of economics. Science, engineering, technology and their relationship with economic development, appropriate technology for developing countries. 3

2. Demand, supply, elasticity' of demand and supply, Competition, monopoly, oligopoly, monopolistic competition, causes creating categories of monopoly .. organization, price determination under perfect competition and monopoly, Price discriminatio~l, equilibrium of firm under competition and monopoly. 5

J. Functions of money, supply and demand for money, money price level and and illHatioll, black money, meaning, m:agnitude and consequences. 4

4. Functions of commercial banks, multiple credit creation, banking system in India, Shortcomings and improvement. 3

5. Central Banking: Function of central banki~g illustrated with reference to RBI, Monitory policy -'meaning, objectives and features. 3

'6. Sources of public revenue, principles oftaxation; direct and indirect taxes, distribution of incidence., tax structure, reform of tax system. 4

7. Theory ofInternational Trade, balance of trade and payment, theory of protection, tariffs and subsidies, foreigQ exchange control, devaluation. 3

8. New Economic Policy: Liberalization, extending privatization, globalization, market-friendly state, exporbkd-growth. 3

9. Causes of underdevelopment, determinants of economic development, economic and non-economic factors, stages of growth, strategy of development big push, balanced qnd unbalanced, critical minimum effOli strategy 4

10. Management functions, responsibilities of management to society, development Of management thought, contribution ofF.W.Taylor, Henri Fayol, Elton Ma '0, System contingency approaches to rnanagement. 4

11 Nature of planning, decision making process, management by objectives. \

12 Organisation: Line and staff Authority relationships, de-centralisation and 1

delegation of authority, span of management, flat organisation. i

13. Communication process, media channels and barriers to effective communicatio[

14. Maslow, Herzberg and Macgregor's theory of motivation, MsClelland's achievement motivation, Blanchard's situational leadership theory.

15. Production Management: Production planning and control, inventory control

16. Project Management: Project development life cycle, project feasibility; project pianning, organisation and control. Tool of project management, CPM, PERT, .. Project information system.

17. Need for good cost accounting system, cost control, techniques of financial control, financial statements, financial ratios, break-even analysis, budgeting and budgetary control.

18. Marketing functions, management of sales and advertising, marketing research.

19. Human resource management: Function application of industrial psychology for selection, training, machine design and man-machine system.

20. Engineering economics: Investment decisions, present worth, Annual worth and rate of return methods. Payback Time.

Recommended Books:

1. Economics: Samuelson
2. Modern Economic Theory: Dewet & Warma
3. Indian Economy: A.N.Agrawal
4. Essentials of Management : Koonz and Odonnel 5.
Marketing Management: V.S.Ramaswamy
6. Finance for non-finance managers: B.K.Chaterji 7.
Management: I-Iampton David
8. Project Managel11cnt : Prasanna Chandra