

C-18 - Curriculum

Diploma in Electronics and Instrumentation Engineering



State Board of Technical Education & Training

Telangana, Hyderabad

IV Semester

TEACHING AND EXAMINATION SCHEME

	Course Code	Course Name	Teaching Scheme					Examination Scheme						
			Instruction periods per week			Total Periods per semester	Credits	Continuous internal evaluation			Semester end examination			
			L	T	P			Mid Sem1	Mid Sem2	Internal Evaluation	Max marks	Min marks	Total Marks	Min marks for passing including internal
1	18EI-401C	Advance Engineering Mathematics	3	1	0	60	3	20	20	20	40	14	100	35
2	18EI-402C	Microcontroller programming.	3	1	0	60	3	20	20	20	40	14	100	35
3	18EI-403C	Linear Integrated circuits	3	1	0	60	3	20	20	20	40	14	100	35
4	18EI-404C	Industrial Instrumentation	3	1	0	60	3	20	20	20	40	14	100	35
5	18EI-405C	Process Control	3	1	0	60	3	20	20	20	40	14	100	35
6	18EI-406P	Linear Integrated circuits Lab Practice	1	0	2	45	1.5	20	20	20	40	20	100	50
7	18EI-407P	Industrial Instrumentation Lab Practice	1	0	2	45	1.5	20	20	20	40	20	100	50
8	18EI-408P	Microcontrollers Programming Lab Practice	1	0	2	45	1.5	20	20	20	40	20	100	50
9	18EI-409P	Process Control Lab practice	1	0	2	45	1.5	20	20	20	40	20	100	50
10	18EI-410P	Advanced communications & Life skills Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
11		Skill Upgradation	0	0	7	105	2.5	0	0	Rubrics			--	Grade A/B/C/D
		TOTAL	20	5	17	630	25	200	200	200	400	170	1000	425

ADVANCED ENGINEERING MATHEMATICS

Course Title : ADVANCED ENGINEERING MATHEMATICS	Course Code : 18EI-401F
SEMESTER : IV	Course Group : Foundation
Teaching Scheme (L : T : P) : 36 :24 : 0 (in Periods)	Credits : 3 Credits
Type of Course : Lecture + Assignments	Total Contact Periods : 60
CIE : 60 Marks	SEE : 40 Marks
Programme : Common to all Engineering Diploma Programmes	

Pre requisites

This course requires the knowledge of Engg. Mathematics at Diploma first year level and Applied Engg. Mathematics at Diploma 3rd Semester level.

Course Outcomes:

At the end of the course, the student will have the ability to:

CO 1	Solve simple Homogeneous Linear Differential Equations
CO 2	Solve simple Non-Homogeneous Linear Differential Equations
CO 3	Express $f(x)$ as a Fourier series in the given interval
CO 4	Express $f(x)$ as a Fourier Half-Range Cosine series and Sine series
CO 5	Find Laplace transforms of simple functions
CO 6	Find Inverse Laplace transforms of simple functions and solve Linear Differential Equations using Laplace Transformations.

Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	Homogeneous Linear Differential equations with constant coefficients	05	Q4	Q1		Q9(a)	Q13(a)
2	Non-Homogeneous Linear Differential equations with constant coefficients	15					
3	Fourier series	10		Q2		Q10(a)	Q14(a)
4	Fourier Half-range series	05					
5	Laplace Transforms	10		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Inverse Laplace transforms	15			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total		60	8		8	8	

Course Contents:

Unit – I

Duration: 05 Periods (L:3.0 – T:2.0)

Homogeneous Linear Differential equations with constant coefficients

Homogenous linear differential equations with constant coefficients of order two and higher with emphasis on second order.

Unit – II

Duration: 15 Periods (L:12.0 – T:3.0)

Non-Homogeneous Linear Differential equations with constant coefficients

Non-homogenous linear differential equations with constant coefficients of the form $f(D)y = X$, where X is in the form $k(a \text{ constant})$, e^{ax} , $\sin ax$, $\cos ax$, x^n , ($n= 1,2,3$) Complimentary Function (CF), Particular Integral (PI) and General Solution (GS).

Unit-III

Duration: 10 Periods (L: 8.0 – T: 2.0)

Fourier series

Orthogonality of trigonometric functions, Representation of a function in Fourier series over the interval $(c, c + 2\pi)$, Euler's formulae, sufficient conditions for existence of Fourier series for a function. Even, Odd functions and Fourier series over the Interval $(0, 2\pi)$ and $(-\pi, \pi)$

Unit – IV**Duration: 05 Periods (L: 3.0 – T: 2.0)****Fourier Half-range series**

Representation of a function as Fourier Half-range Sine series and Cosine series over the interval $(0, \pi)$

Unit – V**Duration: 10Periods (L: 7.0 – T:3.0)****Laplace Transformations:**

Definition, sufficient conditions for existence of Laplace Transform, Laplace Transform of elementary functions, linearity property, Change of scale property, First shifting theorem, multiplication by t^n , division by t , Laplace Transform of derivatives and integrals, unit step function, Laplace Transform of second shifting theorem

Unit – VI**Duration: 15 Periods (L: 12.0 – T: 3.0)****Inverse Laplace transforms:**

Inverse Laplace transforms- shifting theorems and change of scale property, multiplication by s^n and division by s –Inverse Laplace Transform using partial fractions – convolution theorem (no proof) – application of Laplace Transformations to solve ordinary differential equations of second order with initial conditions.

Recommended Books:

1. Higher Engineering Mathematics, B.S.Grewal .
2. Laplace Transforms - Murray R. Spiegel .
3. Ordinary Differential Equations – R. S. Aggarwal.
4. Fourier Series – A.R. Vasishtha and Gupta.

Suggested E-Learning references:

1. www.freebookcentre.net/mathematics/introductory-mathematics-books.html
2. E-books:www.mathebook.net

Suggested Learning Outcomes**Unit-I****1.0 Solve Homogeneous linear differential equations with constant coefficients in engineering situations**

- 1.1 Solve Differential equations of the type $(aD^2 + bD + c)y = 0$ when the roots of the auxiliary equation are real and different, real and repeated, complex.
- 1.2 Solve the higher order homogeneous Linear differential equations with constant coefficients.

Unit-II

2.0 Solve Non Homogeneous linear differential equations with constant coefficients in engineering situations

- 2.1 Explain the concept of complementary function, particular Integral and general solution of a differential equation.
- 2.2 Solve n^{th} order differential equation of the type $f(D)y = X$ where $f(D)$ is a polynomial of second order and X is a function of the form $k, e^{ax}, \sin ax, \cos ax, x^n$.
- 2.3 Solve simple problems on the above types of 2.2

Unit-III

3.0 Understand the Fourier series expansion of functions

- 3.1 Define the orthogonality of functions in an interval.
- 3.2 Define Fourier series of a function on the interval $(C, C+2\pi)$ and write the Euler's formulae for determining the Fourier coefficients.
- 3.3 Write sufficient conditions for the existence of Fourier series for a function.
- 3.4 Write Fourier series of simple functions in the range $(0, 2\pi)$ and $(-\pi, \pi)$.
- 3.5 Write Fourier series for even and odd functions in the interval $(-\pi, \pi)$.
- 3.6 Solve simple problems on even and odd functions in the interval $(0, 2\pi)$ and $(-\pi, \pi)$.

Unit- IV

4.0 Understand the Half – Range Fourier series expansion of functions

- 4.1 Write Half – Range Cosine series of a function in the range $(0, \pi)$.
- 4.2 Write Half – Range Sine series of a function in the range $(0, \pi)$.
- 4.3 Solve simple problems on Half – Range Cosine and Sine series over the interval $(0, \pi)$.

Unit-V

5.0 Understand Laplace transforms

- 5.1 Write the definition of Laplace Transform and Laplace transform of standard functions.
- 5.2 Explain the sufficient conditions of existence of Laplace Transform.
- 5.3 Write the properties of Laplace Transform – Linearity property, First shifting theorem, Change of Scale property.
- 5.4 Solve simple problems using the above properties.

- 5.5 Write formulae for Laplace transform of $t^n f(t), \frac{f(t)}{t}, f^n(t), \int_0^t f(u) du$ in terms of Laplace transform of $f(t)$
- 5.6 Solve simple problems using the above formulae.
- 5.7 Define unit step function and write the Laplace Transform of unit step function.
- 5.8 Write Second shifting theorem.

Unit-VI

6.0 Use Laplace transforms and Inverse Laplace transforms to solve differential equation in engineering problems

- 6.1 Define inverse Laplace Transform and write inverse Laplace Transforms of standard functions.
- 6.2 Solve simple problems on Inverse Laplace Transforms.
- 6.2 Write Shifting theorems and Change of scale property of inverse Laplace Transform.
- 6.3 Solve simple problems on 6.2
- 6.4 Write inverse Laplace Transforms corresponding to Laplace Transform of the functions $t^n f(t), \frac{f(t)}{t}, f^n(t), \int_0^t f(u) du$
- 6.5 Solve simple problems on 6.4
- 6.6 Define convolution of two functions and state convolution theorem.
- 6.7 Solve simple problems on Convolution theorem.
- 6.8 Use Laplace and inverse Laplace Transforms to solve simple differential equations of Second order.

Suggested Student Activities:

1. Student visits Library to refer Standard Books on Mathematics and collect related material.
2. Quiz
3. Group discussion
4. Surprise tests
5. Seminars
6. Home Assignments.

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	3	2	2	1			1			3	1,2,3,4,7,10
CO2	3	2	2	1			1			3	1,2,3,4,7,10
CO3	3	2	2	1			1			3	1,2,3,4,7,10
CO4	3	2	2	1			1			3	1,2,3,4,7,10
CO5	3	2	2	1			1			3	1,2,3,4,7,10
CO6	3	2	2	1			1			3	1,2,3,4,7,10

Internal Evaluation

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignments	-	5
Seminars	-	5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed $\frac{1}{4}$ of a page, 1page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R		U		A
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI					
Total Questions	8		8	8	

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
BOARD DIPLOMA EXAMINATIONS
MID SEM –I, MODEL PAPER, IV SEMESTER
ADVANCED ENGINEERING MATHEMATICS

TIME: 1: 00 Hours

Max. Marks: 20

PART-A

Instructions:

1. Answer **ALL** questions

04 X 01 = 04

2 Each question carries **ONE** mark

1. Write the General solution of $(aD^2+bD+c)y = 0$, whose roots of auxiliary equation are real and distinct.
2. Find the roots of auxiliary equation of the differential equation $(D^2 + 2D + 1)y = 0$
3. Find the Particular Integral of $(D^2 - 4D + 1)y = e^{3x}$
4. Find the P.I of $(D^2 - 16)y = \sin 4x$

PART-B

Instructions:

1. Answer any **TWO** questions

02 X 03 = 06

2. Each question carries **THREE** marks

5 a) Solve: $(D^2 + 3D - 54)y = 0$

Or

5 b) Solve : $(D^2 + 16)y = 0$

6 a) Solve : $(D^2 + 4D + 4)y = e^{2x}$

Or

6 b) Find P.I of $(D^3 + D)y = \sin 2x$

PART C

Instructions:

1. Answer **ALL** questions

02 X 05 = 10

2. Each question carries **FIVE** marks

7 a) Solve : $(D^3 - 2D^2 - 4D + 8)y = 0$

Or

7 b) Solve : $(D^3 - D^2 - D + 1)y = 0$

8 a) Solve : $(D^2 + 36)y = \sin^2 x$

Or

8 b). Solve : $(D^2 + 3D + 2)y = x^2$

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
BOARD DIPLOMA EXAMINATIONS
MID SEM –II, MODEL PAPER, IV SEMESTER
ADVANCED ENGINEERING MATHEMATICS

TIME: 1: 00 Hours**Max. Marks: 20****PART-A**

Instructions:

1. Answer **ALL** questions

04 X 01 = 04

2 Each question carries **ONE** mark

1. Define periodic function and give one example
2. Define Fourier series of the function $f(x)$ in the interval $(0, 2\pi)$
3. Write Half-range sine series of $f(x)$ in the interval $(0, \pi)$
4. Find a_0 for $f(x) = e^x$ in $0 < x < \pi$

PART-B

Instructions:

1. Answer any **TWO** questions

02 X 03 = 06

2. Each question carries **THREE** marks5 a). If $f(x) = x^2$ in $(0, 2\pi)$, then find the value of a_n in Fourier series of $f(x)$

Or

5 b) If $f(x) = |x|$ in $(-\pi, \pi)$, then find the value of a_1 in Fourier series of $f(x)$ 6 a). Find the value of a_n in half-range Cosine series for the function $f(x) = e^x$ in $(0, \pi)$

Or

6 b). Obtain the Fourier Half – Range Sine series for $f(x) = (\pi - x)$ in the interval $(0, \pi)$ **PART C**

Instructions:

1. Answer any **TWO** questions

02 X 05 = 10

2. Each question carries **FIVE** marks7 a). Obtain the Fourier series for $f(x) = x$ in the interval $0 < x < 2\pi$

Or

7 b). Find the Fourier series for $f(x) = (x - x^2)$ in the interval $(-\pi, \pi)$. Hence show that

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots + \frac{\pi^2}{12}$$

8 a) Express $f(x) = \pi x - x^2$ as a half-range Sine series in $(0, \pi)$

Or

8 b). Find the half –range cosine series for the function $f(x) = x^2$ in the interval $(0, \pi)$

BOARD DIPLOMA EXAMINATION, (C-18)
SEMESTER END EXAM MODEL PAPER
IV SEMESTER EXAMINATION
ADVANCED ENGINEERING MATHEMATICS

Time: 2 hours

[Total Marks: 40]

PART-A

Instructions:

1. Answer **ALL** questions

08 X 01 = 08

2 Each question carries **ONE** mark

1. Find the roots of auxiliary equation of the differential equation $(D^2 + 4D)y = 0$.
2. Define Fourier Series for the function $f(x)$ in the interval $(c, c+2\pi)$
3. Find the Particular Integral of $(D^2 - 4D + 1)y = e^x$
4. Find $L(e^{2t} + \cos 3t)$
5. Find $L(t + 5\cos ht)$
6. State the First Shifting theorem of Laplace Transforms.
7. Find $L^{-1}\left(\frac{1}{s-3} + \frac{s}{s^2+4}\right)$
8. Find $L^{-1}\left(\frac{1}{2s+5}\right)$

PART-B

Instructions:

1. Answer any **FOUR** questions

04 X 03 = 12

2. Each question carries **THREE** marks

9. a) Solve: $(D^2 + D + 1)y = 4e^{3x}$
Or
- 9 b) Find $L(t\cos 3t)$
- 10 a) Find Half Range Sine Series of $f(x) = x$ in $(0, \pi)$
Or
- 10 b) Find $L^{-1}\left(\frac{s+1}{s^2+6s-7}\right)$
- 11 a) If $L\{f(t)\} = \frac{20-4s}{s^2-4s+20}$, find $L\{f(3t)\}$
Or
- 11 b) Find $\int_0^\infty t \cdot e^{-2t} \sin 3t dt$ using Laplace Transform Technique
- 12 a) Show that $L^{-1}\left(\frac{1}{s(s^2+a^2)}\right) = \frac{1-\cos at}{a^2}$
- 12 b) Find $L^{-1}\left(\frac{s}{(s+2)^2+4}\right)$

PART C

Instructions:

1. Answer any **FOUR** questions

04 X 05 = 20

2. Each question carries **FIVE** marks

13. a) Solve : Solve: $(D^2 + D - 2) y = x + \sin x$

Or

13 b) Find $L[t e^t \sin 3t]$

14 a) Expand $f(x) = x^2$ as a Fourier series in the interval $(-\pi, \pi)$

Or

14 b) Find $L^{-1}\left(\frac{s}{(s+1)^2(s^2+1)}\right)$

15 a) Find $L\left(\frac{\sin 3t \cdot \cos t}{t}\right)$

Or

15 b) Evaluate $L\left\{\int_0^t \frac{\sin t}{t} dt\right\}$

16 a) Find $L^{-1}\left(\frac{1}{(s+1)(s+2)}\right)$ using Convolution theorem .

Or

16 b). Solve the differential equation $y'' - 2y' - 8y = \sin t$, when $y(0) = 3$, $y'(0) = 6$ by

Laplace Transform method.

