

TEACHING & EVALUATION SCHEME

DISCIPLINE : APPLIED ELECTRONICS & INSTRUMENTATION

SEMESTER : III

Sl. No.	Subject	Teaching Scheme (House/ Week)			Evaluation Scheme					Total Marks
		L	T	P	End Exam.	Theory		Practical		
						Internal Assessment		End Exam	Sessional	
						Class Test	Assignment			
1.	Operating System	4	–	–	80	15	5	–	–	100
2.	Process Instrumentation – 1	4	–	–	80	15	5	–	–	100
3.	Digital Electronics	4	1	–	80	15	5	–	–	100
4.	Electronic Device & Circuits	4	1	–	80	15	5	–	–	100
5.	Engg. Math – III	4	–	–	80	15	5	–	–	100

PRACTICAL

1.	Operating System Lab	–	–	5	–	–	–	25	25	50
2.	Process Instrumentation Lab – I	–	–	5	–	–	–	50	50	100
3.	Digital Electronics Lab	–	–	5	–	–	–	25	25	50
4.	Technical Seminer	–	–	2	–	–	–	25	25	50
	Total	20	02	17	400	75	25	125	125	750

OPERATING SYSTEM

Period/Week : 4 Hrs. (Th.)
Total Contact hrs : 60

Exam. (Th.) 3 Hrs.
End Term Exam : 80 marks
I.A. : 20 (15+5)
Total : 100 marks

RATIONALE :

As Operating System is the resource manager of the Computer System, so students should be exposed towards learning the role of Operating System in controlling and coordinating all the Hardware and Software resources available with a digital computer. System programming deals with Assembler, Compiler, loader etc. which are the system software tools for the students to learn in the field of programming.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Periods
1.	Introduction	05
2.	Process Management	10
3.	Memory Management	10
4.	I/O Management	15
5.	Device Management	05
6.	Dead Locks	05
7.	File Management	10
	Total	60

A. OPERATING SYSTEM

1. INTRODUCTION

05

- 1.1 State Objectives and Explain of operating system.
- 1.2 Discuss Evolution of Operating system and explain structure of operating system.

2. PROCESS MANAGEMENT

10

- 2.1 Define process and Explain Process concept, process control, interacting processes, inter process messages.
- 2.2 Explain implementation issues of Process.
- 2.3 Discuss process scheduling, job scheduling.
- 2.4 Explain process synchronization, semaphore.
- 2.5 State principle of concurrency, types of scheduling.

3. MEMORY MANAGEMENT

10

- 3.1 Explain Resident monitor, multiple partition, swapping.
- 3.2 Explain segmentation, virtual memory using paging, virtual memory using segmentation, contiguous memory allocation, non contiguous memory allocation.

4. I/O MANAGEMENT	15
4.1 Discuss I/O organization.	
4.2 Describe I/O devices.	
4.3 Explain principles of I/O hardware, Principles of I/O software, serial and parallel port access terminal access.	
4.4 Discuss different device management technique : dedicated shared, virtual.	
4.5 Explain I/O traffic control, I/O device handler, I/O buffering, I/O functions.	
5. DEVICE MANAGEMENT	05
5.1 Discuss the techniques for Device Management – Dedicated, shared and virtual.	
5.2 Explain device allocation considerations I/O traffic control & I/O Schedule, I/O Device handlers.	
5.3 Define SPOOLING.	
6. DEAD LOCKS	05
6.1 Explain concept of deadlock.	
6.2 Define Resources.	
6.3 Discuss Dead Lock Detection, Recovery & Prevention, Explain Bankers Algorithm & Safety Algorithm.	
7. File Management	10
File organization, Directory & file structure, sharing of files, file access methods, file systems, reliability, allocation of disk space, file protection, secondary storage management.	

