SCHEME OF INSTRUCTION & EXAMINATION

B.E III YEAR (REGULAR)

(ELECTRONICS & COMMUNICATION ENGINEERING)

SEMESTER - II

Sl. No.	Syllabus Ref.No	SUBJECT	Scheme of Instructions Periods per Week L/T	D/P	Scheme of Examination Dura-tion in Hrs	Maximum Marks Univ. Exam	Sessi-onals
		THEORY					
1.	EC 351	Digital Communications	**4**	**-**	**3**	**75**	**25**
2.	EC 352	Digital Signal Processing	**4**	**-**	**3**	**75**	**25**
3.	EC 353	Antennas & Propagation	**4**	**-**	**3**	**75**	**25**
4.	EC 354	Microprocessors & Micro-Controlled based System Design	**4**	**-**	**3**	**75**	**25**
5.	CM 371	Managerial Economics & Accountancy	**4**	**-**	**3**	**75**	**25**
		PRACTICALS					
1.	EC 381	Digital Communications Lab	**-**	**3**	**3**	**50**	**25**
2.	EC 382	Systems & Digital Signal Processing Lab	**-**	**3**	**3**	**50**	**25**
3.	EC 383	Microprocessors & Micro Controller Lab	**-**	**3**	**3**	**50**	**25**
4.	EC 384	Industrial Visit/Tour/Study	**-**	**-**	**-**	**-**	**Gr***
		TOTAL	**20**	**12**	**-**	**525**	**200**

* Excellent/Very Good/Good /Satisfactory

EC 351

DIGITAL COMMUNICATION SYSTEMS

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

UNIT –I

Elements of Digital Communication System, Advantages and Disadvantages ofDigital Communication Systems over Analog Communication Systems, Analog to Digital Conversion, Quantization and Encoding techniques, application ofPCM, Companding in PCM systems -u law and A law, TDM, example of PCM system, modulation and demodulation ofDM and DPCM. Quantization noise and Slope overload error in DM, Comparison ofDM and PCM. Introduction to Linear Prediction Theory with applications in DM, modulation and demodulation of ADM. SNR of PCM and DM. Vocoders.

UNIT - II

Uncertainty, Information and entropy. Source coding, Shannon -Fano and Huffinan coding. Discrete memoryless channels, Probability relations in a channel, priori & posteriori entropies, cascaded channels, Channel capacity, mutual information, information rate and information capacity. Rate distortion.

UNIT-III

Types of transmission errors, need for error control coding, Linear Block Codes (LBC): description ofLBC, generation, Syndrome and error detection, Minimum distance of a block code, error correcting and error detecting capabilities, Standard array and syndrome decoding, Hamming codes. Binary cyclic codes (BCC): description of cyclic codes, encoding, decoding and error correction of cyclic codes using shift registers. BCH codes, and Convolution codes: description, encoding, decoding.

UNIT-IV

Base band digital data transmission, error probability, matched filter, correlation receiver, coherent and non-coherent ASK and FSK, DPSK, QPSK, error probability. Comparison of carrier modulated and base band transmissions. M-ary signaling schemes. Synchronization methods.

UNIT - V

Need for spreading a code, generation and characteristics of PN sequences. Direct sequence spread spectrum and Frequency hopping spread spectrum systems and their applications. Acquisition schemes for spread spectrum receivers, Tracking of FH and DS signals.

Suggested Reading :

I. Sitmon Haykin., *Communication Systems,* 3rd edition, Wiley, 1995.

2. Sam Shanmugham.K., *Digital and Analog Comunication Systems,* Wiley, 1998.

3. Taub and Schilling, *Principles ofCommunication Systems,* 2ndedition, MGH, 2003.

4. Singh, R.P. and Sapre, S.D., *Communication Systems,* TMH, 1995.
5. Lathi.B.P, *Modern Digital & Analog Communication Systems,* 3rd edition, B.S. Publications.
6. Proakis, J.G. *Digital Communications,* 4thedition, MGH ,2001