MICROCONTROLLER PROGRAMMING

Course Title :	MICROCONTROLLER PROGRAMMING	Course Code	18EI-402 C
Semester	IV	Course Group	Core
Teaching Scheme in Periods(L:T:P)	45:15:0	Credits	3
Methodology	Lecture + Assignments	Total Contact Periods :	60
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of digital electronics.

Course Outcomes

CO1 :	Analyze the architecture of 8051.
CO2 :	Compare the various low level and high level languages and interpret the addressing modes.
CO3:	Write simple programs using instructions of 8051.
CO4 :	Classify and know the working of hardware interfacing devices.
CO5 :	Analyze the need for programmable interfacing devices.
CO6 :	Make use of instructions to solve programs.

COURSE CONTENT

Upon completion of the course the student should be able to

UNIT 1 –Architecture of Microcontroller 8051

Duration: 14 Periods (L: 14– T: 0)

Analyze the architecture of 8051.

Block diagram of a microcomputer - function of each block-Compare Microprocessors and Microcontrollers-applications of microcontrollers-INTEL microcontroller family chips.--features of various INTEL microcontroller family chips-Compare the various INTEL microcontroller families-features of Intel 8051 Micro Controller-multiplexing and de-multiplexing in 8051.
functional block diagram of 8051 microcontroller-function of each block-register structure of 8051-function of various special function registers-pin diagram of 8051 micro controller -purpose of each pin-internal memory Organization in 8051-interrupts in 8051.

UNIT 2 –Assembly language and addressing modes.**Duration: 6 Periods (L: 6– T: 0)****Compare the various low level and high level languages and interpret the addressing modes.**

Define bit, nibble, byte and word related to microcontrollers- machine language, assembly language, and mnemonics-Differences between machine level and assembly level programming-Differences between low level and high level languages-need for assembly level programming-need for an instruction set-instruction format of 8051 -Classify the instruction set of 8051-one byte, two byte and three byte instructions of 8051-What is addressing mode with reference to microcontroller-various addressing modes of 8051-need for bit level addressing..

UNIT 3 –Instruction set of 8051.**Duration: 14 Periods (L: 10– T: 4)****Explain the instruction set of 8051.**

Function of data transfer instructions and the effect of flags- data transfer instructions with examples. Programs in mnemonics to illustrate the application of data copy instructions-function of arithmetic group of instructions and the effect of flags-arithmetic group of instructions with examples. Programs in mnemonics to illustrate the application of arithmetic instructions-function of logical instructions and the effect of flags-logical instructions with examples- programs in mnemonics to illustrate the application of logical instructions-function of branching instructions and the effect of flags-unconditional jump instructions-conditional jump instructions-bit manipulation or Boolean instructions.

UNIT 4 –Hardware Interfacing**Duration: 6 Periods (L: 6– T: 0)****Classify and know the working of hardware interfacing devices.**

interfacing and its need- Distinguish between input and output interfacing-interfacing of pushbutton switch to 8051-interfacing of LED to 8051-interfacing of seven segment display -assembly level program for the above- functions of pins of LCD-instruction command code for programming a LCD- interfacing of LCD to 8051-assembly language Program for interfacing LCD - key press and detect mechanism-interfacing of 4x4 matrix key board.

UNIT 5 –Programmable peripheral devices.**Duration: 10Periods (L: 10– T: 0)****Analyze the need for programmable interfacing devices.**

need for programmable peripheral devices- Classify various programmable interfacing devices- block diagram of PPI 8255- control word format of 8255- PIN diagram of 8255 and function of each PIN- need for DMA controller-block diagram of DMA controller 8257- PIN diagram of 8257 and function of each PIN- need for programmable communication interface-block diagram of serial communication interface 8251- PIN diagram of 8251 and function of each PIN- RS 232 standards-RS232 pin, DB25 and DB9 connectors.

UNIT 6 –8051 Programming Concepts**Duration: 10Periods (L: 7– T: 3)****Make use of instructions to solve programs.**

various symbols used in drawing flow charts-flow charts for simple problems-flow chart illustrating counter technique--program using counter techniques-programs of instructions to perform single byte, double byte and multi byte addition and subtraction-subroutine and its advantages-operation of stack

with PUSH & POP instructions-branching instructions related to subroutines-sequence of program when subroutine is called and executed-information exchange between the program counter and the stack and identification of stack pointer register when a subroutine is called-concept of nesting, multiple ending and common ending in subroutines- input/output, machine related statements in writing assembly language programs- debugging a program-important steps in writing and trouble shooting a simple program-principles of single step and break point debugging techniques-simple programs to setup time delay using counter & a single register-time delay in the program given the clock frequency.

Specific Learning Outcomes

1.0 Comprehend the architecture of Microcontroller 8051

- 1.1 Draw the block diagram of a microcomputer and explain the function of each block.
- 1.2 Compare Microprocessors and Microcontrollers.
- 1.3 List the applications of microcontrollers.
- 1.4 State the INTEL microcontroller family chips.
- 1.5 List the features of various INTEL microcontroller family chips.
- 1.6 Compare the various INTEL microcontroller families.
- 1.7 State the features of Intel 8051 Micro Controller.
- 1.8 Explain multiplexing and de-multiplexing in 8051.
- 1.9 Draw the functional block diagram of 8051 microcontroller.
- 1.10 Explain the function of each block.
- 1.11 Draw the register structure of 8051and explain.
- 1.12 Explain the function of various special function registers.
- 1.13 Draw the pin diagram of 8051 micro controller and specify the purpose of each pin.
- 1.14 Explain internal memory Organization in 8051.
- 1.15 Explain interrupts in 8051.

2.0 Understand the languages and addressing modes of 8051 micro controller.

- 2.1 Define bit, nibble, byte and word related to microcontrollers.
- 2.2 Define the terms machine language, assembly language, and mnemonics.
- 2.3 Write the differences between machine level and assembly level programming.
- 2.4 Write the differences between low level and high level languages.
- 2.5 State the need for assembly level programming.
- 2.6 State the need for an instruction set.
- 2.7 Write the instruction format of 8051 & illustrate these terms by writing an instruction.
- 2.8 Classify the instruction set of 8051.
- 2.9 Explain one byte, two byte and three byte instructions of 8051.
- 2.10 What is addressing mode with reference to microcontroller.
- 2.11 List the various addressing modes of 8051and Explain with examples.
- 2.12 State the need for bit level addressing.

3.0 Understand the instruction set of 8051.

- 3.1. Explain the function of data transfer instructions and the effect of flags.
- 3.2. Explain the data transfer instructions with examples.
- 3.3. Write programs in mnemonics to illustrate the application of data copy instructions.
- 3.4. Explain the function of arithmetic group of instructions and the effect of flags.
- 3.5. Explain the arithmetic group of instructions with examples.
- 3.6. Write programs in mnemonics to illustrate the application of arithmetic instructions.
- 3.7. Explain the function of logical instructions and the effect of flags.
- 3.8. Explain the logical instructions with examples.
- 3.9. Write programs in mnemonics to illustrate the application of logical instructions.
- 3.10. Explain the function of branching instructions and the effect of flags.
- 3.11. Explain unconditional jump instructions.
- 3.12. Explain conditional jump instructions.
- 3.13. Explain bit manipulation or Boolean instructions.

4.0 Hardware Interfacing

- 4.1 What is interfacing and its need?
- 4.2 Distinguish between input and output interfacing.
- 4.3 Explain the interfacing of pushbutton switch to 8051.
- 4.4 Explain the interfacing of LED to 8051.
- 4.5 Explain the interfacing of seven segment display.
- 4.6 Write the assembly level program for the above.
- 4.7 Explain the functions of pins of LCD.
- 4.8 List instruction command code for programming a LCD.
- 4.9 Explain interfacing of LCD to 8051.
- 4.10 Explain assembly language Program for interfacing LCD
- 4.11 Explain key press and detect mechanism.
- 4.12 Explain interfacing of 4x4 matrix key boards.

5.0 Programmable peripheral devices.

- 5.1 Explain the need for programmable peripheral devices.
- 5.2 Classify the various programmable interfacing devices.
- 5.3 Draw and explain the block diagram of PPI 8255.
- 5.4 Write the control word format of 8255.
- 5.5 Draw the PIN diagram of 8255 and explain the function of each PIN.

- 5.6 State the need for DMA controller.
- 5.7 Draw and explain the block diagram of DMA controller 8257.
- 5.8 Draw the PIN diagram of 8257 and explain the function of each PIN.
- 5.9 State the need for programmable communication interface.
- 5.10 Draw and explain the block diagram of serial communication interface 8251.
- 5.11 Draw the PIN diagram of 8251 and explain the function of each PIN.
- 5.12 Explain RS 232 standards.
- 5.13 List RS232 pin, DB25 and DB9 connectors.
- 5.14 Explain the need for MAX 232 and 233 IC's and their circuits used for interfacing.

6.0 Comprehend 8051 Programming Concepts

- 6.1 List the various symbols used in drawing flow charts.
- 6.2 Draw flow charts for simple problems.
- 6.3 Draw a simple flow chart illustrating counter technique.
- 6.4 Write a program using counter techniques.
- 6.5 Write programs to perform single byte, double byte and multi byte addition and subtraction.
- 6.6 Define a subroutine and write its advantages.
- 6.7 Explain the operation of stack with PUSH & POP instructions.
- 6.8 Explain the branching instructions related to subroutines.
- 6.9 Explain the sequence of program execution when subroutine is called and executed.
- 6.10 Explain information exchange between the program counter and stack when a subroutine is called.
- 6.11 Illustrate the concept of nesting, multiple ending and common ending in subroutines.
- 6.12 Use input/output, machine related statements in writing assembly language programs.
- 6.13 Explain the term debugging a program.
- 6.14 List the important steps in writing and trouble shooting a simple program.
- 6.15 Explain the principles of single step and break point debugging techniques.
- 6.16 Write simple programs to setup time delay using counter & a single register.
- 6.17 Calculate the time delay in the program given the clock frequency.

RECOMMENDED BOOKS

1. The 8051 Micro controller and Embedded systems , by Muhammad Ali Mazidi, Janice Mazidi, Janice GillispieMazidi Pearson-Prenticehall publication
2. The 8051 Microcontroller By Kenneth J. Ayala -Thomson Delmar publications
3. Programming customizing the 8051 Microcontroller by MykePredko, TMH
4. Introduction to microprocessors for engineers and scientists by byGhosh& Sridhar, Prentice-Hall.
5. Microprocessors and Microcontrollers by N.Senthil Kumar, M. Saravanan, S. Jeevanathan, Oxford press.

e-linkswww.nptel.comwww.electronics4u.com**Suggested student activities.**

1. Learn how to download keil software.
2. Propose how to manage the e-waste.
3. Down load ed-sim simulator and know its working.
4. Learn the latest microcontrollers used in day to day applications.
5. Prepare a simple PCB to interface a switch and LED.

CO PO Mapping Matrix

On Successful completion of the course, the student will be able to attain the following Course Outcomes (COs):

Course Outcome		CL	Linked PO	Teaching Periods
CO1	Analyze the architecture of 8051.	U/A	1,2,10	14
CO2	Compare the various languages and interpret the addressing modes.	R/U	1,2,	6
CO3	Explain the instruction set of 8051 and write simple programs.	R/U/A	1,2,	14
CO4	Classify and analyze the hardware interfacing devices.	R/U/A	1,2,	6
CO5	Analyze the need for programmable interfacing devices.	R/U	1,2,	10
CO6	Make use of instructions to solve programs.	R/U/A	1,2,	10

MID SEM-I EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

MID SEM –II EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

Semester End Examination

Semester End Examination							
Sl No	Unit No.	Questions to be set for SEE				Remarks	
		R		U	A		
1	I	4	1		9(a)	13(a)	
2	II						
3	III		2		10(a)	14(a)	
4	IV						
5	V		3	5, 6	9(b)	13(b)	
					11(a)	15(a)	
					11(b)	15(b)	
6	VI			7,8	10(b)	14(b)	
		12(a)			16(a)		
		12(b)			16(b)		
Total Questions		8		8	8		

Legend:	Remembering (R)	1 Mark
	Understanding (U)	3 Marks
	Application (A)	5 Marks

**C-18 IV SEMESTER
18 EI-402C MICROCONTROLLER PROGRAMMING**

MODEL PAPER MID- SEM I

TIME : 1 HOUR

MAX. MARKS : 20

PART-A

Answer ALL questions.

4 x 1= 4M

1. List any 2 applications of microcontrollers.
2. List the interrupts of 8051 microcontroller.
3. Define bit and nibble related to microcontrollers.
4. Write the instruction format of 8051.

PART – B

Answer ALL questions.

2 x 3 = 6 M

5(a) State the features of 8051 microcontroller.

OR

5(b) List any 6 SFR's and their functions.

6(a) Write the difference between machine level and assembly level programming.

OR

6(b) Classify the instruction set of 8051.

PART – C

Answer ALL questions.

2 x 5 = 10 M

7(a) Draw the register structure of 8051 and explain.

OR

7(b) Draw the PIN diagram of 8051 and explain the function of each PIN.

8(a) Explain one byte, two byte and three byte instructions with example for each.

OR

8(b) Explain the addressing modes of 8051 microcontroller with an example for each.

C-18 IV SEMESTER
18 EI-402C MICROCONTROLLER PROGRAMMING
MODEL PAPER MID- SEM II

TIME : 1 HOUR

MAX. MARKS : 20

PART-A

Answer ALL questions.

4 x 1= 4M

1. Write the function of the instruction MOV @R0,A.
2. Write the number of bytes and the type of addressing mode for the instruction MOV DPTR, #6500H .
3. What is interfacing?
4. List any 2 input devices and 2 output devices.

PART – B

Answer ALL questions.

2 x 3 = 6 M

- 5(a) Write an assembly language program to add the numbers 3Ah and 19H.

OR

- 5(b) Write an assembly language program to multiply two binary numbers.

- 6(a) Explain the interfacing of pushbutton switch to 8051.

OR

- 6(b) Write functions of pins of LCD.

PART – C

Answer ALL questions.

2 x 5 = 10 M

- 7(a) Write an assembly language program to load numbers into registers R1 and R2 using indirect addressing mode, then exchange the data between them.

OR

- 7(b) Write any 5 arithmetic group of instructions and explain them with an example for each.

- 8(a) Explain the interfacing of seven segment LED display to 8051.

OR

- 8(b) Explain the interfacing of LCD display to 8051.

C-18 IV SEMESTER
18 EI-402C MICROCONTROLLER PROGRAMMING
MODEL PAPER - SEMESTER END EXAMINATION

TIME : 2 HOURS

MAX. MARKS : 40

PART-A

Answer ALL questions.

8 x 1 = 8M

1. Define machine language and mnemonics.
2. Define interfacing.
3. List any 2 pins of DB 9 connector.
4. What is the need for programmable peripheral devices?
5. Write the function of IC's 8255 and 8257.
6. What is control word with reference to 8255.
7. List any 4 flow chart symbols.
8. Define a subroutine.

PART – B

Answer ALL questions.

4 x 3 = 12 M

- 9(a) List the interrupts of 8051 and write their vector addresses and order of priority.

OR

- 9(b) Write the control word format of 8051.

- 10(a) Write an assembly language program to rotate a number in register R4 twice towards left with carry.

OR

- 10(b) Explain the operation of stack with PUSH and POP instructions.

- 11(a) Draw the PIN diagram of 8257.

OR

- 11(b) Explain the standards of RS – 232.

- 12(a) Explain the term debugging.

OR

- 12(b) Write an assembly language program to generate a time delay of 10 microseconds using a register and operating with a clock frequency of 10MHz.

PART – C

Answer ALL questions.

2 x 5 = 10 M

13(a) Draw and explain the functional block diagram of 8051.

OR

13(b) Draw and explain the block diagram of 8251.

14(a) Explain the key press and key detect mechanism.

OR

14(b) Explain the sequence of program execution when a subroutine is called and executed.

15(a) Draw and explain the block diagram of 8255.

OR

15(b) Explain MAX 232 and MAX 233 IC with necessary diagrams.

16(a) Write an assembly language program to transfer a block of 5 numbers stored in i-RAM locations from 10H onwards to off-chip RAM locations from 6400H onwards.

OR

16(b) Write an assembly language program to add a block of 5 numbers stored in i-RAM locations from 10H onwards. Store the sum onto off-chip RAM locations from 6400H and carry 6401H.