RECOMMENDED BOOKS :

1. Operating System By Silverschz & Galvin, Addison Wesley
2. System Programming By : J.J. Donovan – TMH
3. Modern Operating System By Tanenbaum, PHI.
4. Operating System & System Programming – By Harjeet Kaur & Astha Sharma, Kalyani Publishers



PROCESS INSTRUMENTATION – I

Period/Week : 4
Total Period : 60

Total Marks : 100
End. Exam. Theory : 80
Internal Assessment : 20 (15+5)
Exam. Time : 3 Hours

RATIONALE :

The study of Industrial Measurement and Instrumentation – I, will help the students for clear understanding about different industrial process parameters such as temperature, pressure, flow, level through use of measuring instruments used in industries.

OBJECTIVES :

1. To determine and compute the parameters of interest in process industry
2. To use different methods for temperature measurement
3. To know about LVDT and other pressure gauges used for pressure measurement
4. To measure flow by using flow meters
5. To utilize the concepts of system stability and to deduce stability criterion from the observed data.

TOPIC WISE DISTRIBUTION PERIODS

Sl. No.	Topics	Periods
1.	Measurement of temperature	18
2.	Measurement of pressure	16
3.	Flow measurements	16
4.	Level measurements	10
Total		60

COURSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES :

1. MEASUREMENT OF TEMPERATURE

- 1.1 Classify methods of temperature measurements
- 1.2 Explain Measurement of temperature by non-electrical methods
 - (a) Liquid Expansion type
 - (b) Solid Expansion type
 - (c) Gas and Vapour Expansion type.
- 1.3 Explain Measurement of temperature by Electrical methods of Measurements :
 - (a) Resistance Thermometers
 - (i) State advantages of Resistance Thermometer over other types
 - (ii) Describe the method of measurement of change in resistance by null balance bridge method,
 - (iii) compensation of lead Resistance by 3-wire & 4-wire methods.

- (b) Thermocouples
 - (i) Explain principle of thermoelectricity (Seebeck, Peltier, Thomson effects)
 - (ii) Classify thermocouple materials
 - (iii) Describe the function of thermocouple extension wires
 - (iv) Describe the method of measurement of output of thermocouple. State the types of Thermocouple insulation materials and their functions.
 - (v) State the advantages & disadvantages of thermocouple type thermometer
 - (vi) Explain the Cold junction compensation of Thermocouple.
- (c) Thermistors
 - (i) Explain the basic principles & characteristics of thermistors
 - (ii) State the method of temperature measurement by thermistors and their uses.
- (d) Pyrometers :
 - (i) Explain the principle & operation of Radiation & Optical pyrometers with suitable diagram and sketches
 - (ii) State its advantages & disadvantages
 - (iii) Describe the source of errors & precautions to be taken in various types of thermometer insulation.
- (e) Describe the function and use of Temperature switch

2. MEASUREMENT OF PRESSURE

- 2.1 Classify methods of pressure measurement
- 2.2 Explain the working principles and use of Mechanical Methods of measurement of pressure by :
 - (i) Manometers (U-tube, well type, inclined type)
 - (ii) Elastic type pressure gauge (bourdon tube, diaphragm, bellows)
 - (iii) Bell gauge
- 2.3 Explain the working principles and use of Electrical Methods of measurement of pressure by :
 - (a) Strain gauge pressure transducer
 - (b) Capacitive pressure transducer
 - (c) Reluctance type pressure transducer
 - (d) Piezoelectric pressure transducer
- 2.4 Describe the operation and explain the working principles of Vacuum Gauges
 - (i) Thermal conductivity gauge
 - (ii) McLeod gauge
 - (iii) Hot filament ionization vacuum gauge.
- 2.5 Explain the working of mechanical & pneumatic pressure transmitters. Pressure switch (two wire and four wire type of transmitter) and state their uses.