Additional Reading:

1. Simontal, M.K., *Digital Communication Techniques,* PHI, 1995.
2. Wilson, *S.G.,"Digital Modulation and Coding",* PHI, 1996.
3. Carlson, A.B.; Rutledze.J. and Crilly.P. ; *Communication Systems,* 4thedition, TMH, 2002

DIGITAL SIGNAL PROCESSING

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

UNIT -I

Discrete time signals and systems: Linear and shift-invariant system, stability and causality. Frequency domain representation of discrete time systems and signals. Sampling of analog signals. UNff-D

Discrete Fourier transform and its properties, Linear convolution using DFT. Decimation in time and decimation in frequency. FFT algorithms for radix-2 case- in place computation, bit reversal.

UNIT-II

FIR digital filter design techniques, properties of FIR digital filters, design of FIR filters using windows (Rectangular, Bartlet, Hamming and Blackman), realization ~nd finite word length effects. UNU-IV

Butterworth and Chebychev approximation. IIR digital filter design techniques, Impulse invariant technique. Bilinear transform technique. Digital Butterworth, Chebychev filters, comparison of FIR and IIR filters.

UNIT - III

I\pplication of Digital Signal Processing to Speech: Introduction -Model of speech production- Short time spectrum analysis -Speech analysis and synthesis -Channel voice coder -Voice coder analyzers and synthesizers -Pitch detection and voiced I unvoiced decision and detections.

Suggested Reading:

1. Oppenheim, A. \Z, and Schaffer, RW., *Discrete 1/me Signal Processing,* PHI, 2003. 2. Rabiner L.R. and Gold, B., *Theory and Applications of Digital Signal Processing,* PHI, 1993.
2. Johnson, J. R., *Introduction to Digital Signal Processing,* PHI, 2002.
3. ,Mitra, S.K., *Digital Signal Processing, A Computer Based approach,* 2°O edition TMH, 2002.
4. S. Proakis John G., *Digital Signal Processing, Principles, Algorithms, and Applications,* 3rdedition, PHI, 2003.
5. Salivahanan, *Digital Signal Processing,* TMH, 2003.

EC 353

ANTENNAS AND PROPAGATION

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

UNIT-I

Principles of radiation, retarded potential and isotropic radiator, Basic antenna parameters, patterns, radiation intensity, far field, near field, Gain and directivity, Hertizian dipole, monopole, effective aperture, aperture efficiency. Friis transmission formula. Antenna field zones, point sources, power patterns.

UNIT -II

Arrays of point sources, Directional properties of dipole antenna, two element array ~ with equal and unequal amplitudes, different phase. Linear array with uniform i distribution, binomial array. principle ofpattern multiplication. Broadside and end I' fire array, effect of inter element phase shift on beam scanning. Effect of earth on vertical patterns.

UNIT III

Antenna Polarization, Linear and Circular Polarization, Linear Antennas, Radiation 1

resistance of 12 antenna, Loop antenna, Far field pattern of circular loop with uniform I current, square loops, Radiation efficiency, Q, Bandwidth, SIN ratio.Helical Antennas, I Axial mode patterns, wideband characteristics of Helical Antenna, Travelling wave antenna .

UNIT-IV

VHF, UHF turnstile antennas, Rhombic Antenna, Vagi Uda Array, Logperiodic Antenna, Parabolic Reflector, Lens and Horn Antennas, (Working principle and characteristics only) Antenna Measurements, Antenna Test Site, Impedance pattern and gain measurement techniques, Antenna temperature.

UNIT-V

Ground wave propagation, space and surface waves, Tropospheric refraction and reflection, sky ,wave propagation, regular and irregular variations in ionosphere, Line of sight propagation, Microwave links.

Suggested Reading :

I. Balanis, C.A. *Antenna Theory, Analysis and Design,* 2nd edition, John Wiley, 1997
2. Jordan E.C. and Balmain -*Electromagnetic Waves and Radiating Systems,* 2°O edition, PHI, 1997.
Krauss, *J;D.,Antennas,* 3rdEdition, TMH, 2003.