LINEAR INTEGRATED CIRCUITS

Course Title :	Linear Integrated Circuits	Course Code	18EI-403C
Semester	IV	Course Group	Core
Teaching Scheme in Periods(L:T:P)	45:15:0	Credits	3
Methodology	Lecture + Assignments	Total Contact Periods :	60
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of Basic Physics and Mathematics at Secondary school level ,and basics of electrical and electronics

Course Outcomes

Upon completion of the course, the student should be able to

Course Outcome	
CO1	Compare different IC fabrication techniques
CO2	Familiarize operational amplifier and its characteristics
CO3	Construct basic application circuits using op-amp
CO4	Construct oscillators and multi-vibrators using Op-amp
CO5	Develop Timers and PLL using Op-amp
CO6	Construct Instrumentation amplifier and ADC and DAC converters using Operational Amplifiers

COURSE CONTENTS

UNIT1- IC Manufacturing:

Duration: 8 Periods (L: 6– T:4)

Merits and demerits of Integrated Circuits-Classification of ICs based on manufacturing process (monolithic, thin film, thick film and hybrid)- Manufacturing process of monolithic ICs- fabrication of resistor, and capacitor on monolithic IC- Fabrication of diode and transistor on monolithic IC- different IC packages- - Power rating of above packages- Various levels of integration (SSI, MSI, LSI, VLSI etc.,)- Surface Mount Technology (SMT)- Merits of SMT Technology

UNIT -2: Operational Amplifier

Duration: 10 Periods (L: 6– T:4)

Need for differential amplifier- Circuit diagram of differential amplifier- Operation of differential amplifier- Reasons for not implementing differential amplifier with discrete components- differential gain and common mode gain- Function of an operational amplifier- Symbol - Inverting and Non inverting inputs of Op Amp- Important characteristics of ideal operational amplifier- Input impedance, Open loop gain, Slew rate, CMRR, Input offset voltage, Input offset Current- block diagram and pin out diagram of IC 741 - Pin configuration of IC 741- Typical values of Open loop gain, Slew rate, CMRR, Input offset voltage, Input offset Current- Power supply requirements of Operational Amplifier- Concept of virtual ground and Virtual short- Single supply operation of Operational Amplifier- Pin configuration of single supply Op Amps such as CA 3011 ,LM324 - Features of above ICs.

UNIT 3 –Op-amp applications

Duration: 12 Periods (L: 6– T:4)

Inverting amplifier configuration of Op Amp- input and output waveforms- Equation for voltage gain- Effect of feedback on input impedance and Bandwidth for inverting amplifier configuration- Non Inverting amplifier configuration of Op Amp- formula for Voltage gain- Effect of feedback on input impedance and Bandwidth- For Non inverting amplifier configuration. Use of operational amplifier as i) inverter , ii) Voltage Buffer iii) Summing Amplifier iv) Scale changer v) Integrator vi) Differentiator- Reasons for not implementing differentiator circuit in high frequency applications- *Voltage to current* converter circuit- applications of *Voltage to current* converter- *Current to Voltage* converter circuit - *Current to Voltage* converter circuit - Applications of *Current to Voltage* converter-Active and Passive filters- Op amp Active low pass filter with circuit diagram of first order- Frequency response - Op amp Active high pass filter of first order- Frequency response of the above circuit- Merits of active filters

UNIT -4:Oscillators and Multi- vibrators using Op-amp**Duration: 12 Periods (L: 6– T:4)**

OP-Amp Wein-bridge Oscillator circuit- - Output waveform - Conditions required for stable operation - RC Phase shift oscillator using OP Amp - conditions for stable operation -Classification of Multi vibrators- OP-Amp Bistable multi vibrator - OP-Amp Bistable multi vibrator- output waveforms- OP-Amp Monostable multivibrator with waveforms- Astable multi vibrator using OP-Amp- OP-Amp based Astable multi vibrator- waveforms- applications of multivibrators- OP-Amp Schmitt trigger circuit- fundamental consideration of sweep waveform- Hysteresis of Schmitt trigger circuit

Unit 5- Timers and PLL**Duration: 8 Periods (L: 6– T:4)**

Block diagram of 555 IC - Astable multi using 555 IC- Monostable Multivibrator using 555 IC.- Phase locked loops - Block diagram of PLL – LM565- operation of VCO (LM566)- Lock range of PLL- Capture range of PLL-Give design rules(Formulas) for implementing PLL circuit - Applications of PLL

UNIT- 6:Instrumentation amplifiers and A/D and D/A converters**Duration: 10 Periods (L: 6– T:4)**

Use of op amp circuits in instrumentation- Op amp and instrumentation amplifier- Need for instrumentation amplifier- OP amp instrumentation amplifier circuit- Need for A/D and D/A conversion- Terms: resolution, Accuracy, Monotonicity and settling time of D/A converter- D/A converter using binary weighted resistors- - Circuit of D/A converter using R-2R ladder network-.A/D converter using counter method with a block diagram - A/D converter using successive approximation method - Block diagram - Performance of above A/D converters.

Specific Learning Outcomes: After completing this course the student will be able to

1.0 Explain the IC manufacturing methods

- 1.1 List the advantages and disadvantages of Integrated Circuits over discrete assembly.
- 1.2 Classify ICs based on fabrication techniques (monolithic, thin film, thick film and hybrid).
- 1.3 Compare the different types of above fabrication techniques
- 1.4 Explain the manufacturing process of monolithic ICs.
- 1.5 Explain the fabrication of resistor, and capacitor on monolithic IC.
- 1.6 Explain the fabrication of diode and transistor on monolithic IC.
- 1.7 List different IC packages.
- 1.8 Draw the sketch of above package types
- 1.9 Mention the power rating of above packages.
- 1.10 Explain various levels of integration (SSI, MSI, LSI, VLSI etc.,).
- 1.11 Explain the Surface Mount Technology (SMT)
- 1.12 List 6 merits of SMT Technology.

2.0 Explain the working of Operational amplifier

- 2.1 State the need for differential amplifier
- 2.2 Draw and explain the circuit diagram of differential amplifier
- 2.3 Give reasons for not implementing differential amplifier with discrete components.
- 2.4 Define the terms differential gain and common mode gain
- 2.5 State the function of an operational amplifier.
- 2.6 Draw the symbol of an operational amplifier.
- 2.7 Explain inverting and Non inverting inputs of Op Amp
- 2.8 State the important characteristics of ideal operational amplifier with practical values.
- 2.9 Define Input impedance, Open loop gain, Slew rate, CMRR, Input offset voltage, Input offset Current,
- 2.10 Draw the Pin configuration of IC 741
- 2.11 State the function of each pin.
- 2.12 Give typical values of Open loop gain, Slew rate, CMRR, Input offset voltage, Input offset Current,
- 2.13 Explain the power supply requirements of Operational Amplifier.
- 2.14 Explain the concept of virtual ground and Virtual short.
- 2.15 Explain single supply operation of Op-amp
- 2.16 Give the pin configuration of single supply op-amps such as CA 3011, LM324
- 2.17 List 6 important features of above ICs
- 2.18 Explain the operation of adjustable voltage regulator (LM317)
- 2.19 Give the formula for output voltage of adjustable regulators

3.0 Operational amplifier applications using negative feedback

- 3.1. Explain the Inverting amplifier configuration of Op Amp with input and output waveforms.
- 3.2. Derive the equation for voltage gain of an inverting amplifier
- 3.3. Explain the concept of virtual ground and Virtual short.
- 3.4. Derive the equation for voltage gain of an inverting amplifier.
- 3.5. Explain the Non Inverting amplifier configuration of Op Amp.
- 3.6. Derive the formula for Voltage gain of above.
- 3.7. Explain the use of operational amplifier as i) inverter , ii) Buffer iii) Summing Amplifier
iv)Scale changer v) Integrator vi) Differentiator
- 3.8. Mention the reasons for not implementing differentiator circuit in high frequency applications.
- 3.9. Draw the *Voltage to current* converter circuit.
- 3.10. Explain the operation of above circuit
- 3.11. List 3 applications of *Voltage to current* converter.
- 3.12. Draw the *Current to Voltage* converter circuit.
- 3.13. Explain the operation of *Current to Voltage* converter circuit.

- 3.14. List 3 applications of *Current to Voltage* converter
- 3.15. Distinguish between Active and Passive filters.
- 3.16. Explain the working of Op amp Active low pass filter with circuit diagram of first order.
- 3.17. Draw the frequency response of the above circuit.
- 3.18. Explain the working of Op amp Active high pass filter with circuit diagram of first order
- 3.19. Draw the frequency response of the above circuit.
- 3.20. Mention the merits of active filters.

4.0 Explain the working of Oscillators and Multi- vibrators using Op-amp

- 4.1 Explain Wein-bridge Sine wave Oscillator circuit using an OP-Amp
- 4.2 Mention the reason for using non linear element in the feedback circuit.
- 4.3 State the conditions required for stable operation and frequency of oscillation of above circuit
- 4.4 Explain RC Phase shift oscillator circuit using OP Amp
- 4.5 Mention the conditions and frequency of oscillation for stable operation of the above circuit
- 4.6 Explain Gain Bandwidth product of Op Amp
- 4.7 Classify Multi vibrators.
- 4.8 Draw and explain the operation of transistor astable multivibrator.
- 4.9 Draw OP-Amp Bistable multi vibrator
- 4.10 Explain the working of OP-Amp Bistable multi vibrator with output waveforms.
- 4.11 Draw and explain the working of OP-Amp Monostable multivibrator with waveforms.
- 4.12 Draw the circuit of Astable multi vibrator using OP-Amp.
- 4.13 Explain the working of OP-Amp based Astable multi vibrator with output waveforms.
- 4.14 List 6 applications of multivibrators
- 4.15 Draw OP-Amp Schmitt trigger circuit.
- 4.16 Explain the working of OP-Amp Schmitt trigger circuit.

5.0 Explain the working of Timers and PLL

- 5.1. Draw the block diagram of 555 IC and explain.
- 5.2. Explain the working of astable multi using 555 IC.
- 5.3. Explain the working of Monostable Multivibrator using 555 IC.
- 5.4. Explain the concept of Phase locked loops
- 5.5. Draw and explain the block diagram of PLL – LM565.
- 5.6. Explain the operation VCO (LM566)
- 5.7. Define lock range of PLL
- 5.8. Define capture range of PLL.
- 5.9. Give design rules (Formulas) for implementing PLL circuit
- 5.10. List the applications of PLL.
- 5.11. Explain use of PLL as frequency multiplier

6.0 Explain the working of Instrumentation Amplifiers and A/D and D/A converters

- 6.1. Explain the use of op amp circuits in instrumentation.
- 6.2. Distinguish between Op amp and instrumentation amplifier.
- 6.3. Explain the need for instrumentation amplifier
- 6.4. Draw three OP amp instrumentation amplifier circuit
- 6.5. Explain the working of above circuits.
- 6.6. State the need for *A/D* and *D/A* conversion.
- 6.7. Define the terms resolution, Accuracy, Monotonicity and settling time of D/A converter.
- 6.8. Draw and explain the circuit of D/A converter using binary weighted resistors
- 6.9. Explain the operation D/A converter using binary weighted resistors.
- 6.10. Draw and explain the circuit of D/A converter using R-2R ladder network.
- 6.11. Explain operation of D/A converter using R-2R ladder network.
- 6.12. Explain the operation of A/D converter using counter method with a block diagram
- 6.13. Explain A/D converter using successive approximation method with a block diagram
- 6.14. Compare the performance of above A/D converters

RECOMMENDED BOOKS

1. Electronic Devices and Circuits – T.F. Bogart Jr., J.S. Beasley and G. Rico, Pearson Education, 6th edition, 2004.
2. Linear Integrated circuits – D. Roychoudhury & Shail B. Jain – New age International Publishers – II Edition – 2004.
3. Op-amps and linear integrated circuits, Ramakanth A. Gayakwad, ISBN- 9780132808682
4. Principles of Electronics, Rohit Mehta and V K Mehta, S. Chand and Company Publishing, ISBN- 9788121924504
5. Electronic Devices and Circuits, David A. Bell, Oxford University Press, ISBN 9780195693409

Suggested Student Activities

1. Student visits Library to refer to Manual of Operational amplifiers
2. Student inspects the available equipment in the Lab to test the applications of op-amp
3. Visit nearby Industry to familiarize with fabrication techniques of ICs
4. Participate in the Quiz
5. Participate in Group discussion
6. Search internet for circuits using the operational amplifier

Suggested E-Learning references

1. <http://electrical4u.com/>
2. www.electronics-tutorials.ws
3. www.nptel.ac.in

CO-PO MAPPING MATRIX

Course Outcome		CL	Linked PO	Teaching Hours
CO1	Know the different IC fabrication techniques	R/U	1,2,10	8
CO2	Know the salient features of Op-amp and Understand the working of op-amp	R/U/A	1,2,5,6,7	12
CO3	Apply the knowledge of op-amp in constructing and analyzing the basic applications	R/U/A	1,2,9	10
CO4	Apply the basic knowledge of Op-amp in the design of oscillators and multi-vibrators	R/U/A	1,2,5,7	10
CO5	Apply the knowledge of Op-amp and know the working of Timers and PLL	R/U/A	1,2,5	10
CO6	Apply the knowledge of op-amp in understanding the Instrumentation amplifier and A/D and D/A converters	R/U/A	1,2,3,7	10

MID SEM-I EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	
MID SEM –II EXAM					
S.No	Unit Name	R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

Semester End Examination

Sl No	Unit No.	Questions to be set for SEE				Remarks	
		R		U	A		
1	I	4	1		9(a)	13(a)	
2	II						
3	III		2		10(a)	14(a)	
4	IV						
5	V		3	5, 6	9(b)	13(b)	
					11(a)	15(a)	
					11(b)	15(b)	
6	VI			7,8	10(b)	14(b)	
		12(a)			16(a)		
		12(b)			16(b)		
Total Questions		8		8	8		

Legend:	Remembering (R)	1 Mark
	Understanding (U)	3 Marks
	Application (A)	5 Marks

STATE BOARD OF TECHNICAL EDUCATION & TRAINING: TS: HYDERABAD

C18EI-403C Linear Integrated Circuits

IV SEMESTER MID SEMESTER – I MODEL PAPER

Time: 1 hour

Max. Marks:20

PART-A

Answer All questions. Each carries 1 mark.

4X1=4 Marks

1. List different IC packages?
2. List merits of SMT technology?
3. List the important characteristics of ideal operational amplifier?
4. Define the common mode gain?

PART-B

Answer ALL questions. Each carries 3 marks.

2X3=6 Marks

5.a Explain manufacturing process of monolithic IC?

(OR)

5.b Explain the fabrication process of diode on monolithic IC?

6.a Draw the pin diagram of IC741 and mention the function of each pin?

(OR)

6.b List important features of ICs CA 3011 and LM 324?

PART-C

Answer ALL questions. Each carries 5 marks.

2X5=10 Marks

7.a Explain the Surface Mount Technology (SMT)?

(OR)

7.b Explain fabrication of a transistor on monolithic IC?

8.a Define Slew rate and CMRR of operational amplifier? Explain their importance in the operation of operational amplifier.

(OR)

8.b Explain power supply requirements of Operational Amplifier.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING: TS: HYDERABAD

C18EI-403C Linear Integrated Circuits

IV SEMESTER MID SEMESTER – II MODEL PAPER

Time: 1 hour

Max. Marks: 20

PART-A

Answer All questions. Each carries 1 marks.

4X1=4 Marks

1. List the applications of Voltage to Current converter?
2. List the merits of active filters?
3. Classify Multi-vibrators?
4. List the applications of Multi-vibrators?

PART-B

Answer **ALL** questions. Each carries 3 marks.

2X3=6 Marks

- 5.a. Give the reason for using non-linear element in the feedback circuit of Wein-bridge oscillator?
(OR)
- 5.b. Give the conditions for stable operation of RC – Phase shift oscillator?
- 6.a Explain Gain-Bandwidth product of Op-amp?
(OR)
- 6.b Explain RC phase shift oscillator circuit using Op-amp?

PART-C

Answer **ALL** questions. Each carries 5 marks.

2X5=10Marks

- 7.a Draw and explain the working of first order active low pass filter using op-amp?
(OR)
- 7.b Draw and explain the Non-inverting amplifier configuration of op-amp and derive the expression for voltage gain?
- 8.a Draw and explain the working of Bi-stable multi-vibrator using Op-amp?
(OR)
- 8.b Draw and explain the Schmitt-Trigger circuit using Op-amp?