3. FLOW MEASUREMENTS

- 3.1 Classify flow meters and explain the principles of operation with diagrams
- 3.2 Variable head type flow meters.
Explain the principle of operation, advantages & disadvantages of
 - (i) orifice plate (ii) venturi tube
 - (iii) nozzles (iv) dall tubes
 - (v) elbow taps

- 3.3 Explain Variable area flow meters (Rotameter), Cylinder & piston type and state their uses.
- 3.4 Explain Non-hydraulic meters and state their industrial uses.
 - (i) Magnetic flow meter
 - (ii) Ultrasonic flow meter
- 3.5 Describe the construction and explain working principle of Thermal flow meters
- 3.6 Describe the construction and explain principle of Quantity flow meters
 - (i) Positive displacement type
 - (ii) Reciprocating piston type

4. LEVEL MEASUREMENTS

- 4.1 Classify level indicators
- 4.2 Explain the working of sight glass, Float type of indicator and displacement level detector
- 4.3 Explain the construction and use of inductive, resistive level gauges.
- 4.4 Explain the working of Capacitor level detector and Radiation level detector
- 4.5 State and explain the function of different types of level switches

RECOMMENDED BOOKS :

(A) Text Books :

- (i) Industrial Instrumentation, By – S.K.Singh
- (ii) Instrumentation By – Patranabish
- (iii) Electrical & Electronic Measurements & Instrumentation by R.K. Rajput (S.Chand Publishers.)

(B) Reference Books :

- (i) Mechanical measurement and measuring instruments, By – R.K.Jain
- (ii) Handbook of Instrumentation.



DIGITAL ELECTRONICS

(Common to ETC / AE & I)

Period/Week : 5
Total Period : 75

Total Marks : 100
End. Exam. Theory : 80
Internal Assessment : 20 (15+5)
Exam. Time : 3 Hours

ELECTRONICS DEVICES AND CIRCUITS

Period/Week : 5
Total Period : 75

Total Marks : 100
End. Exam. Theory : 80
Internal Assessment : 20 (15+5)
Exam. Time : 3 Hours

RATIONALE :

The study of analogue electronics circuits from the basis of understanding the discipline of Applied Electronics & Instrumentation Engineering. Any electronics equipment/instrumentation comprises devices and circuit modules. The characteristics of the devices and functional operational principles of the circuits are extremely important not only for understanding the performance of the electronic equipment/instruments but also for their repair and maintenance.

OBJECTIVES :

1. To explain the parameters and characteristics of different solid state devices, such as diode, transistors, multi-vibrators and explain their principles of operation.
2. To draw and develop different electronic circuits such as rectifiers, Amplifiers, oscillators, multi-vibrators and explain their principles of operation.
3. To explain the principles of different wave shaping circuits such as clippers, clampers and state their uses.

TOPIC WISE DISTRIBUTION OF PERIODS :

Sl. No.	Topics	Periods
1.	Junction diodes	08
2.	Rectifiers and filters	10
3.	Bipolar transistor	08
4.	Analysis of transistor amplifier	10
5.	Audio power amplifiers	09
6.	Feedback amplifiers	10
7.	Oscillators	08
8.	Tuned amplifiers	06
9.	Wave shaping circuits	06
Total		75

COURSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES :

1. JUNCTION DIODES

- 1.1 Explain Volt-ampere characteristic of P-N junction
- 1.2 Explain energy-band diagram of an unbiased P-N junction and biased P-N junction
- 1.3 Explain biased P-N junction and unbiased P-N junction
- 1.4 Explain Capacitance effects in diodes.
- 1.5 Explain the working principles and state the use of Zener diode, Tunnel diode, Varicap diodes, Gun diode, LCD, PIN diode, Schottky diode, Snap diode.

2. RECTIFIERS AND FILTERS

- 2.1 Explain the concept of Load line of diode ckt. Solve simple problems
- 2.2 Explain Static and dynamic characteristics and construction of load line
- 2.3 Explain the working principle, with circuit diagrams, compare the merits and demerits of Rectifiers - Half wave & full wave-center tapped & bridge rectifiers.
- 2.4 Derive expression for Rectifier efficiency, (Half wave & Full wave)
- 2.5 Deduce expression for Ripple factor for half wave and full wave rectifier
- 2.6 Explain voltage regulation of power supply with a circuit diagram
- 2.7 Explain the working principles of Capacitance filter, L-filter, π -filter, T-filter, showing their output wave shapes
- 2.8 Explain voltage doubler and multiplier circuits Develop voltage Regulator circuits using zener diode.

