

## SCHEME OF INSTRUCTION & EXAMINATION

### B.E III YEAR (REGULAR)

#### (INSTRUMENTATION ENGINEERING)

#### SEMESTER - II

Sl. No.	Syllabus Ref.No	SUBJECT	Scheme of Instructions		Scheme of Examination		
			Periods per Week	L/T D/P	Duration in Hrs	Maximum Marks	Univ. Exam Sessi- onals
<b>THEORY</b>							
1.	EE 351	Digital Signal Processing	4	-	3	75	25
2.	EE 354	Microprocessors	4	-	3	75	25
3.	EE 360	Electronic Instrumentation	4	-	3	75	25
4.	EE 361	Instrumentation Systems-II	4	-	3	75	25
5.	CM 371	Managerial Economics & Accountancy	4	-	3	75	25
<b>PRACTICALS</b>							
1.	EE 382	Power Electronics Lab	-	3	3	50	25
2.	EE 383	IC Lab	-	3	3	50	25
3.	EE 385	Transducers Lab	-	3	3	50	25
4.	EE 384	Industrial Visit/Study	-	-	-	-	Gr*
<b>TOTAL</b>			<b>20</b>	<b>9</b>	<b>-</b>	<b>525</b>	<b>200</b>

\*Excellent/Good/Satisfactory/Unsatisfactory  
Minimum two visits to the Industries

**EE 351**

**DIGITAL SIGNAL PROCESSING**

Instructions	4 Periods per Week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

**Unit I**

Review of Z transform: Discrete time signals and systems. Linear shifting invariant systems; stability and causality Frequency-domain representation of discrete time systems and signals.

**Unit II**

The Discrete Fourier Transform: Discrete Fourier series, Discrete Time Fourier, transform. Properties of Discrete Fourier Transform. Linear convolution using Discrete Fourier Transform. Periodic convolution.

**Unit III**

Computation of the Discrete transform: Fast Fourier transform, decimation-in-time and decimation-in-frequency. FFT algorithms for radix 2 case. In-place computation, bit reversal.

**Unit IV**

FIR Digital Filter Design Techniques: Properties of FIR Digital Filters Design of FIR filters using windows.

**Unit V**

Butterworth and Chebyshev approximations: IIR digital filter design techniques. Impulse variant technique. Bilinear transform technique. Digital Butterworth filters. Comparison of FIR and IIR filters.

**Suggested Readings:**

1. Oppenheim AV and Schaffer R.W Digital Signal Processing- Prentice Hall Inc. 1975
2. Jackson L.B Digital Filters and Signal Processing, Second edition, Kluwer Academic publishers, 1989
3. Porat B. Digital Processing of Random Signals, Prentice Hall, International edition, 1994
4. Chi-T Song Chen, Digital Signal Processing, Oxford University, Press, 2001

**EE 354**

**MICROPROCESSORS**

Instructions	4+1 Periods per Week
Duration of University Examination	3 Hours
University Examination	75 Marks

Sessional

25 Marks

**Unit I**

Microprocessor Architecture of 8085- Instruction cycle-Machine cycle-Instruction set and Timing diagrams.

**Unit II**

8085 Assembly language and Machine code programming-Simple programs, loops, Arithmetic problems-BCD to binary-binary to BCD conversion- Sorting and searching subroutines-delays-counters.

**Unit III**

Memory interfacing-ROM-SRAM-I/O interfacing-memory mapped I/O and I/O mapped I/O scheme- programmable peripheral chips 8255, 8212, 8155-7 segment LEDs, DAC, ADC – Interfacing

**Unit IV**

Data transfer schemes-programmed data transfer-Interrupt structure-masking of interrupts-SIM, RIM-interrupt drives-Data transfer-DMA data transfer, programmable interrupt controller 8259-Programmable DMA controller chip(8237)- Serial data transmission-8251-Communication interface.

**Unit V**

8086 Microprocessor Architecture-Segmented memory-Addressing modes- Instruction set-Simple programs.

**Suggested Reading:**

1. Rames S. Gaonkar-Microprocessor Architecture, Programming and Applications with the 8085, 8080A, 4<sup>th</sup> edition – Wiley Eastern Limited
2. Badri Ram- Advanced Microprocessors and Intefacing, Tata McGraw Hill, 2003
3. Walte A Trieble & Avtar Singh-The 8088 & 8086 Microprocessor-Prentice Hall of India Ltd., New Delhi-1995
4. Aditya P. Mathur, Introduction to Microprocessors, 3<sup>rd</sup> edition, Tata McGraw Hill, 1995

**EE 360**

**ELECTRONIC INSTRUMENTATION**

Instructions	4 Periods per Week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

**Unit I**

Analog and Digital Measuring Systems: Interfacing Active and Passive Transducers. Amplifiers: Instrumentation amplifiers (Fixed and Programmable gain types and its specifications), Isolation amplifiers (Types and its specifications).