STATE BOARD OF TECHNICAL EDUCATION & TRAINING: TS: HYDERABAD

SEMESTER END EXAMINATION MODEL QUESTION PAPER

C18EI-403C Linear Integrated Circuits

Time: 2 hours

Max. Marks: 40

PART-A

Answer All questions. Each carries 1 mark.

8X1=8 Marks

1. What is the need for a heat sink in a power transistor?
2. Draw the Summing amplifier circuit using Op-amp?
3. Define Mono tonicity and settling time?
4. Define Input offset voltage and Input offset current of Op-amp?
5. Define lock range and capture range of PLL?
6. What is the purpose of the voltage-controlled oscillator (VCO) in PLL?
7. What is instrumentation amplifier?
8. The basic step of a 9 bit DAC is 10.3 mV. If 000000000 represents 0Volts, what is the output for an input of 101101111?

PART-B

Answer ALL questions. Each carries 3 Marks.

4X3=12Marks

9.a Draw the block diagram of operational amplifier?.

(OR)

9.b Explain controlled voltage and threshold of IC-555.?

10.a Mention the reasons for not implementing differentiator circuit in High Frequency applications?

(OR)

10.b What is the difference between Op-amp and instrumentation amplifier?

11.a Explain controlled voltage and threshold of IC-555.?

(OR)

11.b Mention design rules for implementing PLL circuit?

12.a What is the need for ADC and DAC converters?

(OR)

12.b Compare the performance of Counter method and SAR ADC?

PART-C

Answer ALL questions. Each carries 5 Marks.

4X5=20Marks

13.a Define Slew rate and CMRR of operational amplifier? Explain their importance in the operation of operational amplifier?

(OR)

13.b Determine the frequency of oscillation for the astable multivibrator using IC-555. Given that $R_A = R_B = 1K\Omega$ and $C = 1000PF$.

14.a For the subtractor circuit using an op-amp input voltages are $V_1 = 5V$ and $V_2 = 2V$ and $R_1 = 10K$ and $R_2 = 20k$ respectively. Calculate the output voltage.

(OR)

14.b A certain 8-bit DAC has a full-scale output of 2mA and a full-scale error of $\pm 0.5\%$ F.S. What is the range of possible outputs for an input of 10000000?

15.a Explain controlled voltage and threshold of IC-555.?

(OR)

15.b Explain the operation of PLL-based FM demodulator?

16.a Explain the operation of instrumentation amplifier using three operational amplifiers?

(OR)

16.b Explain the operation of Successive Approximation method of ADC?

Department of Technical Education

State Board of Technical Education & Training (TS)

Course Title	Industrial Instrumentation	Course Code	18EI-404C
Semester	IV Semester	Course Group	Core
Teaching Scheme in Periods(L:T:P)	45:15:0	Credits	3
Methodology	Lecture +Assignments	Total Contact Periods	60 Periods
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of Instrumentation.

Course Outcomes

Upon completion of the course the student shall be able to

CO1	Apply the knowledge of Transducers in the measurement of speed ,velocity & vibration
CO2	Demonstrate Density and Viscosity measurement transducers used in Industries.
CO3	Illustrate the use of Humidity, Moisture and Special sensors and their applications
CO4	Understand the working principle of nuclear radiation measurement techniques
CO5	Analyze smart sensor and understand the types & working of Proximity Sensors & Relays
CO6	Applications of Industrial Instrumentation in different fields.

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	Measurement of Speed, Velocity & Vibration	8	Q4	Q1	Q9(a)	Q13(a)	
2	Measurement of Density & Viscosity	10					
3	Humidity, Moisture and Special Sensors	10		Q2	Q10(a)	Q14(a)	
4	Fundamentals of Nuclear Instrumentation	8					
5	Smart sensors	12		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q14(b), Q15(a), Q15(b)
6	Advance Applications of Industrial Instrumentation	12			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q13(b), Q16(a), Q16(b)
Total		60	8		8	8	

Course Contents

UNIT 1-Measurement of Speed, Velocity & Vibration

Duration: 8Periods (L: 6 T :2)

Vibration monitoring-linear velocity measurement-moving coil type velocity transducers-moving iron type velocity transducers-Angular velocity speed measurements-AC & DC Tachogenerator-Photo electric tachometer-toothed rotor variable reluctance tachometer.

UNIT 2- Measurement of Density and Viscosity

Duration: 8Periods (L:6 - T :2)

Density-Displacement type density measurement-fluid dynamic type density measurement-Ultrasonic type density measurement-Viscosity-Capillary Viscometer-Falling ball Viscometer-Rotational Viscometer.

UNIT 3-Humidity, Moisture and Special Sensors

Duration: 12Periods (L:9- T :3)

Humidity-Moisture-Importance of humidity measurement-Classification of humidity-hair hygrometer-flame sensor-leak detector-noise sensor

UNIT 4-Nuclear Instrumentation

Duration: 6Periods (L:4.5- T :1.5)

Types of Ionization radiation- Alpha, Beta and Gamma Particles, Neutrons & their properties-Radiation detectors- Geiger Muller counter - Ionization chamber-Scintillation counter.

UNIT 5- Smart sensors

Duration: 12Periods (L:9- T :3)

Definition of smart sensor- block diagram and its architecture of smart sensor- Evolution of smart sensor- 1st, 2nd, 3rd, 4th, 5th generations & brief explanation of some examples as Proximity sensors- IR sensors, Motion detection sensors- Accelerometer sensors- Gyroscope sensors- temperature- level sensors

UNIT 6- Advanced Applications of Industrial Instrumentation

Duration: 14Periods (L:10.5 - T :3.5)

Altimeter-Bevometer-Electronic Tuner-Barkometer-Ceilometer-Actinometer

Reference Books

1. Principles of Industrial Instrumentation by Patranabis.
2. Industrial Instruments and Control by S.K.Singh
3. Electronics Instruments and Instrumentation Technology by M.M.S. Anand
4. Instrumentation Measurement, Devices and systems by Rangan Mani and Sharma
5. Electrical and Electronic Measurements and Instrumentation by A.K.Sawhney
6. Handbook of Instrumentation-Liptalk

Suggested E-Learning references

1. www.egr.msu.edu
2. www.bme.rutgers.edu
3. www.BMES.org
4. www.Biospace.com
5. www.chromacademy.com
6. www.agilent.com

Suggested learning Outcomes

UNIT 1- Measurement of Speed, Velocity & Vibration

- 1.1 Mention the types of Velocity Transducers.
- 1.2 Explain the principle of operation of Moving coil type velocity transducer.
- 1.3 List the advantages of Moving coil type velocity transducer.
- 1.4 List the disadvantages of Moving coil type velocity transducer.
- 1.5 Explain the principle of operation of Moving iron type velocity transducer
- 1.6 List the advantages of Moving Iron type velocity transducer.
- 1.7 List the disadvantages of Moving Iron type velocity transducer.
- 1.8 Mention the types of angular velocity speed measurement Transducer.
- 1.9 Explain the principle of operation of A.C Tacho generators.
- 1.10 List the advantages of A.C Tacho generators.
- 1.11 List the disadvantages of A.C Tacho generators.
- 1.12 Explain the principle of operation of D.C Tacho generators.
- 1.13 List the advantages of D.C Tacho generators.
- 1.14 List the disadvantages of D.C Tacho generators.
- 1.15 Explain the principle of operation of Photo electric Tachometer.
- 1.16 List the advantages of Photo electric Tachometer.
- 1.17 List the disadvantages of Photo electric Tachometer.
- 1.18 Explain the principle of operation of toothed rotor variable reluctance Tachometer.
- 1.19 List the advantages of toothed rotor variable reluctance Tachometer.
- 1.20 List the disadvantages of toothed rotor variable reluctance Tachometer.
- 1.21 State the importance of vibration monitoring.

UNIT 2- Measurement of Density and Viscosity

- 2.1 Define Density.
- 2.2 State the importance of density measurement in industry.
- 2.3 Explain the principle of operation of Displacement type density measurement.

- 2.4 List the advantages of Displacement type density measurement.
- 2.5 Explain the principle of operation of Fluid dynamic type density measurement.
- 2.6 List the advantages of Fluid dynamic type density measurement.
- 2.7 Explain the principle of operation of Ultrasonic density measurement.
- 2.8 List the advantages of Ultrasonic density measurement.
- 2.9 Define Viscosity.
- 2.10 State the importance of Viscosity measurement in industry.
- 2.11 Explain the principle of operation of Capillary viscometer.
- 2.12 List the advantages of Capillary viscometer.
- 2.13 Explain the principle of operation of falling ball viscometer.
- 2.14 List the advantages of falling ball viscometer.
- 2.15 Explain the principle of operation of Rotational viscometer.
- 2.16 List the advantages of Rotational viscometer.

UNIT 3- Humidity, Moisture and Special Sensors:

- 3.1 Define Humidity.
- 3.2 Mention the Units for Humidity.
- 3.3 Define Moisture.
- 3.4 Mention the Units for Moisture.
- 3.5 State the importance of Moisture measurement in Industries.
- 3.6 State the importance of Humidity measurement in Industries.
- 3.7 List the types of Humidity
- 3.8 Define Absolute humidity
- 3.9 Define Relative Humidity.
- 3.10 Explain the operation of Hair hygrometer.
- 3.11 List the Applications of Hair hygrometer.
- 3.12 Explain the principle of operation of Flame sensors.
- 3.13 List the Applications of Flame sensors.
- 3.14 Explain the principle of operation of Leak detectors.
- 3.15 List the Applications of Leak detector.
- 3.16 Explain the principle of operation of Noise sensors.
- 3.17 List the Applications of Noise sensors

4.0 Fundamentals of Nuclear Instrumentation

- 4.1 List the types of Radiations.
- 4.2 List the properties of Alpha Particles.
- 4.3 List the properties of Beta Particles.
- 4.4 List the properties of Gamma Particles.
- 4.5 List the properties of Neutrons.
- 4.6 List the types of radiation detectors.

- 4.7 Explain the Geiger Muller method of detection of radiation.
- 4.8 List the Advantages of Geiger Muller method of detection of radiation.
- 4.9 List the Disadvantages of Geiger Muller method of detection of radiation.
- 4.10 Explain the Ionization chamber method of detection of radiation.
- 4.11 List the Advantages of Ionization chamber method of detection of radiation.
- 4.12 List the Disadvantages of Ionization chamber method of detection of radiation.
- 4.13 Explain the Scintillation counter method of detection of radiation.
- 4.14 List the Advantages of Scintillation counter method of detection of radiation.
- 4.15 List the Disadvantages of Scintillation counter method of detection of radiation.
- 4.16 Explain the method of detection of neutrons.

UNIT 5- SMART SENSORS.

- 5.1 Define smart sensor.
- 5.2 Differentiate sensor and smart sensor
- 5.3 Draw the block diagram of smart sensor and explain its architecture.
- 5.4 Explain the evolution of smart sensor as 1st, 2nd, 3rd, 4th, 5th generations .
- 5.5 Define proximity sensor.
- 5.6 List proximity sensors.
- 5.7 Explain Proximity type inductive, capacitive, photoelectric, ultrasonic sensors.
- 5.8 List applications of proximity sensors.
- 5.9 Define IR sensor.
- 5.10 Explain IR sensor and list its applications.
- 5.11 Define motion detection sensor.
- 5.12 List applications of motion detection sensors..
- 5.13 Define Accelerometer sensor.
- 5.14 List applications of Accelerometer sensor.
- 5.15 Explain about Hall Effect accelerometer and piezoelectric accelerometer
- 5.16 Define Gyroscope sensor.
- 5.17 List the applications of Gyroscope sensor.

UNIT 6-Applications of Industrial Instrumentation

- 6.1 Explain the principle of operation of Altimeter.
- 6.2 List the Advantages of Altimeter.
- 6.3 List the Disadvantages of Altimeter.
- 6.4 Explain the principle of operation of Bevameter.
- 6.5 List the Advantages of Bevameter.
- 6.6 List the Disadvantages of Bevameter.
- 6.7 Explain the principle of operation of Electronic Tuner.
- 6.8 List the Advantages of Electronic Tuner.
- 6.9 List the Disadvantages of Electronic Tuner.

- 6.10 Explain the principle of operation of Barkometer.
- 6.11 List the Advantages of Barkometer.
- 6.12 List the Disadvantages of Barkometer.
- 6.13 Explain the principle of operation of Ceilometer
- 6.14 List the Advantages of Ceilometer.
- 6.15 List the Disadvantages of Ceilometer.
- 6.16 Explain the principle of operation of Actinometer
- 6.17 List the Advantages of Actinometer.
- 6.18 List the Disadvantages of Actinometer.

Suggested Student Activities

1. List out the Transducers available in the market and collect the following information like name of the transducer, comparisons, specifications, Price etc. The student should submit a handwritten report. Documents have to be maintained as a record.
2. Conduct Quiz or tests / assignments in topics of Industrial Instrumentation. Documents have to be maintained as a record.
3. Prepare power point presentation on current topics in Industrial Instrumentation. Documents have to be maintained as a record.
4. Visit YouTube or any other sites on current topics in Industrial Instrumentation. Listen to the lectures and submit a handwritten report and a soft copy (CD/DVD).

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	2	2	2	2						2	1,2,3,4,10
CO2	2	2	2	2						2	1,2,3,4,10
CO3	2	2	2	2						2	1,2,3,4,10
CO4	2	2	2	2						2	1,2,3,4,10
CO5	2	2	2	2						2	1,2,3,4,10
CO6	2	2	2	2						2	1,2,3,4,10

Internal Evaluation

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignment	1	5
Seminars	1	5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed $\frac{1}{4}$ of a page, 1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R			U	A
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total Questions	8			8	8

State Board of Technical Education and Training, Telangana
Model Question paper
DEIE IV semester Mid Semester-I Examination

Corse Code: 18EI-404C
Course Name: Industrial Instrumentation

Duration:1 hour
Max.Marks:20

PART-A

Answer **all** questions, Each Question carries one mark

4x1 = 4 Marks

- 1) Mention the types of velocity transducers.
- 2) List the advantages of D.C tacho generators
- 3) Define density.
- 4) List the advantages of capillary viscometer.

PART-B

Answer **two** questions. Each question carries three marks

2x 3 = 6 Marks

- 5(a) List the advantages of Moving coil type velocity transducer.
(or)
5(b) State the importance of vibration monitoring.
- 6(a) List the advantages of ultra sonic density measurement.
(or)
6(b) State the importance of Viscosity measurement in industry

PART-C

Answer **two** questions. Each question carries five marks

2x 5 = 10 Marks

- 7(a) Explain the principle of AC tacho generator.
(or)
7(b) Explain the operation of toothed rotor variable reluctance tachometer.
- 8(a) Explain the operation of Displacement type density measurement.
(or)
8(b) Explain the operation of rotational viscometer.

State Board of Technical Education and Training, Telangana
Model Question paper
DEIE IV semester Mid Semester-II Examination

Corse Code: 18EI-404C
Course Name: Industrial Instrumentation

Duration:1 hour
Max.Marks:20

PART-A

Answer all questions, Each Question carries one mark

4x1= 4 Marks

1. Define humidity
2. List the application of flam sensors.
3. List the types of Radiations
4. State the types of radiation detectors

PART-B

Answer two questions. Each question carries three marks

2x 3 = 6 Marks

- 5(a) State the importance moisture measurement in industries.
(or)
5(b) Mention the basic working principle of fall ball viscometer.
- 6(a) List the properties of Alpha and Beta particles
(or)
6(b) Explain the method of detection of neutrons.

PART-C

Answer two questions. Each question carries five marks

2x 5 = 10 Marks

- 7(a) Explain the operation of hygrometer.
(or)
7(b) Explain the operation of leak detectors.
- 8(a) Explain the operation of Geiger Muller method of detection of radiation.
(or)
8(b) Explain the operation of scintillation counter method of detection of radiation

State Board of Technical Education and Training, Telangana
Model Question paper
DEIE IV Semester
Semester End Examination

Corse Code: 18EI-404C
Course Name: Industrial Instrumentation

Duration: 2 hours
Max.Marks: 20

PART-A

Answer all questions

8x1 = 8 Marks

- 1) Mention the types of angular velocity speed measurement transducer.
- 2) List the types of Radiation detectors.
- 3) Define IR sensor.
- 4) List the application of Noise sensor.
- 5) Define smart sensor.
- 6) List the applications of Gyroscope sensor.
- 7) List the advantages of Altimeter.
- 8) State the disadvantages of Ceilometers'.