3. BIPOLAR TRANSISTOR

- 3.1 Explain the constructional feature and operation of Junction transistor
- 3.2 Explain different current components in a transistor.
- 3.3 Describe different modes of operation of a transistor (CB, CE & CC)
- 3.4 Explain relationship between input and output current and α , β , γ of transistor in various modes. Derive an expression for relationship between them
- 3.5 Explain the working principle and compare their input and output parameters.

4. ANALYSIS OF TRANSISTOR AMPLIFIER

- 4.1 Draw and explain load line analysis and determination of Q-point
- 4.2 Explain stabilisation and methods of transistor biasing
- 4.3 Explain characteristics of a CB, CE and CC amplifier
- 4.4 Explain gain or amplification and frequency response of a noise and phase distortion
- 4.5 Explain DC and AC equivalent circuit of a transistor amplifier also explain DC and AC load lines and multi stage amplifier.

5. AUDIO POWER AMPLIFIERS

- 5.1 Classify power amplifiers A, B, C, AB
- 5.2 Explain different types of power amplifier circuits.
- 5.3 Derive expression for efficiency of class-B, class-AB and class-C push-pull amplifiers
- 5.4 Explain complementary-symmetry amplifiers
- 5.5 Explain principle and working characteristics use of a R-C coupled amplifier

6. FEEDBACK AMPLIFIERS

- 6.1 Explain the effect of feedback on stability
- 6.2 Explain principle of negative feedback and its effect on the performance of the amplifier
- 6.3 Draw block diagram of a feedback amplifier
- 6.4 Explain Gain of an amplifier with feedback
- 6.5 Explain emitter-follower circuit

7. OSCILLATORS

- 7.1 Explain Fundamental principle of oscillators. State Barkhausen criteria
- 7.2 Describe concept of the feedback. Explain the principle of a tuned circuit.
- 7.3 Explain the function of Tuned collector oscillator. Hartly oscillator, Colpitt's oscillator, Phase shift oscillator, Wein bridge oscillator, Crystal oscillator.

8. JFET & MOSFET

- 8.1 Differentiate between BJT & JFET
- 8.2 Explain operation of JFET & JFET characteristics
- 8.3 Define JFET parameters
- 8.4 Differentiate between JFET & MOSFET
- 8.5 Explain operation of depletion MOSFET
- 8.6 Explain operation of enhancement MOSFET.

RECOMMENDED BOOKS :

(A) Text Books :

- (i) Principle of Electronics – V.K Mehta
- (ii) Electronics Devices & Circuits – Sanjeeb Gupta
- (iii) Electronics Devices and Circuits – J.B.Gupta
- (iv) Electronic Devices & Circuits by – B.L.Theraja & R.S.Sedha (S.Chand Publishers.)

(B) Reference Books :

- (i) Electronics Devices and Circuit Theory : Robert Boylestad & Lonis Nashelslay.
- (ii) Integrated Electronics – Milliman and Halkis.



ENGINEERING MATHEMATICS – III

(Common to ETC / AE & I / ELECT)

Period/Week : 4 Hrs.

Total Period : 60

Examination : 3 Hr

Total Marks : 100

Theory : 80

IA : 20 (15 + 5)

OPERATING SYSTEM LAB

Period/Week : 5 Hrs. (Pr.)
Total Period : 75

Total Marks : 50
End exam. 25 marks
Sessional : 25 marks
Exam. time : 4 Hours

1. OVERVIEW OF UNIX

UNIX as an Operating system, Kernel, shell and User, UNIX File System, Files and Directories, Access Permission, File system hierarchy.

2. BASIC UNIX COMMANDS

Listing of files and directories, Copying, Deleting Renaming and comparing files, Creation, Navigation and Removing directories, Access permission of files and directories, Editors in UNIX, Status of users, terminals, Date and time, Displaying blown-up message, paging & Printing of files, background jobs.