Additional Reading :

I. Rao, N.N.,. *Elements of Eng.Electromagnetics,* Sthedn-PHI,2002
2. Dolukhanov M., *Propagation of Radio Waves,* MIR Publications, 1971.

EC 354

MICROPROCESSORS & MICROCONTROLLER BASED SYSTEM DESIGN

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

UNIT- I

8086/8088 -Architecture and Instruction Set -Addressing modes -Minimum and Maximum mode operations. 8086- control signal interfacing, under Minimum mode system, control signal interfacing under Maximum mode using Multiprocessing Systems. Interrupt structure -vector interrupts.

Assembly Language Programming: Assembler directives. Use of 8086 Instruction set, Simple program loops using Data transfer, arithmetic, Logical and Branching & ASCII instruction. String processing. Procedures & Stack. Simple programs using DOS functions.

UNIT-II

8086 Interfacing: Memory interfacing using standard RAM, EPROM, EEPROM

IC chips, need for DMA and Interfacing with DMA Controller chips (Inte18237/ I 8257 ICs); Keyboard & display controller (Intel 8279 IC) Interfacing, programmable communication interface -serial and parallel data transmission formats, UART/ USART interfacing, intel (825 I IC chip). Interfacing Numeric data processor (Intel 8087), Brief ideas of 16 bit Data Converter's Interfacing -Programming using standard ADC, DAC Chips.

UNIT-III

Introduction & overview of8/16 Bit MicroControllers oflntel/Motorola/Micro Chip make controllers. Intel 8051 Architecture on chip features, memory organization & expansion. 8051 instruction set & Addressing modes and Bit addressable features; Interrupt & 1/0 port structures and their operations. Assembly language Programming
with 8051 for simple applications, using Timers, 1/0 Port$ and Serial Port. 8051 A serial data communication.

UNIT-IV

Interfacing: Interfacing with external Memory, expansion of 1/0 ports and A to D & D to A converters. Introduction to Assemblers, brief ideas on debugging tools. Assembly Language programming of 8051. Application programming for data lisition LCD display modules, real time clock and interrupt base controlling.

UNIT-V

x86 series Microprocessor: Introduction and brief overview of 802861 ~itectural features. Introduction to 80386 Microprocessor -special registers, :lory management, protected and virtual modes. Brief overview of 80486 and :ium Processors -(elementary treatment only).

Suggested Reading:

For Microprocessors (Units **I,II** & V)

I. Yu-cheng Liu and Gibson, G.A., *Micro Computer Systems: The* 8086/8088 *family Architecture, Programming and Design,* 2nd edition, PHI, 2003.

2. Barry B. Brey, *The Intel Microprocessors* 8086/8088,80186/80/88, 80286, 8038680486, *Pentium, Pentium pro processo1; Pentium II, Pentium Ill, Pentium I~,* Pearson Education, 2003.

3. Douglas V. Hall, *Microprocessors and Interfacing, Programming and Hardware,* TMH,2003.

4. Rafiquzzaman.M, *Microprocessors Theory and Applications {Intel and Motorola),* PHI, 2001.
5. Ray, A.K. and Bhurchandi, K.M., *Advanced Microporcessors and Peripherals,* TMH , 2003.

For Microcontrollers (Units ill & IV)

1. Ayala, K.J ., *The* 8051 *Microcontroller Architecture, Programming and Applications,* Penram International, 2001.

2. Muhammad Ali Mazidi, J.G. Mazidi, *The* 8051 *Micro Controller and Embedded Systems,* Pearson Education, 2000.
3. Raj Kamal, *Embedded Systems, Architecture, Programming and Design,* TMH,2003.
4. Myke Predko -*Programming and Customizing the* 8051 *Microcontroller.* TMH,2003.
5. Peatrnan, J.B., *Design with PIC Microcontrollers,* Pearson Education, 2003.