PART-B

Answer four questions

4 x3 = 12 Marks

- 9(a) State the importance of vibration monitoring.
(or)
9(b) Differentiate sensor and smart sensor.
- 10(a) List the properties of Alpha and Beta particles
(or)
10(b) State the advantages of Bevameter.
- 11(a) List proximity sensors.
(or)
11(b) Describe Gyroscope sensor.
- 12(a) Define Electronic tuner.
(or)
12(b) Mention the advantages of Barkometer.

PART-C

Answer four questions

4 x 5 = 20 Marks

13(a) Explain the operation of toothed rotor variable reluctance tachometer.

(or)

13(b) Draw the block diagram of smart sensor and explain its architecture.

14(a) Explain the operation of Geiger Muller method of detection of radiation.

(or)

14(b) Explain the principle of Altimeter.

15(a) Explain the operation of proximity type inductive sensor.

(or)

15(b) Explain the operation of Accelerometer sensor.

16(a) Explain the operation of Barkometer.

(or)

16(b) Explain the operation of Actinometer.

Department of Technical Education

Course Title :	PROCESS CONTROL	Course Code	18EI-405C
Semester	IV	Course Group	:Core
Teaching Scheme in Periods(L:T:P)	45:15:0	Credits	: 3
Methodology	Lecture + Assignments	Total Periods :	: 60
CIE	60 Marks	SEE	40 Marks

State Board of Technical Education & Training (TS)

Pre requisites

This course requires the basic knowledge of Physics, Mathematics and Process Instrumentation.

Course Outcomes

CO1 :	Compare open loop and closed loop control systems and familiarize different types of systems. Categorize the Process control
CO2 :	Determine the various Control system parameters and compare the various Controller principles
CO3 :	Analyze the concepts of Final Control Elements and Actuators
CO4 :	Use standards for Process control and draw Process Instrument diagrams
CO5 :	Determine and compare Controller Tuning methods
CO6 :	Analyze the concepts of Advanced Process Control Systems

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1.	Introduction to basics of control systems & process control	10	Q4	Q1	Q9A	Q13A	
2	Controller Principles	10					
3	Final Control Elements	8		Q2	Q10A	Q14A	
4.	Process Instrument diagrams and Standards	8					
5.	Analog controllers & Tuning methods of Controller	12		Q3	Q5,Q6	Q9B,Q11A, Q11B	Q13B, Q15A, Q15B
6.	Advanced Process control systems	12					
	Total	60	8		8	8	

Legend: R: Remembering, U: Understanding, A: Applying

Course Contents

UNIT 1-Introduction to basics of control systems and process control

Duration: 10 Periods(L:8– T:2)

Definition of control system-Importance of Control Engineering-Types of control system-Block diagram- explanation and comparison of Open Loop and Closed Loop systems-Linear & non-linear- Time variant & time invariant- Continuous data & sampled data- Digital control systems

Process control principle- process control block diagram -typical control variables - controlled variable-manipulated variable- Continuous and Batch process- process characteristics

UNIT 2- Controller Principles

Duration: 10 Periods(L:9– T:3)

Control system parameters: error, control lag, dead time, cycling- Controller modes- discontinuous, two-position, multi-position, floating- Continuous control modes - proportional, integral, derivative control mode- Composite control modes - PI, PD and PID-Controller

UNIT 3- Final Control Elements**Duration: 8 Periods (L:5– T:3)**

P/I and I/P converters-Different types of the Actuators-Pneumatic, Hydraulic, Electro pneumatic, Actuators- different types of control valves.

UNIT-4- Process Instrument diagrams and Standards**Duration: 8 Periods (L:7– T:1)**

Line diagrams-Definition of P & I diagrams- Use of letter code of identification of Instruments- Introduction to standards that are widely used in instrumentation Viz.- ISI ANSI, BIS, ISA.

UNIT-5- Analog controllers & Tuning methods of PID Controller**Duration: 12Periods (L: 10– T: 2)**

Introduction- general features- electronic controller- implementation of two position Proportional, Integral, Derivative, PI, PD and PID-Tuning methods- ultimate gain method and process reaction curve method.

UNIT 6- Advanced Process control systems**Duration: 12 Periods (L:9– T:3)**

Single variable, independent variable, interactive single variable, compound variable, multivariable control systems, cascade control, feed forward control, ratio control, and adaptive control systems.

Recommended Books

1. Automatic process control by Donald.P.Eckmann
2. Control systems engineering by Nagrath and Gopal
3. Instrument Engineers Hand book by Liptak, Volume II
4. Instrument Technology by B.E.Jones, Volume I, II, III
5. Process Analysis & Control by Coughnour.
6. Process control instrumentation technology by Curtis .D.Johnson Seventh edition
7. Process Control by D.Patranabis

Suggested E-Learning references

- 1.<http://electrical4u.com/>
2. www.electronics-tutorials.ws
3. www.nptel.ac.in

Suggested Learning Outcomes

1.0 Introduction to basics of control systems and process control

- 1.1 Define a control system
- 1.2 Explain the importance of control engineering in day to day life.
- 1.3 Explain the importance of control engineering in industry.
- 1.4 Classify control systems.
- 1.5 Define open loop control system.
- 1.6 Draw the block diagram of an open loop control system.
- 1.7 List the various parts in an open loop control system.
- 1.8 List the examples of open loop control systems
- 1.9 Define closed loop control system.
- 1.10 Draw the block diagram of a closed loop control system.
- 1.11 List the various parts of closed loop control system.
- 1.12 List the examples of closed loop control systems.
- 1.13 Distinguish between open loop and closed loop control systems.
- 1.14 Explain the need for feed back in a control system with example.
- 1.15 Explain briefly about the following system.
 - a) Linear and Non-linear control system.
 - b) Time variant and time invariant system.
 - c) Continuous data and sample data system
- 1.16 Digital control systems
- 1.17 Define process control.
- 1.18 Explain an automatic process control with example.
- 1.19 Draw the block diagram of a process control loop.
- 1.20 Describe each element in a process control loop
- 1.21 Explain batch process and continuous process.
- 1.22 Explain the concept of controlled variable and manipulated variable with an example.
- 1.23 Explain a physical control system with block diagram.
- 1.24 Explain the concept of control system objective.
- 1.25 List the requirements of control system objective.
- 1.26 Define process characteristics such as process equation, process load, process lag and self-regulation.

2.0 Control system parameters and Controller principles

- 2.1 Define error, control lag, dead time, and cycling.
- 2.2 List the Discontinuous control modes.

- 2.3 Explain two positions control mode.
- 2.4 Explain multi position control mode.
- 2.5 Explain floating control mode.
- 2.6 List the continuous control modes.
- 2.7 Describe proportional control mode.
- 2.8 Define proportional band, and offset.
- 2.9 List the characteristics of proportional control mode.
- 2.10 Describe integral control mode.
- 2.11 List the characteristics of integral control mode
- 2.12 Describe the derivative control mode.
- 2.13 List the characteristics of derivative control mode.
- 2.14 List the composite control modes.
- 2.15 Describe the Proportional-Integral Control mode.
- 2.16 List the characteristics of Proportional-Integral Control mode.
- 2.17 Describe PD control mode.
- 2.18 Describe PID control mode.
- 2.19 List advantages and disadvantages of PI, PD & PID controllers

3.0 Final Control Elements and Actuators

- 3.1 Explain the principle of operation of final control element in a process with block diagram
- 3.2 State the need for electric to pressure and pressure to electric converters.
- 3.3 Explain the working of Nozzle-Flapper system with a diagram.
- 3.4 Explain the working of Electric to Pressure converter.
- 3.5 Explain the working of Pressure to Electric converter.
- 3.6 List the types of Actuators.
- 3.7 Explain the principle of Pneumatic Actuator with diagram.
- 3.8 Explain the principle of Hydraulic Actuator with diagram.
- 3.9 Explain the working of Electro Pneumatic Actuator with diagram.
- 3.10 Explain the working of Solenoid valve actuator
- 3.11 Explain the working Stepper motor actuator
- 3.12 Classification of Control valves.
- 3.13 Explain the construction and working of Sliding stem control valve
- 3.14 Explain the construction and working of Single seat Plug Control valve
- 3.15 Explain the construction and working of Rotating shaft Control valve
- 3.16 Explain the construction and working of Butterfly control valve
- 3.17 List the Flow-Lift characteristics of control valves such as quick opening, Linear, Equal percentage valves.

4.0 Process Instrument diagrams and Standards

4.1 State the importance of process line diagrams and symbols in process control.

4.2 Explain the representation of following in a process using line diagrams.

- a) Process line, connection to process or instrument supply
- b) Fluid pressure Line.
- c) Electric signal
- d) Pneumatic signal
- e) Hydraulic signal
- f) Capillary tube.
- g) Electromagnetic or Sonic signal (guided and not guided).
- h) Undefined signal.
- i) Mechanical link
- j) Internal system link (software or data link or computer signal)
- k) Orifice installed line.
- l) Point of measurement

4.3 Explain the representation of following controllers and transmitters using symbols.

- a) Pressure transmitter
- b) Flow Transmitter
- c) Level Transmitter
- d) Temperature Transmitter
- e) Pressure Controller
- f) Flow Controller
- g) Level Controller
- h) Temperature Controller

4.4 Explain the representation of following control valves using symbols.

- a) Hydraulically operated control valve
- b) Pneumatically operated control valve
- c) Electrically operated control valve
- d) Butterfly valve
- e) Solenoid Valve
- f) Gate valve
- g) Gate valve-hand operated
- h) Globe Valve
- i) Globe valve- hand operated

4.5 Explain the representation of following general instruments by Balloon symbols

- a) Instrument at locally mounted
- b) Instrument at control centre
- c) Instrument- bi-functional /two services

d) Instrument-transmitting type

4.6 Define piping and instrumentation diagram (P&I diagram).

4.7 Explain the simple application oriented P & I diagram.

4.8 Explain the use of letter codes for identification of instruments

4.9 Explain different standards used in Instrumentation.

a) ISI

b) ANSI

c) BS

d) ISA

f) DIN

5.0 Analog controller implementation and Controller tuning methods.

5.1 Introduction to electronic controllers

5.2 General features of electronic controllers

5.3 Explain the implementation of following controller modes using Op-Amps

a) Two – position controller modes

b) Proportional controller modes

c) Integral controller modes

d) Proportional Integral controller modes

e) PID Controller modes

5.4 State the need for tuning of PID controller

5.5 List methods of tuning of PID controllers

5.6 Explain about methods of tuning of PID controllers

a. Ultimate gain method

b. Process reaction curve method

6.0 Advanced Process Control Systems

6.1 Define single loop control system

6.2 Explain the following control system configuration.

a) Single variable control system.

b) Independent single variable control system

c) Interactive single variable control system

d) Compound variable control system and

e) Multivariable control system

6.3 Define cascade control system

6.4 Explain the block diagram of cascade control system.

6.5 Mention the merits of cascade control system over single loop control system

6.6 Explain the following with example

- a. Cascade control
 - b. Single loop control system
- 6.7 Compare how the cascade control system is better than single loop control system with an example.
 - 6.8 List the applications of cascade control system.
 - 6.9 Explain feed forward control system with block diagram.
 - 6.10 Distinguish between feedback and feed forward control systems.
 - 6.11 Explain the operation of Ratio control with a diagram.
 - 6.12 List the applications of Ratio control system.
 - 6.13 Define Adaptive control.
 - 6.14 Explain programmed adaptive control system with block diagram.
 - 6.15 Explain self- adaptive control system with block diagram.
 - 6.16. List the applications of adaptive control system.

Suggested Student Activities

1. Student visits Library to refer to Manual of electronic components to find their specifications
2. Student inspects the available equipment in the Lab to identify the components
3. Visit nearby Industry to familiarize with controlling process ex: Power stations, Cement , paper Industries
4. Quiz
5. Group discussion
6. Surprise test

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	2	2			2					2	1,2,5,10
CO2	2	2			2	2					1,2,5,6
CO3	2	2		2	2						1,2,4,5
CO4	2	2			2		2				1,2,5,7

CO5	2	2		2	2			2			1,2,4,5,8
CO6	2	2	2					2			1,2,3,8

Internal evaluation

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignment	1	5
Seminars	1	5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed ¼ of a page, 1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE			
	R		U	A
I	Q4	Q1	Q9(a)	Q13(a)
II				
III		Q2	Q10(a)	Q14(a)
IV				
V		Q3	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI				
Total Questions	8		8	8

Model Question Paper
BOARD DIPLOMA MID-SEMESTER- I EXAMINATIONS (C-18)
DEIE – IV SEMESTER EXAMINATION
PROCESS CONTROL (18EI-405C)

TIME: 1 Hours

MAXIMUM MARKS: 20

PART –A

Instructions: Answer all the questions. Each question carries one marks. MARKS: 4X1 =4

1. Define a control system.
2. Draw the block diagram of an open loop control system.
3. Define Integral control mode.
4. List the advantages of PID controller.

PART –B

Instructions: Answer two questions. Each question carries three marks. MARKS: 2X3 =06

5. (a) Distinguish between open loop and closed loop control system.
(or)
5. (b) Explain briefly about Non –linear control system.
- 6.(a) Describe the derivative control mode
(or)
- 6.(b) Describe PID Control mode.

PART –C

Instructions: Answer two questions. Each question carries five marks MARKS: 2X5=10

- 7.(a) Explain the closed loop control system with the help of an example.
(or)
- 7.(b) Explain briefly about time variant and time invariant systems.
8. (a) Explain two position control mode
(or)
8. (b) Explain the Proportional Integral control modes and mention its advantages and disadvantages.

Model Question Paper
BOARD DIPLOMA MID-SEMESTER-II EXAMINATIONS (C-18)
DEIE - IV SEMESTER EXAMINATION
PROCESS CONTROL (18EI-405C)

TIME: 1 Hours

MAXIMUM MARKS: 20

PART –A

Instructions: Answer all the questions. Each question carries one marks.

MARKS: 4X1 =04

1. Define principle of final control element.
2. State the need for electric to pressure converter.
3. Draw the process line diagram for
 - a) Pneumatic signal.
 - b) Capillary tube
4. Define piping & instrumentation diagram.

PART –B

Instructions: Answer two questions. Each question carries three marks.

MARKS: 2X3 =06

- 5.(a) Explain the principle of pneumatic actuator.
(or)
- 5.(b) Give the classification of control valves.
- 6.(a) Draw the balloon symbols for locally mounted and transmitted type instruments.
(or)
- 6.(b) List the types of standards used in instrumentation.

PART –C

Instructions: Answer two questions. Each question carries five marks

MARKS: 2X5 =10

- 7.(a) Explain the working of stepper motor actuator.
(or)
- 7.(b) Explain the working and construction of butterfly control valve.
- 8.(a) Explain the use of letter codes for identification of instruments.
(or)
- 8.(b) Explain the ISI standard

Model Question Paper
BOARD DIPLOMA END SEMESTER EXAMINATIONS (C-18)
DEIE - IV SEMETER EXAMINATION
PROCESS CONTROL (18EI-405C)

TIME: 2Hours

MAXIMUM MARKS: 40

PART –A

Instructions: Answer all the questions. Each question carries one mark.

MARKS: 8X1 =08

1. Classify control systems.
2. Define principle of final control element.
3. State the need for tuning.
4. Define Integral control mode.
5. List any two general features of electronic controllers
6. List the types of Tuning methods for PID Controller.
7. Define ratio controller.
8. List any two application of adaptive control.

PART –B

Answer FOUR questions

4 x 3= 12

- 9.(a) Distinguish between open loop and closed loop control system.
(or)
- 9.(b).Draw proportional control mode using Op-Amp.
- 10.(a) Explain the principle of pneumatic actuator.
(or)
- 10.(b) List the applications of Cascade control system.
- 11.(a) Design the two position control using op-amp.
(or)
- 11.(b) Design the PI controller using op-amp.
- 12.(a) Explain the feed forward control with block diagram
(or)
- 12.(b) List the applications of adaptive control system.

PART –C

Answer FOUR questions

4 x 5 = 20

13.(a) Draw the Block diagram of process control loop and explain each element in it.