3. PROGRAMMING WITH THE SHELL

System variables and shell variables, interactive Shell scripts, Shell termination, conditional statements, looping statements, Special parameters in shell computation and string handling.



3rd Semester (AE & I)

Process Instrumentation Lab – I

Pd/Wk : 5
Total Pd : 75

Total Marks = 100
End Exam = 50
Sessional = 50
Exam Time = 4 Hrs.

RATIONALE :

In this Process Instrumentation lab. Students will acquire skills of operation and testing of sensors and transducers. Besides the students will be acquainted with the operation and maintenance of fundamental Electronics measuring devices and components.

COURSE CONTENT :

(Perform any 10 of the following)

1. Measurement of temperature using thermometer transducer.
2. Measurement of temperature using RTD transducer.
3. Measurement of temperature using thermocouple transducer.
4. Measurement of furnace temperature using optical pyrometer.
5. Measurement of liquid level.
6. Measurement of flow using rotameter.
7. To plot the characteristics of semiconductor diode.
8. Soldering Practice.
9. Construction of half wave rectifier and measurement of its output.
10. Construction of full wave rectifier and measurement of its output.
11. Construction of single stage transistor amplifier using voltage divider method of biasing.
12. Experiment with LVDT.
13. Measurements using strain gauge.
14. Study of Peizo electric Transducers.

NOTE ON PRACTICAL CLASSES :

- All the practical will be oriented towards developing psychomotor skills.
- The students will be exposed to making experimental layouts.
- They will develop work ethics and work culture.
- Develop co-operative and interpersonal relationship.
- Develop precise measurement techniques.
- Develop safety practices.
- Develop correct methods of handling equipment, machinery, tools and accessories.
- Develop the skill of assembling/fabricating circuits.



DIGITAL ELECTRONICS LAB.

(Common to ETC / AE & I)

Period/Week : 5
Total Period : 75

End Exam. : 25
Sessional : 25
Exam Time : 4 Hours.

TECHNICAL SEMINAR

Total Period : 30
No of period : 2 P/W

Sessional : 25
End Exam : 25

RATIONALE :

It is necessary to develop the communication skill both for verbal and written presentation of facts and data. For developing the skill of presenting the fact related to technical matter in terms of oral presentation the seminar is to be arranged. For developing the skill of presenting the report of any observed phenomena the preparation of report is needed. The job is designed in such a way that both the verbal and writing skill as well as techniques of presentation will be developed.

OBJECTIVES :

After successful completion of this seminar, the student will able to

- (i) Present the facts or data or concept through a seminar for developing oral communication skill.
- (ii) Interacting with the audience during questionnaire session.
- (iii) Write the reports containing synopsis, content and other description with suitable display items.
- (iv) Presentation will be either OHP/Power Point Presentation or chart display etc.

COURSE CONTENT INTERMS OF SPECIFIC OBJECTIVES :

Classes should be divided into smaller groups of not more than four in each group. One group should be assigned a topic for the Seminar. The topic should be usually related to their course of studies or should be of general interest. Every student of the group should prepare on a particular aspect of the main topic with active support and guidance from a teacher guide. The student should be encouraged to extensively use the library facilities and also to collect relevant material from different Technical Magazines and Journals. Each student should be usually asked to present his paper on the topic of the Seminar within 15 minutes after which a question answer session may follow for 5 minutes. The Sr. Lecturer or Sr. faculty member should preside over the Seminar and ensure its smooth conduct. The student should be encouraged to use Audio-Visual Aids and other modern teaching methods during presentation of the topics in the Seminar. The Chairman should give the valedictory address and offer suggestions for quality improvement of the Seminar. The Chairman should give the valedictory address and offer suggestions for quality improvement of the Seminar. Each student at-least speaks for a minimum of two times during the semester.

The Sessional Records should be maintained and evaluated by a team of faculty members and the final marks awarded by the team.