Digital to Analog Converters: R-2R ladder and Inverted ladder DACs. Main DAC specifications. Analog to Digital Converter: R-2R ladder and Inverted ladder DACs, Main DAC specifications, Analog to Digital Converters: Parallel (or Flash) ADC successive approximation, ADC Microprocessor compatibility, Dual slope ADC, Principal specifications of an ADC

## **Unit II**

Digital Voltmeters and Multimeters: Simple D.C Voltage attenuator, Current to Voltage converter, Resistance to Voltage converter, Automatic ranging and Automatic zeroing RMS detector in DMM and RMS and True RMS, Digital Frequency and Time measurements, Frequency measurements, frequency ratio time interval and pulse width measurements, Scaling and Checking modes. Counting errors, Input signal conditioning. Trigger level, Hysteresis.

## **Unit III**

Signal Analysis: Wave Analyzers: Signal analysis and wave analyzer: Type and applications. Harmonic Distortion Analyzers: harmonic Distortion, heterodyne Harmonic Analyzer or Wave meter, Tuned circuit, Fundamental Suppression. Spectrum Analysis: Block Diagram, Phase locked circuit for the first local oscillator, successive Limiting type of Log IF amplifier.

## **Unit IV**

Computer controlled Test Systems: Testing an Audio amplifier, Radio Receiver instruments used in Computer controlled instrumentation, Frequency counter, synthesized signal generator interfaced with IEEE 488 Bus, Relay switched attenuator, IEEE 488 Electrical Interface.

## **Unit V**

Cathode ray Oscilloscope: Block Diagram, Basic concepts, Vertical amplifier, Time base, Trigger Delay line and their role in a CRO, Digital storage Oscilloscope, Magnetic Recorders, Digital Interface for Programmable Instrumentation, Description and Sample examples of Automatic Instrumentation.

### **Suggested Reading:**

1. A.J. Owens, Digital Instrumentation, McGraw Hill International Edition, 1995
2. H.S. Kalsi, Electronic Instrumentation, Tata McGraw Hill
3. H. Knatak, Data acquisition & Data Conversion.
4. Hlfrick and Cooper, Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall of India, 2002
5. Tran Tien Lang, Electronic Measuring Systems, John Wiley and Sons, 1987

Instructions	4 Periods per Week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

### **Unit I**

Measurement of Flow-Classification of Flow meters-Head flow meters-Orifice plate-Venturi tube-flow Nozzle and pilot tube-Rota meter-Electromagnetic flow meter-Positive displacement meters-Anemometers-Hotwire Hot film Anemometer-Mass flow measurements –Rotor torque mass flow meter.

### **Unit II**

Liquid Level Measurement – Electrical methods – Resistive –Inductive and capacitive methods-Capacitive variable area method- Capacitive voltage divider method- capacitive variable dielectric constant method- Measurement of liquid level with Gamma Rays- Ultrasonic method- Measurement of liquid level using float.

### **Unit III**

Measurement of Humidity- Absolute Humidity- Relative Humidity-Hygrometers- Resistive Hygrometer- Capacitive Hygrometer- Microwave refracto meter- Aluminium oxide Hygrometers-Measurement of PH value- PH electrodes- Station glass and calomel electrodes- Installation and measurement of PH values.

### **Unit IV**

Measurement of Sound- Sound level meter- Microphones-Types-Carbon microphone-Capacitive microphone- Dynamic Microphone- Inductive-Piezoelectric Microphone-Pressure response of a capacitor microphone- Measurement of sound using Microphones.

### **Unit V**

Feedback Transducer System-Feedback fundamentals-Inverse Transducers-Temperature balance system-Self balancing potentiometers-Self balancing bridges-Heat flow balance system-Feedback Pneumatic load cell-Servo operated Electro magnetic flow meter.