Additional Reading :

I. Tribel, W.A., and Avtar Singh; *The* 8088 *and* 8086 *Microprocessors, Programming, Interfacing, Software, Hardware, and Applications.* 4th edition, PHI 2003.
2. Mathivanan, N.; Microprocessor, PC Hardware and Interfacing, PHI, 2003

CM 371

MANAGERIAL ECONOMICS AND ACCOUNTANCY

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

UNIT - I

Introduction to Eeonomics and its evolution -Managerial Economics its scope, importance and relation to other sciences, its usefulness to engineers -Basic concept of Managerial economics.

UNIT –II

Demands Analysis -Concept of demand, determinants, Law of demand, its assumptions, Elasticity of demand, price, income and cross elasticity, Demand Forecasting- Markets Competitive structures, price-output determination under perfect competition and Monopoly. (Theory questions and small numerical problems can be asked).

UNIT-III

Theory of Production -Firm and Industry -Production function -input-out relations -laws of returns -internal and external economics of scale. Cost Analysis: Cost concepts -fixed and variable costs -explicit and implicit costs -out of pocket costs and imputed costs -Opportunity cost -Cost output relationship -Break-even analysis. (theory and problems).

UNIT-IV

Capital Management, its significance, determination and estimation of fixed and working capital requirements, sources of capital -Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems.
(Theory questions are numerical problems on estimating working capital requirements and evaluation of capital budgeting opportunities can be asked).

UNIT-V

Book-keeping, principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts Trial Balance concept and preparation of Final Accounts with simple adjustments -Analysis and interpretation of Financial Statements through Ratios.

(theory questions and numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement, calculation of some ratios).

Suggested Reading :

1. Varshney RL and KL Maheswari, *Managerial &onomics,* Sultan Chand.

2. JC Pappas and EF Brigham, *Managerial &onomics. 3. Grawal TS. Introduction to Accontancy.*

4. Maheswari S.N. *Introduction to Accountancy. 5. Panday I.M. Financial Management.*

EC 381

DIGITAL COMMUNICATION LAB

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

Special note :

i) Sessional marks are to be awarded as per the following breakup. a) 15 marks for the regular lab exercises

b) 10 marks for the Mini Project-cum-design exercise(s)

ii) A total of not less than 15 experiments must be carried out during the semester. (Wherever possible more than I lab experiment should be carried out in one lab session of 3 periods per week).

1. PCM generation & detection
2. ErrorControl coding
3. Data formats / channel encoding and decoding
4. Linear Delta Modulation, Demodulation and errors.
5. Adaptive Delta Modulation, demodulation
6. FSK & ASK generation & Detection
7. PSK -binary, quadrature generation & detection
8. Minimum Shift Keying generation & detection
9. Optical Fibre measurements: Numerical aperture, Attenuation, E-O and O-E characteristics
10. Digital Fibre Optic Multiplexed Link (Voice & Data)
11. Study of Modem.
12. ARQ protocols
13. Wavelength Division Multiplexing
14. Study of Blocking type Digital switch(space division)

Note: Time division switches will be used in TOM II. Mini Project cum Design Exercise(s):

13-15. The' students should design and realize at least one mini- project using either linear and / or digital ICs for given specifications. A report of the case study of the project is recommended.

Example:

Design and implement a simple DM system with necessary filtering for 2khz J sine wave and I Vp-p amplitude input signal.

Genernl Note:

i) There should not be more than 2 students per batch while performing any , of the regular lab experiments.

ii) Mini Project cum design exercise(s):

a) The student must design, rig-up, and test the circuits wherever necessary by carrying out the experiments individually by placing the components on breadboard. The tested circuit should be soldered on a general PCB.

b) This exercises carry sessional marks of 10 out of 25 while the remaining 15 marks are for the regular Lab experiments.