(or)

13.(b) Explain the ultimate gain method in detail.

14.(a) Explain the principle of Hydraulic Actuator with diagram.

(or)

14.(b) Draw and explain the block diagram of cascade control system.

15.(a) Explain the implementation of Integral control mode using Op Amp.

(or)

15.(b) Explain the process reaction curve tuning method of PID.

16.(a) Explain the programmed adaptive control system with block diagram.

(or)

16.(b) Explain the operation of Ratio control with diagram.

LINEAR INTEGRATED LAB PRACTICE

Course Title :	Linear Integrated Lab Practice	Course Code	18EI-406P
Semester	IV	Course Group	Core
Teaching Scheme in Periods(L:T:P)	7.5:00:37.5	Credits	1.5
Methodology	Lecture + Practicals	Total Contact Periods :	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic skills of Handling Basic Electronics tools and Components, knowledge of connecting cables and meters

Course Content and Blue Print of Marks for SEE

Unit No	Unit name	Periods	Marks for SEE			Marks weightage	%Weightage
			Handling	Manipulation	Precision		
1	Op-amp circuits	15	4	2	6	12	
2	Oscillators and 555 Timer	9	2	2	6	8	
3	Phase Locked Loops	9	2	2	4	8	
4	Op-amp applications	12	2	2	6	12	
	Total	45	10	8	22	40	

List of Experiments

I. Operational Amplifier Circuits

1. Familiarize with Operational amplifier 741 and Quad Opamp LM 324 and comparator LM 339 ICs

2. Determine the CMRR and Slew Rate of the OP-AMP.

3) Implement and test 741 Op-Amp as

a) Inverting amplifier

b) Non Inverting amplifier

c) Voltage follower (Buffer),

4) Implement and test 741 Operation amplifier as

a) Summing Amplifier

b) Difference amplifier

c) Scale changer (with two Op-Amps)

5. Implement Wave shaping circuits using Op-Amp

a) Implement & test Differentiator and Integrator circuits.

b) Implement & test a Voltage comparator Circuit

c) Implement & test Op amp Schmitt trigger and draw characteristics

II. Signal conditioning Circuits using Op -amp

6) Implement & test Signal conditioning Circuits using Op amp

a) Interface op amp output with TTL gates with input amplitude limiting circuit

b) Implement & test Current to Voltage converter using Op amps

c) Implement & test Current to Voltage converter and use it to detect photodiode reverse current.

7. Implement & test Voltage to current converter

- a) Implement & test a Voltage to current converter that produces a proportionate current in the range of 4mA to 20mA corresponding to input voltages from 0 to 5V

III. Op amp Oscillators &555 Timer IC

8) Implement & test Sine wave Oscillator Circuits using Op-Amp CA 3011

- a) RC-phase shift oscillator
b) Wien bridge oscillator

) implement Op-Amp Relaxation Oscillators

- a) Implement &test Monostable multivibrator circuit and observe output waveforms on CRO
b) Implement &test Astable multivibrator observe output waveforms on CRO

9) Verify different modes of 555 IC.

- a) Implement Monostable multi vibrator and observe output waveforms on CRO
b) Implement Astable multivibrator and observe output waveforms on CRO

10) Verify functions of 565 Phase Locked loop IC

- A) Implement 565 Phase locked loop circuit and determine VCO free running frequency Lock range , Capture Range Practically and observe output waveforms on CRO
b) Implement Frequency demodulator using 565 and observe output waveform on CRO.

11) Use 566 as a square and Triangular wave generator

- a) Implement waveform /Function generator using 566 .
b) Produce Frequency modulation using 566 and observe output waveform on CRO.

12) Verify the features of Tone Decoder IC 567 IC

(Refer to the application notes and implement following circuits)

- a) Implement 10 KHz signal detector and test
b) Implement frequency Doubler and test.

13) Implement &Test Precision Rectifier using Op amp

14) Assemble Audio Power Amplifier circuit using LM 380 IC and Test the performance.

Suggested Student Activities

- (i) Collection of catalogues and specification sheets, preparation of a chart displaying symbols of passive components and connectors/cables.
- (ii) Collection of the contributors (scientists) and contribution details to the field of Electrical and Electronics engineering
- (iii) Any other such activities that can contribute to the student's knowledge in respect of this course.
- (iv) Record the best practices used in the disposal of E-waste and precautions in the operation of electrical appliances.

Course Outcome		Linked PO
CO1	Analyze op-amp characteristics and apply the knowledge of op-amp in basic applications	1,2,3,4,5,6,7,8
CO2	Apply the knowledge of Op-amp in Signal conditioning circuits	1,2,3,4
CO3	Design and test the working of Timers, PLL	1,2,3
CO4	Design simple circuits using op-amp and implement	1,2,3,10

E Learning Resources

1. <http://electrical4u.com/>
2. www.electronics-tutorials.ws
3. www.nptel.ac.in

State Board of Technical Education and Training, Telangana

Semester MID-I Examination Model Question paper

DEIE IV semester practical Examination

Corse Code: 18EI-406P

Duration: 2 hours

Course Name: Linear Integrated Circuits Lab Practice

Max.Marks:20

Instructions to the Candidate:

(i) Answer any One of the following Questions.

(ii) Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Compare the features of Operational amplifier 741 and Quad Op amp LM 324 and comparator LM 339 ICs

2. Construct the circuit to determine the CMRR and Slew Rate of the OP-AMP and measure.

3) Implement and test 741 Op-Amp as

a) Inverting amplifier b) Non Inverting amplifier c) Voltage follower (Buffer),

4) Implement and test 741 Operation amplifier as

a) Summing Amplifier b) Difference amplifier c) Scale changer (with two Op Amps)

5. Implement Wave shaping circuits using Op-Amp

a) Implement & test Differentiator and Integrator circuits.

b) Implement & test a Voltage comparator Circuit

6. Implement Wave shaping circuits using Op-Amp as Schmitt trigger and draw characteristics

7. a) Interface op amp output with TTL gates with input amplitude limiting circuit

b) Implement & test Current to Voltage converter using Op amps

8. a) Implement & test Current to Voltage converter and use it to detect photodiode reverse current.

b) Implement & test Voltage to current converter

9. Implement & test a Voltage to current converter that produces a proportionate current in the range of 4mA to 20mA corresponding to input voltages from 0 to 5V

10 implement & test Sine wave Oscillator Circuits using OpAmp CA 3011

a) RC-phase shift oscillator

b) Wien bridge oscillator

State Board of Technical Education and Training, Telangana

Semester MID-II Examination Model Question paper

DEIE IV semester practical Examination

Corse Code: 18EI-406P

Duration: 2 hours

Course Name: Linear Integrated Circuits Lab Practice

Max.Marks:20

Instructions to the Candidate:

(i) Answer any One of the following Questions.

(ii) Record the results on a graph sheet if required , and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Implement Op-Amp Relaxation Oscillators

- a) Implement & test Monostable multivibrator circuit and observe output waveforms on CRO
- b) Implement & test Astable multivibrator observe output waveforms on CRO

2 Verify different modes of 555 IC.

- a) Implement Monostable multi vibrator and observe output waveforms on CRO
- b) Implement Astable multivibrator and observe output waveforms on CRO

3) Verify functions of 565 Phase Locked loop IC

- A) Implement 565 Phase locked loop circuit and determine VCO free running frequency Lock range , Capture Range Practically and observe output waveforms on CRO
- b) Implement Frequency demodulator using 565 and observe output waveform on CRO.

4) Use 566 as a square and Triangular wave generator

- a) Implement waveform /Function generator using 566.
- b) Produce Frequency modulation using 566 and observe output waveform on CRO.

5) Verify the features of Tone Decoder IC 567 IC

- a) Implement 10 KHz signal detector and test
- b) Implement frequency Doubler and test.

State Board of Technical Education and Training, Telangana

Semester End Examination Model Question paper

DEIE IV semester practical Examination

Corse Code: 18EI-406P

Duration: 3 hours

Course Name: Linear Integrated Circuits Lab Practice

Max.Marks:60

Instructions to the Candidate:

(i) Answer any One of the following Questions.

(ii) Record the results on a graph sheet if required , and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration ,choose appropriate values when not mentioned in the question

1. Compare the features of Operational amplifier 741 and Quad Op amp LM 324 and comparator LM 339 ICs

2. Construct the circuit to determine the CMRR and Slew Rate of the OP-AMP and measure.

3) Implement and test 741 Op Amp as

a) Inverting amplifier b) Non Inverting amplifier c) Voltage follower (Buffer),

4) Implement and test 741 Operation amplifier as

a) Summing Amplifier b) Difference amplifier c) Scale changer (with two Op Amps)

5. Implement Wave shaping circuits using Op-Amp

a) Implement & test Differentiator and Integrator circuits.

b) Implement & test a Voltage comparator Circuit

6. Implement Wave shaping circuits using Op-Amp as Schmitt trigger and draw characteristics

7. a) Interface op amp output with TTL gates with input amplitude limiting circuit

b) Implement & test Current to Voltage converter using Op amps

8. a) Implement & test Current to Voltage converter and use it to detect photodiode reverse current.

b) Implement & test Voltage to current converter

9. Implement & test a Voltage to current converter that produces a proportionate current in the range of 4mA to 20mA corresponding to input voltages from 0 to 5V

10 implement & test Sine wave Oscillator Circuits using Op-Amp CA 3011

- a) RC-phase shift oscillator
- b) Wien bridge oscillator

11. Implement Op-Amp Relaxation Oscillators

- a) Implement & test Monostable multivibrator circuit and observe output waveforms on CRO
- b) Implement & test Astable multivibrator observe output waveforms on CRO

12 Verify different modes of 555 IC.

- a) Implement Monostable multi vibrator and observe output waveforms on CRO
- b) Implement Astable multivibrator and observe output waveforms on CRO

13) Verify functions of 565 Phase Locked loop IC

- A) Implement 565 Phase locked loop circuit and determine VCO free running frequency Lock range , Capture Range Practically and observe output waveforms on CRO
- b) Implement Frequency demodulator using 565 and observe output waveform on CRO.

14) Use 566 as a square and Triangular wave generator

- a) Implement waveform /Function generator using 566.
- b) Produce Frequency modulation using 566 and observe output waveform on CRO.

15) Verify the features of Tone Decoder IC 567 IC

- a) Implement 10 KHz signal detector and test
- b) Implement frequency Doubler and test.

Department of Technical Education

State Board of Technical Education & Training (TS)

Course Title	Industrial Instrumentation lab Practice	Course Code	18EI-407P
Semester	IV Semester	Course Group	Practical
Teaching Scheme in Periods(L:T:P)	15:0:30	Credits	1.5
Methodology	Lecture+ Assignments	Total Contact Periods	45Periods
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of Instrumentation.

Course Outcomes

Upon completion of the course the student shall be able to

CO1	Able to handle AC & DC Tachometers.
CO2	Identify and measure the Density and Viscosity of different samples.
CO3	Can measure Humidity and detect different parameters.
CO4	Analyze and observe the response of various fluids by pH and Conductivity meters.

Course Content and Blue Print

Unit No	Unit Name	Periods
1	AC & DC Tachometers	10
2	Densitometer & Viscometer	10
3	Hygrometer, Smoke sensor , Audio sensor & leak detectors	15
4	Measurement of pH & Conductivity	10
Total		45

Course Contents

UNIT-1AC & DC Tachometers (Able to handle AC & DC Tachometers).

1. Conduct an experiment to measure angular velocity using AC Tacho generator.
 - a) Identify the Tacho generator
 - b) Connect to a rotating device
 - c) Measure the speed of a rotating device
2. Conduct an experiment to measure angular velocity using DC Tacho generator.
 - a) Identify the Tacho generator
 - b) Connect to a rotating device
 - c) Measure the speed of a rotating device

UNIT-2 Densitometers & Viscometers. (Identify and measure the Density and Viscosity of Different samples)

1. Viscosity measurement using falling Ball viscometer
 - a) Identify different Viscometers
 - b) Measure the viscosity of the given sample
2. To measure the Density of a given sample.
 - a) Identify different Densitometers
 - b) Measure the Density of the sample

UNIT-3 Hygrometer, Smoke sensor, Audio sensor & leak detectors. (Can measure Humidity and Detect different parameters).

1. Conduct an experiment to measure Relative Humidity using Hygrometer
 - a) Identifying different Hygrometers. Place the meter in the environment where the humidity Measurement is to be measured

- b) Observe the Changing humidity
- 2. Study of smoke sensor characteristics
 - a) Identify different Smoke sensors
 - b) Study the characteristics
- 3. Study of leak detector and its procedures
 - a) Identify different Leak detectors
 - b) Study the characteristics
- 4. Study of Audio sensor characteristics
 - a) Identify different Audio sensors
 - b) Study the characteristics

UNIT-4 Measurement of pH & Conductivity (Analyze and observe the response of various fluids by pH and Conductivity)

- 1. Conduct an experiment to measure pH of the given sample using Analog pH Meter
 - a) Identify the pH meter & Place it in the solution
 - b) Measure the pH of the given sample
- 2. Conduct an experiment to measure pH of the given sample using Digital pH Meter
 - a) Identify the pH meter & Place it in the solution
 - b) Measure the pH of the given sample
- 3. Conduct an experiment to measure conductivity of the given sample
 - a) Place the conductivity meter in the Sample solution
 - b) Measure the Conductivity of a given solution

Reference Books

- 1. Instrumentation Devices & Systems – Rangan , Mani & Sharma
- 2. Transducers & Instrumentation - D V S Murthy
- 3. Introduction to Measurements & instrumentation – Arun K Ghosh
- 4. Electrical & Electronic Measurements – A K Sahney
- 5. Instrumentation handbook – Liptak

Suggested E-Learning references

- 1. www.nptel.ac.in

Suggested Student Activities

1. Do Market survey on List of Electronic components available in the market and collect the following information like name of the electronic component, specifications, Price etc. The student should submit a handwritten report. Documents have to be maintained as a record.
2. Take Quiz tests / assignments in Semiconductor device experiments. Documents have to be maintained as a record.
3. Do power point presentations on Speed, Density, Viscosity, pH, Conductivity, Hygrometer, and Sensors & Detectors. Documents have to be maintained as a record.

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	2		2							2	1,3,10
CO2	2	2								2	1,2,10
CO3	2	2	2				2			2	1,2,3,7,10
CO4	2		2	2				2		2	1,3,4,8,10

Internal Evaluation

Test	Units	Marks
Mid Sem 1	1, 2	20
Mid Sem 2	3,4	20
Internal Evaluation	Attendance (5) Attitude of students towards practicing experiments(10) Prompt submission of records in time (5)	20
	Total	60

State Board of Technical Education and Training, Telangana
Model Question paper
DEI IV semester Mid Semester-I Examination

Corse Code: 18EI-407P

Course Name: Industrial Instrumentation lab Practice

Duration:1 hour

Max.Marks:20

Instructions to the Candidate:

(i) Answer any One of the following Questions. 1x20=20

(ii) Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Conduct an experiment to measure angular velocity using AC Tacho generator.
 - a) Identify Tacho generator
 - b) Connect to a rotating device
 - c) Measure the speed of a rotating device
2. Conduct an experiment to measure angular velocity using DC Tacho generator.
 - a) Identify Tacho generator
 - b) Connect to a rotating device
 - c) Measure the speed of a rotating device
3. Viscosity measurement using falling Ball viscometer
 - a) Identify different Viscometers
 - b) Measure the viscosity
4. To measure the Density of a given sample.
 - a) Identify different Densitometers
 - b) Measure the Density

State Board of Technical Education and Training, Telangana
Model Question paper
DEI IV semester Mid Semester-II Examination

Corse Code: 18EI-407P

Course Name: Industrial Instrumentation lab Practice

Duration: 1 hour

Max.Marks:20

Instructions to the Candidate:

(i) Answer any One of the following Questions.

1x20=20

(ii) Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Conduct an experiment to measure Relative Humidity using Hygrometer
 - a) Identifying different Hygrometers Place it in where the humidity measurement is required
 - b) Observe the Changing humidity
2. Study of smoke sensor characteristics
 - a) Identify different Smoke sensors
 - b) Study the characteristics
3. Study of leak detector and its procedures
 - a) Identify different Leak detectors
 - b) Study the characteristics
4. Study of Audio sensor characteristics
 - a) Identify different Audio sensors
 - b) Study the characteristics
5. Conduct an experiment to measure PH of the given sample using Analog PH Meter
 - a) Identify the PH meter & Place it in the solution
 - b) Measure the PH
6. Conduct an experiment to measure PH of the given sample using Digital PH Meter
 - a) Identify the PH meter & Place it in the solution
 - b) Measure the PH
7. Conduct an experiment to measure conductivity of the given sample
 - a) Place the conductivity meter in the Sample solution
 - b) Measure the Conductivity of a given solution.