NB: Signal conditioning aspects should be covered

### **Suggested Reading:**

1. C.S Rangan, G.R.Sarma, V.S.V Mani Instrumentation devices and System- Tata McGraw Hill Publications Ltd., New Delhi, 1995.
2. D.V.S Murthy, Transducers and Instrumentations, Prentice Hall of India(P) Ltd., New Delhi, 1995.

### **CM- 371**

#### **MANAGERIAL ECONOMICS AND ACCOUNTANCY**

Instruction	4 Periods per week
Duration of Examination	3 Hours
University Exam.	75 Marks

Sessionals

25 Marks

**UNIT –I**

Introduction Economics and its evolution – Managerial Economics its scope Importance and relation to other sciences, its usefulness to engineer’s 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-output 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 relation ship, break –even analysis (theory and problems )

**UNIT – IV**

Capital management its significance, determinates and estimation of fixed and working capital requirements, sources of capital, introduction to capital budgeting, methods with problems.

**UNIT – V**

Book keeping, principles and significance 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 Maheswar, “Managerial Economics” Sultan Chand.
2. JC Pappas and EP Brigham. “Managerial Economics”.
3. Grawal T.S. “Introduction to Accountancy”.
4. Meheswar S.N. “Introduction to Accountancy”.
5. Panday IM “Financial Management”.

**EE- 382**

**POWER ELECTRONICS LAB**

Instruction	3 Periods per week
Duration of Examination	3 Hours
University Exam.	50 Marks
Sessionals	25 Marks

**List of Experiments:**

1. S.C.R Characteristics and RC Phase shift trigger Circuit.

2. UJT Oscillator and UJT trigger control.
3. Phase shift trigger pulse generation, zero crossing detection, using op-amp and monostable.
4. Pedestal trigger control for SCR using ICs
5. Study and development of commutation circuits.
6. Bridge rectifiers-half control and full control.
7. DC voltage control using Thyristor chopper circuit
8. Forced commutated inverter
9. Thyristor controlled D.C drive
10. Simulation of Single Phase Full converter and Semi converter using PSPICE
11. Simulation of Three Phase Inverter using PSPICE
12. IGBT and MOSFET based Inverter

Note: ATLEAST 10 EXPERIMENTS SHOULD BE CONDUCTED IN THE SEMESTER

**EE- 383**

**INTEGRATED CIRCUITS LAB**

Instruction	3 Periods per week
Duration of Examination	3 Hours
University Exam.	50 Marks
Sessionals	25 Marks

**List of Experiments:**

1. Generation of triangular and square wave using Op-Amp.
2. PLL(Phase Locked Loop)
3. Design of astable multi vibrator using 555 timer.
4. Active filters.
5. Instrumentation amplifier-Sample and hold circuit.
6. Design of integrator and differentiator using Op-Amp
7. Multiplexer-application for logic realization and parallel to serial conversions.

8. Synchronous counters.
9. Asynchronous counters.
10. Clippers and clampers using Op-Amps.
11. Monostable and astable multi vibrators using Op-Amps
12. Bi-stable multi vibrators & Schmitt trigger using Op-Amps.
13. Boot strap sweep circuit using Op-Amp
14. Half adder, full adder and Subtractor and realization of combinational logic
15. A/D converters.

Note: ATLEAST 10 EXPERIMENTS SHOULD BE CONDUCTED IN THE SEMESTER

**EE- 385**

**TRANSDUCERS LAB**

Instruction	3 Periods per week
Duration of Examination	3 Hours
University Exam.	50 Marks
Sessionals	25 Marks

**LIST OF EXPERIMENTS:**

1. Measurement of speed by magnetic pickup
2. Measurement of temperature by (a) Thermistors (b) Thermocouple
3. Study and calibration of strain gauge
4. Measurement of speed and torque using Opto Electronic Sensor
5. Measurement of pressure by bellows
6. Measurement of Displacement by Capacitive pickup
7. Measurement of Displacement by (a) Piezoelectric pickup and (b) Light dependent resistor
8. Level Measuring System
9. Study and Calibration of LVDT
10. Study and calibration of RTD

11. Measurement of displacement by inductive pickup

Note: ATLEAST 10 EXPERIMENTS SHOULD BE CONDUCTED IN THE SEMESTER

**EE 384**

**INDUSTRY – VISIT STUDY**

Atleast 3 days in Semester  
Sessional/Examination

4 x 6 = 24 hours  
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. Department should evaluate the reports through a committee consisting of the Head of the Department and two or more faculty members to award the Grades

\* Excellent/Good/Satisfactory/Unsatisfactory