EC 382

SYSTEMS AND SIGNAL PROCESSING LAB

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

Specia1 note :

i) Sessional marks are to be awarded as per the following breakup. a) 15 marks for the regular lab exercises

b) 10 marks for the Mini Project-cum-design exercise(S)

ii) A total of not less than 15 experiments must be carried out during the semester. (Wherever possible more than I lab experiment should be carried out in one lab session of 3 periods per week).

(A) Experiments on control systems

1. Syncro and related error detector.
1. Time response of first & second order systems. 3
2. AC & DC servo motors.
3. Phase lead ,lag, lag-lead networks.
4. AC/DC position control systems.

6. Effect of derivative, integral and Pill controller on system response of a servomechanism.
7. DC motor speed control systems.
1. Root locus plot of a control system using mathematica / matlab.
2. Bode plot of a control system using Mathematica/ Matlab.

10. Nnyquist plot of a control system using mathematica/matlab.

(B) Experiments on signal processing.

1. Laplace transforms
2. Fourier transforms
3. z- Transforms
4. Discrete -time Fourier transform
5. Discrete fourier transforms
6. Linear Convolution
7. Circular Convolution
8. Fast Fourier transfonn Algorithms : (Decimation in time and Decimation in Frequency)
9. FIR filter Design and Windowing
10.& 11 IIR Filters : Butterworth, Chebysheve Type-1 & Chebyshev Type- 2 Filter
12. Sampling of Continuous time Signals
13.Power Spectrum estimation
14. System modeling

Note: MATLAB with different toolboxes' / 'MATHEMATICA'/ any popular software can be used for experiments of Section 'B'.

Minimum 4 experiments from Part -A & Minimum 8 experiments from Part-B.

Project cum Design Exercise(s):

15. Mini Projects to be carried on software / Hardware fo cifications

Example:

1. Design and simulation of 32-pt and 64-pt FFT algorithm
2. Projects based on Noise-ca",cellation in Raw- Signalsl channels / systems 3. Analysis of speech signals.
4. Design of simple Digital Communication System / Control System General Note:

iii) There should not be more than 2 students per batch while perfonning any of the regular lab experiments.

iv) Mini Project cum design exercise(s):

a) The student must design, rig-up, and test the circuits wherever necessary by carrying out the experiments individually by placing the components on breadboard. The tested circuit should be soldered {)n a general PCB.

b) b) This exercises carry sessional marks of 10 out of 25 while the remaining 15 marks are for the regular Lab experiments.

EC383

MICROPROCESSORS AND MICROCONTROLLER LAB

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

Special note :

i) A total of not less than 15 experiments must be carried out during the semester. . (Wherever possible more than 1 lab experiment should be carried out in one lab session of 3 periods per week).

Note: Assembly Language Progrnrnming for 8086 & 8051 using respective Assemblers

1.2.3. Instruction sets for simple programmes (using 4 to 15 Lines of instruction code) under different addressing modes for data transfer, manipulation; Arithmetic operations, Branching operations, Logical operations and testing of "bitlbit patterns" in a given data.

4.5. Code Conversion, sorting and searching.

6. Single byte, Multi byte Binary and BCD addition, subtraction, multiplication and Division.

7. Generation of wave forms and gating applications using 8253/54 Timers with 8086

8. Timer and counter operations & programming using 8051

9.10. Interfacing 8237 & 8259 with 8086

11. Keyboard and display controller interfacing using 8279 .

12.13.14. Interface applications using 8086 & 8051 for LCD (2X40, 4X20) modules and AID & D/ A applications.

15. Interfacing with UART/USART (PC 16550/8051)

16. Interfacing real time clock using 8051

17. Interfacing Elevator Simulator Control using 8051 18. Interfacing traffic signal control using 8051.

EE 384

INDUSTRIAL VISIT

Atleast 3 days in Semester	4 x 6 = 24 hours
Sessional/Examination	Grade*

Students are expected to visit at least two Industries during the semester and submit a detailed technical report on the study-visits to the Department. The (Department should evaluate the reports through a Committee consisting of Head of the Department and two more faculty members toward the Grades)

* Excellent/Good/Satisfactory/Unsatisfactory.

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