State Board of Technical Education and Training, Telangana
Model Question paper
DEI IV Semester
Semester End Examination

Corse Code: 18EI-407P
Course Name: Industrial Instrumentation lab Practice

Duration: 2 hours
Max.Marks:40

Instructions to the Candidate:

(i) Answer any One of the following Questions.

1x40=40

(ii) Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Conduct an experiment to measure angular velocity using AC Tacho generator.
 - a) Identify Tacho generator
 - b) Connect to a rotating device
 - c) Measure the speed of a rotating device
2. Conduct an experiment to measure angular velocity using DC Tacho generator.
 - a) Identify Tacho generator
 - b) Connect to a rotating device
 - c) Measure the speed of a rotating device
3. Viscosity measurement using falling Ball viscometer
 - a) Identify different Viscometers
 - b) Measure the viscosity
4. To measure the Density of a given sample.
 - a) Identify different Densitometers
 - b) Measure the Density
5. Conduct an experiment to measure Relative Humidity using Hygrometer
 - a) Identifying different Hygrometers Place it in where the humidity measurement is required
 - b) Observe the Changing humidity
6. Study of smoke sensor characteristics
 - a) Identify different Smoke sensors
 - b) Study the characteristics
7. Study of leak detector and its procedures
 - a) Identify different Leak detectors
 - b) Study the characteristics
8. Study of Audio sensor characteristics

- a) Identify different Audio sensors
 - b) Study the characteristics
9. Conduct an experiment to measure PH of the given sample using Analog PH Meter
- a) Identify the PH meter & Place it in the solution
 - b) Measure the PH
10. Conduct an experiment to measure PH of the given sample using Digital PH Meter
- a) Identify the PH meter & Place it in the solution
 - b) Measure the PH
11. Conduct an experiment to measure conductivity of the given sample
- a) Place the conductivity meter in the Sample solution
 - b) Measure the Conductivity of a given solution

Microcontroller Programming lab Practice

Course Title :	Microcontroller Programming lab Practice	Course Code	18EI-408P
Semester	IV	Course Group	:Core
Teaching Scheme in Periods(L:T:P)	15:0:30	Credits	: 1.5
Methodology	Lecture + Practical	Total Contact Periods :	:45
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic skills of Handling digital circuits and computer.

Course Content and Blue Print of Marks for SEE

Unit No	Unit name	Periods	Marks for SEE			Marks weightage	%Weightage
			Handling	Manipulation	Precision		
1	Programs related to data transfer instructions	12	8	2	0	10	25
2	Programs related to arithmetic and logical group	15	0	12	0	10	30
3	Application programs	15	2	2	4	15	20
4	Implement Delays and Timers	3	2	4	4	5	25
	Total	45	12	20	8	40	100

Note: To assess all skill levels, sub experiments may be given

Course outcomes

On successful completion of the course, the students will be able to attain below Course Outcome

Course Outcome	
CO1	Execute programs for data manipulation.
CO2	Execute programs to perform and arithmetic and logical functions.
CO3	Write and execute programs to meet a requirement..
CO4	Implement time delays by writing programs.

Course Contents

I. Programs related to data transfer instructions.

- Write an assembly language program (ALP) to move the data from one register to another.
- Write an ALP to move the data from internal RAM one location to another.
- Write an ALP to move the data from external RAM one location to another.
- Write an ALP to move the data from external RAM internal RAM and vice versa.
- Write an ALP to exchange the data between two registers.
- Write an ALP to exchange the data between two i-RAM locations.
- Write an ALP to exchange the data between two i-RAM locations.

II. Programs related to arithmetic and logical group

1. Programs on arithmetic instructions.

- Write an ALP to add two binary numbers in i-RAM location.
- Write an ALP to add two binary numbers in OFF chip-RAM location.
- Write an ALP to add two decimal numbers in OFF chip-RAM location.
- Write an ALP to add two decimal numbers in OFF chip-RAM location and store the carry in any reg.
- Write an ALP to add two 16-bit binary numbers in i-RAM location.
- Write an ALP to subtract two binary numbers in registers and store the diff. In i-RAM.
- Write an ALP to multiply two binary numbers.
- Write an ALP to divide two binary numbers.

2. Programs on logical instructions.

- Write an ALP to mask the higher order nibble.
- Write an ALP to mask the lower order nibble.
- Write an ALP to mask any one bit only of the binary number.
- Write an ALP to rotate a number left twice with carry set.
- Write an ALP to rotate a number right twice with carry reset.

- f. Write an ALP to find the 1's complement of a given number.
- g. Write an ALP to find the 2's complement of a given number.

III. Programs to perform function on block data using counters and conditions.

- a. Write an ALP to transfer a block of data from internal RAM to external RAM with overlap.
- b. Write an ALP to transfer a block of data from external RAM to internal RAM without overlap.
- c. Write an ALP to add block of data present in internal RAM. Store the sum and carry in registers.
- d. Write an ALP to add block of decimal numbers present in internal RAM. Store the sum and carry in registers.
- e. Write an ALP to test if a given number is present in the block of data.
- f. Write an ALP to identify the even numbers from a block of given data.
- g. Write an ALP to identify the odd numbers from a block of given data.
- h. Write an ALP to find the largest number from a block of data.
- i. Write an ALP to find the smallest number from a block of data.
- j. Write an ALP to arrange a block of data in ascending order.
- k. Write an ALP to arrange a block of data in descending order.

IV. Programs to Counters, Timers and delays.

- a. Implement a HEX up/down counter - (Program should check value @R0=0X30, if 0X30=0 then up counter else down counter)
- b. Implement BCD(00-99) up/down counter - (Program should check value @R0=0X30, if 0X30=0 then up counter else down counter)
- c. Write a program in assembly language to produce required time delay a) by Using instructions only b) by Using Timers
- d. Write a program in assembly language to verify Logical or Delay loop using Call and return instructions

Department of Technical Education
State Board of Technical Education & Training (TS)

Course Title :	Process Control Lab Practice	Course Code	18EI-409P
Semester	IV	Course Group	:Practical
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	: 1.5
Methodology	Lecture + Practicals	Total Periods :	:45 periods
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of temperature, flow, level, pressure controllers and I to P & P to I converters.

Course Outcomes

CO1 :	Analyze and Evaluate the Temperature control using P ,PI,PID & EPID Controller
CO2 :	Analyze and Evaluate the Flow control using P ,PI & PID Controller
CO3 :	Analyze , Observe and Record the Level control using P ,PI & PID Controller and closed loop level control characteristics
CO4 :	Analyze , Observe and Record the Pressure control using P ,PI & PID Controller and open & closed loop level control characteristics
CO5 :	Analyze , Observe and Record the I to P, P to I converters performance characteristics

Course Content and Blue Print

Unit No	Unit name	Periods
1.	Temperature controller	12
2.	Flow controller	8
3.	Level controller	8
4	Pressure controller	11
5	I to P, P to I converters	6
		45

Course Contents

1. Temperature controller

Duration: 12Periods(L:3– P:9)

Conduct an experiment:

- To control Temperature using P & PI
- To control Temperature using PID.
- To control Temperature in P& PI mode using EPID
- To control Temperature in PID mode using EPID

2. Flow Controller

Duration: 8Periods(L:2– P:6)

Conduct an experiment:

- To control Flow using P & PI
- To control Flow using PID

3. Level controller

Duration: 8Periods(L:2– P:6)

Conduct an experiment:

- To control Level using P&PI
- To control Level using PID.
- To draw the performance characteristics of Closed loop Level control

4. Pressure controller

Duration: 11Periods(L:2– P:9)

Conduct an experiment:

- a) To control Pressure using P& PI
- b) To control Pressure using PID.
- c) To draw the performance characteristics of Open loop Pressure Control
- d) To draw the performance characteristics of Closed loop Pressure control

5. I to P, P to I Converters

Duration: 6Periods(L:2– P:4)

Conduct an experiment:

- a) To plot the performance characteristics of I / P converter
- b) To plot the performance characteristics of P/I converter.

Recommended Books

8. Automatic process control by Donald.P.Eckmann
9. Instrument Engineers Hand book by Liptak, Volume II
10. Instrument Technology by B.E.Jones, Volume I, II, III
11. Process Analysis & Control by Coughnour.
12. Process control instrumentation technology by Curtis .D.Johnson Seventh edition

Suggested Student Activities

1. Student inspects the available equipment in the Lab to identify the components
2. Visit nearby Industry to familiarize with automation using PLC/SCADA ex: Power stations, Cement, paper, Chemical Industries

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	2	2	2	2				2		2	1,2,3,4,8,10
CO2	2	2	2	2				2		2	1,2,3,4,8,10
CO3	2	2	2	2				2		2	1,2,3,4,8,10
CO4	2	2	2	2				2		2	1,2,3,4,8,10
CO5	2	2	2	2				2		2	1,2,3,4,8,10

Internal Evaluation

Test	Units	Marks
Mid Sem 1	1, 2 and 3	20
Mid Sem 2	4,5	20
Internal Evaluation	Attendance (5) Attitude of students towards practicing experiments (10) Prompt submission of records in time (5)	20
	Total	60

State Board of Technical Education and Training, Telangana

Semester Mid-1 Examination Model Question paper

DEIE IV Semester Practical Examination

Course Code: 18EI-409P

Duration: 1hour

Course Name: Process Control Lab Practice

Max.Marks:20

Instructions to the Candidate:

(i) Answer any One of the following Questions.

(ii) Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Conduct an experiment to Control the Temperature using P & PI controller
2. Conduct an experiment to Control Temperature using PID controller.
3. Conduct an experiment to Control Temperature in P& PI mode using EPID controller
4. Conduct an experiment to Control Temperature in PID mode using EPID controller
5. Conduct an experiment to Control Flow using P & PI controller

State Board of Technical Education and Training, Telangana
Semester Mid-2 Examination Model Question paper
DEIE IV Semester Practical Examination

Course Code: 18EI-409P

Course Name: Process Control Lab Practice

Duration: 1.5 hours

Max.Marks: 20

Instructions to the Candidate:

(i) Answer any One of the following Questions.

(ii) Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Conduct an experiment to Control Flow using PID controller
2. Conduct an experiment to Control Level using P&PI controller
3. Conduct an experiment to Control Level using PID controller
4. Draw the performance characteristics of Closed loop Level control controller
5. Conduct an experiment to Control Pressure using P& PI controller

State Board of Technical Education and Training, Telangana

Semester End Examination Model Question paper

DEIE IV Semester Practical Examination

Course Code: 18EI-409P

Duration:3 hours

Course Name: Process Control Lab Practice

Max.Marks:40

Instructions to the Candidate:

(i)Answer any One of the following Questions.

(ii)Record the results on a graph sheet if required, and conclude your observation of the experiment

(iii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Conduct an experiment to Control the Temperature using P & PI controller
2. Conduct an experiment to Control Temperature using PID controller.
3. Conduct an experiment to Control Temperature in P& PI mode using EPID controller
4. Conduct an experiment to Control Temperature in PID mode using EPID controller
5. Conduct an experiment to Control Flow using P & PI controller
6. Conduct an experiment to Control Flow using PID controller
7. Conduct an experiment to Control Level using P&PI controller
8. Conduct an experiment to Control Level using PID controller
9. Draw the performance characteristics of Closed loop Level control controller
10. Conduct an experiment to Control Pressure using P& PI controller
11. Conduct an experiment to Control Pressure using PID controller
12. Draw the performance characteristics of Open loop Pressure Control
13. Draw the performance characteristics of Closed loop Pressure control
14. Plot the performance characteristics of I / P converter
15. Plot the performance characteristics of P / I converter.

Advanced Communication Skills and Life Skills

Course Title	Advanced Communication Skills and Life Skills	Course Code	18 Common 410 P
Semester	IV	Course Group	Foundation
Teaching Scheme in Periods- L:T:P	15:0:30	Credits	1.5
Methodology	Lecture + Practical	Total Contact Hours	45 Periods (3 Periods per Week)
CIE	60 Marks	SEE	40 Marks

Rationale:

This course is designed to impart writing skills and employability skills to the students of diploma which will help them in obtaining and maintaining the employment.

Prerequisites:

This course requires the basic knowledge of vocabulary, grammar and four language learning skills, viz. Listening, Speaking, Reading and Writing.

Course Outcomes:

Modules	At the end of the course the students will have the ability to:
Presentation Skills	Prepare a presentation. Use presentation aids effectively. Develop public speaking skills. Learn to make PowerPoint Presentations effectively. Present a Paper using appropriate body language.
	Learn kinds of reports.

Writing Reports	Learn the format of a report. Organize ideas. Develop essential vocabulary useful to write scientific and technical reports.
Interview Skills	Learn the techniques to face an interview. Learn the etiquette to communicate with employers. Learn the dos and don'ts of an interview. Learn the frequently asked questions in interviews. Use appropriate body language. Learn to face interviews telephonically. Gain the confidence to face an interview by attending mock interview.
Group Discussion	Learn the dos and don'ts of a Group Discussion. Participate in a Group Discussion in a healthy manner. Use effective non-verbal communication. Use appropriate phrases and expressions useful in a group discussion.
	Learn workplace etiquette. Identify the knowledge, skills and attributes useful at workplace.

Workplace Awareness	Build strong workplace relationships. Learn professional ethics. Understand gender equality at the workplace Develop a sense of responsibility towards the society.
Writing Skills Useful at Workplace	Learn various writing formats useful at workplace. Develop an ability to apply technical information in documentation. Revise and edit written documents effectively. Develop corresponding skills - learn the kinds of business letters - the format of a business letter. Learn effective e-mail writing skills. Learn Business Memos. Learn Notes and Narratives. Learn Forms and Applications. Prepare templates for different purposes. Prepare an agenda of a meeting. Prepare the minutes of a meeting. Prepare Notices / Circulars for various purposes. Prepare Press release.

CO-PO Matrix

	Course Outcome		Linked PO
CO 1	Making effective presentations	R/U/A	1, 2, 3,4, 5,6,7,8,9,10
CO 2	Writing scientific and technical reports	R/U/A	1,2,3,4, 5,6,7,8,9,10
CO 3	Learn to face oral and telephonic interviews	R/U/A	1,2,3,4, 7,9,
CO 4	Learn to face group discussion	R/U/A	1,2,3,7,8,9
CO 5	Learn to write various formats useful at workplace	R/U/A	1,2,3,5,7,8,9,10
CO6	Learn workplace etiquette and ethics	R/U/A	1,2,3,7,8,9,10

Course Contents:

I. Presentation Skills periods	Duration: 6
II. Writing Reports periods	Duration: 9
III. Interview Skills periods	Duration: 9
IV. Group Discussion periods	Duration: 6
V. Workplace Awareness periods	Duration: 6
VI. Writing Skills Useful at Workplace periods	Duration: 9

Suggested Student Activities:

- Paper Presentations
- Seminars
- Mock Interviews

- Telephonic Interviews
- Group Discussions
- Role Plays
- Creating advertisements
- Five-minute activities
- Creating a model of workplace

Evaluation Pattern:

I. Continuous Internal Examination: 60 Marks

- | | |
|---|---|
| <p>a. Mid Sem - I</p> <p>Syllabus:</p> <ul style="list-style-type: none"> i. Presentation Skills ii. Writing Reports | <p>20 marks</p> |
| <p>b. Mid – II:</p> <p>Syllabus:</p> <ul style="list-style-type: none"> i. Interview Skills ii. Group Discussion | <p>20 Marks</p> |
| <p>c. Internal assessment:</p> <ul style="list-style-type: none"> i. Seminars: ii. Assignments: iii. Lab record submission: | <p>20 marks</p> <p>10 marks</p> <p>5 marks</p> <p>5 marks</p> |

II. Semester End Examination : 40 Marks

- | | |
|---|----------|
| a. Write an essay on a given topic or participate in an activity: | 15 Marks |
| b. Interview or Group Discussion: | 15 Marks |
| c. <i>Viva Voce</i> | 10 marks |

References:

- Adair, John. *Effective Communication*. London: Pan Macmillan Ltd., 2003.
- Ajmani, J. C. *Good English: Getting it Right*. New Delhi: Rupa Publications, 2012.
- Amos, Julie-Ann. *Handling Tough Job Interviews*. Mumbai: Jaico Publishing, 2004.
- Collins, Patrick. *Speak with Power and Confidence*. New York: Sterling, 2009.
- Fensterheim, Herbert and Jean Baer. *Don't Say Yes When You Want To Say No*. New York: D
- Raman, Meenakshi & Sangeeta Sharma. *Technical Communication: Principles and Practice*. Second Edition. New Delhi: Oxford University Press, 2011

E-Learning Resources:

- <http://www.dailywritingtips.com/>
- <http://www.englishdaily626.com/c-errors.php>
- <http://www.owl.net.rice.edu/~cainproj/>
- <http://www.thehumorsource.com/>
- <http://www.indiabix.com/group-discussion/topics-with-answers/>
- <http://networketiquette.net/>
- <https://public.wsu.edu/~brians/errors>
- <http://www.bbc.co.uk/worldservice/learningenglish/radio/specials/15>

BOARD DIPLOMA EXAMINATION (C-18)
FOURTH SEMESTER COMMON-410P
ADVANCED COMMUNICATION SKILLS AND LIFE SKILLS

MID SEM - I

Time : 1 Hour

Total Marks: 20 Marks

Part – A

10 marks

Instruction: Answer any one of the following questions.

1. Write the guidelines for preparing a PowerPoint presentation.
2. How do you prepare yourself for presenting a technical paper?
3. Mention a few presentation aids and how do you use them effectively?

Part – B

10 marks

Instruction: Answer any one of the following questions.

4. Write the format of a report and describe it.
5. Write a report on the accident you have seen recently.
6. Give the outline of a project report and describe it.

BOARD DIPLOMA EXAMINATION (C-18)
FOURTH SEMESTER COMMON-410P
ADVANCED COMMUNICATION SKILLS AND LIFE SKILLS

MID SEM - II

Time : 1 Hour

Total Marks: 20 Marks

Part – A

10 marks

Instruction: Answer any one of the following questions.

1. What are the dos and don'ts for a formal interview?
2. What at least ten frequently asked questions in a formal interview?
3. How do you prepare for a telephonic interview?

Part – B

10 marks

Instruction: Answer any one of the following questions.

4. What are the dos and don'ts of a group discussion?
5. Mention some phrases and expressions commonly used in a group discussion.
6. Write a short paragraph on the steps you take while participating in a group discussion.

BOARD DIPLOMA EXAMINATION (C-18)
FOURTH SEMESTER 18 COMMON-410P
ADVANCED COMMUNICATION SKILLS AND LIFE SKILLS
SEMESTER END EXAM

Time : 3 Hours

Total Marks: 40 Marks

Part – A

10 marks

Instruction: Pick any one question from the given lot.

1. Prepare the outline of a project report and describe it.
2. Write the guidelines for preparing the slides of a PowerPoint presentation.
3. Write the minutes of the meeting conducted at the Principal's chamber to conduct the annual day celebrations. Prepare the agenda of the annual day celebrations.
4. Describe the workplace etiquette.
5. Prepare a press note for the '*Job Mela*' which is going to be conducted at your institute.

Part – B

15 marks

6. Interview / Group Discussion

Part – C

15 marks

7. *Viva Voce*

STUDENT ACTIVITY SHEET FOR SKILL UP GRADATION

The activity should be graded as

Excellent: 5 Marks, Good: 4 Marks, Satisfactory: 3 Marks, Needs improvement: 2 Marks, Unsatisfactory: 1 Mark

Note:

(1) Along with every activity the rubrics table should be given to the student for his information about the criterion of assessment.

(2) As a record of the activity at least Rubric sheet for each student For every activity at least Rubric sheet for each student as be preserved as a document.

RUBRICS MODEL – Group activity like Mini Project

RUBRICS FOR ACTIVITY(5 Marks)						
Dimension	Unsatisfactory <u>1</u>	Developing <u>2</u>	Satisfactory <u>3</u>	Good <u>4</u>	Excellent <u>5</u>	Student Score
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collect much information; but very limited relate to the topic	Collects some basic information; most refer to the topic	Collects a great deal of information; all refer to the topic	Ex: 4
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties but Unreliable.	Performs very little duties	Performs nearly all duties	Performs all duties of assigned team roles	<u>5</u>
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Normally does the assigned work	Always does the assigned work without having to be reminded	<u>3</u>
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Talks good; but never show interest in listening others	Listens, but sometimes talk too much	Listens and speaks a fair amount	<u>2</u>
Average / Total marks=(4+5+3+2)/4=14/4=3.5=4						

Rubrics assessment for Power point presentations

ELEMENT	Exemplary	Proficient	Partially Proficient	Unsatisfactory	POINTS
Research and Note Taking	3 points	2 points	1 point	0 points	___/3
	Accurately researched a variety of information sources recorded and interpreted significant facts, meaningful graphics, and evaluated alternative points of view.	Recorded relevant information from multiple sources of information evaluated and synthesized relevant information.	Misinterpreted statements, graphics and questions and failed to identify relevant arguments.	Recorded information from four or less resources, did not find graphics and ignored alternative points of view.	
Presentation planning	3 points	2 points	1 point	0 points	___/3
	the slide presentation structure with thumbnail sketches of each slide including: title of slide, text, background color, placement & size of graphic, fonts - color, size, type for text and headings. All slides are numbered, and there is a logical sequence to the	The thumbnail sketches on the topic include titles and text for each slide and are in sequential order.	The thumbnail sketches on the topic are not in a logical sequence and have incomplete information.	There a very few thumbnail sketches on the topic and do not provide an overview of the presentation.	

	presentation.				
Introduction	3 points	2 points	1 point	0 points	___/3
	The introduction presents the overall topic and draws the audience into the presentation with compelling questions or by relating to the audience's interests or goals.	The introduction is clear and coherent and relates to the topic.	The introduction shows some structure but does not create a strong sense of what is to follow. May be overly detailed or incomplete and is somewhat appealing to the audience.	The introduction does not orient the audience to what will follow. The sequencing is unclear and does not appear interesting or relevant to the audience.	
Content	3 points	2 points	1 point	0 points	___/3
	The content is written clearly and concisely with a logical progression of ideas and supporting information. The project includes motivating questions and advanced organizers. The project gives the audience a clear sense of the main idea. Information is accurate, current	The content is written with a logical progression of ideas and supporting information. Includes persuasive information from reliable sources.	The content is vague in conveying a point of view and does not create a strong sense of purpose. Includes some persuasive information with few facts. Some of the information may not seem to fit.	The content lacks a clear point of view and logical sequence of information. Includes little persuasive information and only one or two facts about the topic. Information is incomplete, out of date and/or incorrect.	

	and comes mainly from * primary sources.		Sources used appear unreliable.	Sequencing of ideas is unclear.	
Text	3 points	2 points	1 point	0 points	___/3
	The fonts are easy to read and point size varies appropriately for headings and text. Use of italics, bold, and indentations enhances readability. Text is appropriate in length for the target audience and to the point. The background and colors enhance the readability of text.	Sometimes the fonts are easy to read, but in a few places the use of fonts, italics, bold, long paragraphs, color or busy background detracts and does not enhance readability.	Overall readability is difficult with lengthy paragraphs, too many different fonts, dark or busy background, overuse of bold or lack of appropriate indentations of text.	The text is extremely difficult to read with long blocks of text and small point size of fonts, inappropriate contrasting colors, poor use of headings, subheadings, indentations, or bold formatting.	
Layout	3 points	2 points	1 point	0 points	___/3
	The layout is visually pleasing and contributes to the overall message with appropriate use of headings, subheadings and white space.	The layout uses horizontal and vertical white space appropriately.	The layout shows some structure, but appears cluttered and busy or distracting with large gaps of white space or uses a distracting background.	The layout is cluttered, confusing, and does not use spacing, headings and subheadings to enhance the readability.	

Graphics, and/or Animation	3 points	2 points	1 point	0 points	____/3
	The graphics, and/or animation assist in presenting an overall theme and enhance understanding of concept, ideas and relationships. Original images are created using proper size and resolution, and all images enhance the content. There is a consistent visual theme.	The graphics, /and or animation visually depict material and assist the audience in understanding the flow of information or content. Original images are used. Images are proper size, resolution.	Some of the graphics, , and/or animations seem unrelated to the topic/theme and do not enhance the overall concepts. Most images are clip art or recycled from the internet. Images are too large/small in size. Images are poorly cropped or the color/resolution is fuzzy.	The graphics, , and/or animations are unrelated to the content. Graphics do not enhance understanding of the content, or are distracting decorations that create a busy feeling and detract from the content.	
Writing Skills	3 points	2 points	1 point	0 points	____/3
	The text is written with no errors in grammar, capitalization, punctuation, and spelling.	The text is clearly written with little or no editing required for grammar, punctuation, and spelling.	Spelling, punctuation, and grammar errors distract or impair readability. (three or more errors)	Errors in spelling, capitalization, punctuation, usage and grammar repeatedly distract the reader, and major editing and revision is required.	

				(more than five errors)	
TOTAL POINTS					___ /24

Note: This is only an example. Appropriate rubrics/criteria may be devised by the concerned faculty (Course Coordinator) for assessing the given activity.

Model of rubrics for assessing student activity:

General Scale for scoring student performance in Skill Upgradation (Rubrics)

Type of Skill/Score	Excellent(4)	Good(3)	Satisfactory(2)	Developing(1)
Data/Material Collection	All Data/Material was collected one time independently. Collects a great deals of information, all refer to the topic	All Data/Material was collected more than one time independently. Collects more information, most refer to the topic	All Data/Material was collected several times independently. Collects basic information, most refer to the topic	All Data/Material was collected several times with assistance. Collects very limited information, some relate to topic
Methodology/ Procedure	Procedures were outlined in a step-by-step fashion that could be followed by anyone without additional explanations.	Procedures were outlined in a step-by-step fashion that could be followed by anyone without additional explanations. Expert help was needed to accomplish this.	Procedures were outlined in a step-by-step fashion, but had 1 or 2 gaps that require explanation even after expert feedback.	Procedures that were outlined were incomplete or not sequential, even after expert feedback had been given.
Activity/ Development	Quality of Skill is high.	Skill is mastered to the level of expectation.	Skill is present but with errors and omissions.	Skill needs improvement.
Interpretation/ summary	Student provided a detailed conclusion clearly.	Student provided a somewhat detailed conclusion clearly.	Student provided a conclusion with some reference.	No conclusion was apparent.
Full-fills team roles and duties	Performs all duties of assigned team roles	Performs almost all duties	Performs nearly all duties	Performs very little duties
Shares work equality	Always does the assigned work, without needing reminding	Always does the assigned work, rarely needs reminding	Usually does the assigned work, rarely needs reminding	Rarely does the assigned work, often needs reminding.
Listen to other team mates	Listens and talks a fare amount	Listens and talks a little more than needed	Listens, but sometimes talk too much	Usually does most of the talking, rarely allows others to speak

SKILL UPGRADATION ACTIVITIES

1. Visit the College library and prepare a list of at least 10 text books available in the library with author name and publishing company for each subject of the semester. The student should submit a handwritten report. (POs 8, 9, 10)
2. Do Market survey on List of Various Linear ICs and digital ICs available in the market and collect the information like pin diagrams, specifications, Price etc. The student should submit a handwritten report. Documents have to be maintained as a record. (POs 8, 9)
3. To Study using internet about the applications of various Linear ICs which are useful to the society, design and demonstrate their working. Prepare a detailed report of their working and uses. Documents have to be maintained as a record. (POs 5, 8, 9, 10)
4. To Study using internet about the applications of various Digital ICs which are useful to the society, design and demonstrate their working. Prepare a detailed report of their working and uses. Documents have to be maintained as a record. (POs 5, 8, 9, 10)
5. To Study using internet about the various equipment like Analog Instruments and Digital Instruments available in the Lab and prepare a detailed report of their working and uses. Documents have to be maintained as a record. (POs 8, 9, 10)
6. To Study using internet about the various equipment like Analog Instruments and Digital Instruments available in the Lab and prepare a detailed report of their working and uses. Documents have to be maintained as a record. (POs 8, 9, 10)
7. To Study using internet about various equipment like function generators, CROs and various test instruments available in the Lab and prepare a detailed report of their working and uses. Documents have to be maintained as a record. (POs 8, 9, 10)
8. To Study using internet about transducers like tachometers and tachometers / Speedometers available in the market and how they are calibrated in KMPH / RPM. The student should submit a handwritten report. Documents have to be maintained as a record. (POs 8, 9, 10)
9. To Study using internet about transducers used for measurement of density. The student should submit a handwritten report. Documents have to be maintained as a record. (POs 8, 9, 10)
10. To Study using internet about transducers used for measurement of viscosity. The student should submit a handwritten report. Documents have to be maintained as a record. (POs 8, 9, 10)
11. To Study using internet about transducers used for measurement of humidity. The student should submit a handwritten report. Documents have to be maintained as a record. (POs 8, 9, 10)
12. To Study using internet about various proximity sensors. The student should submit a handwritten report. Documents have to be maintained as a record. (POs 8, 9, 10)

13. To Study using internet about various motion detection sensors. The student should submit a handwritten report. Documents have to be maintained as a record. (POs 8, 9, 10)
14. Analyze the connections in the UPS available in the Institution. Documents have to be maintained as a record. (POs 4, 8, 9)
15. Give Seminars on the topics of the concerned Course as allotted by the staff. Documents have to be maintained as a record. (POs 8, 9)
16. Participate in Quiz in Concerned subjects. Documents have to be maintained as a record.
(POs 8)
17. Write assignments in concerned subjects. Documents have to be maintained as a record.
(POs 8, 9)
18. Prepare a power point presentation with full details about the Electronic components used in the concerned subject experiments. Documents have to be maintained as a record.
(POs 8, 9)
19. Prepare a power point presentation with full details about the Digital ICs used in the concerned subject experiments. Documents have to be maintained as a record.
(POs 8, 9)
20. Visit YouTube or any other sites on current topics in Digital electronics experiments. Listen to the lectures and submit a handwritten report and a soft copy (CD/DVD).
(POs 8, 9, 10)
21. Design a mini project useful to the society based on the topics relevant to electronic circuits and they have to be demonstrated. Student can search 5 min. /10 min. projects in you tube for this purpose. (POs 5, 8, 9, 10)
22. Design a mini project useful to the society based on the topics relevant to Digital electronics and they have to be demonstrated. Student can search 5 min. /10 min. projects in you tube for this purpose. (POs 5, 8, 9, 10)
23. Visit YouTube or any other sites to study the manufacturing of various sensors and transducers like LVDT, RVDT and Potentiometers etc. Submit a handwritten report.
(POs 8, 9, 10)
24. Visit YouTube or any other sites to study the manufacturing of various sensors and transducers like Sight glass, IR sensors, etc. Submit a handwritten report.
(POs 8, 9, 10)
25. Visit YouTube or any other sites to study the manufacturing of various sensors and transducers like Thermo couple, Thermistor, RTD etc. Submit a handwritten report.
(POs 8, 9, 10)
26. Visit YouTube or any other sites to study the manufacturing of various sensors and transducers like Bourdon tubes, Bellows Dead weight tester etc. Submit a handwritten report.
(POs 8, 9, 10)

27. Visit YouTube or any other sites to study the manufacturing of various sensors and transducers like Orifice, Venturi tube, Rota meter, Electromagnetic flow meter etc. Submit a handwritten report. (POs 8, 9, 10)
28. Design a mini project useful to the society based on the topics relevant to sensors and transducers Thermistor, RTD, Float etc. and they have to be demonstrated. Student can search 5 min. / 10 min. projects in you tube for this purpose. (POs 5, 8, 9, 10)
29. Do Market survey on commercially available microcontrollers in the market and collect the following information like name specifications, Price etc. The student should submit a handwritten report. Documents have to be maintained as a record. (POs 8, 9)
29. Give a power point presentation on 8051 Microcontroller architecture and pins description. (POs 8, 9)
30. Visit YouTube or any other sites for Arduino based experiments / mini projects interfacing Sensors/Actuators as per your choice with Arduino and Breadboard.

(POs 8, 9)